May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 1

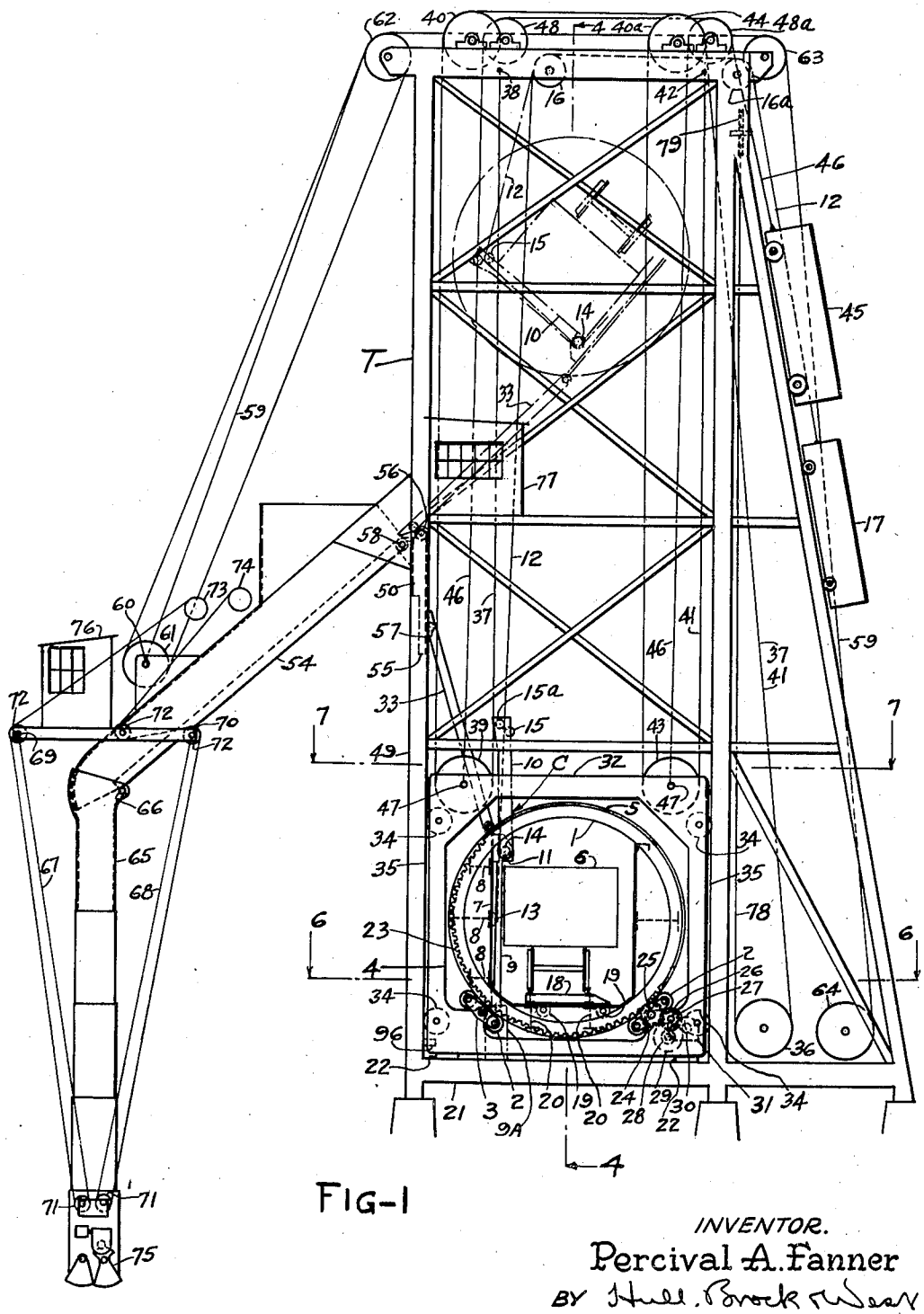


FIG-1

INVENTOR.
Percival A. Fanner
BY Hull, Brock & Dean
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 2

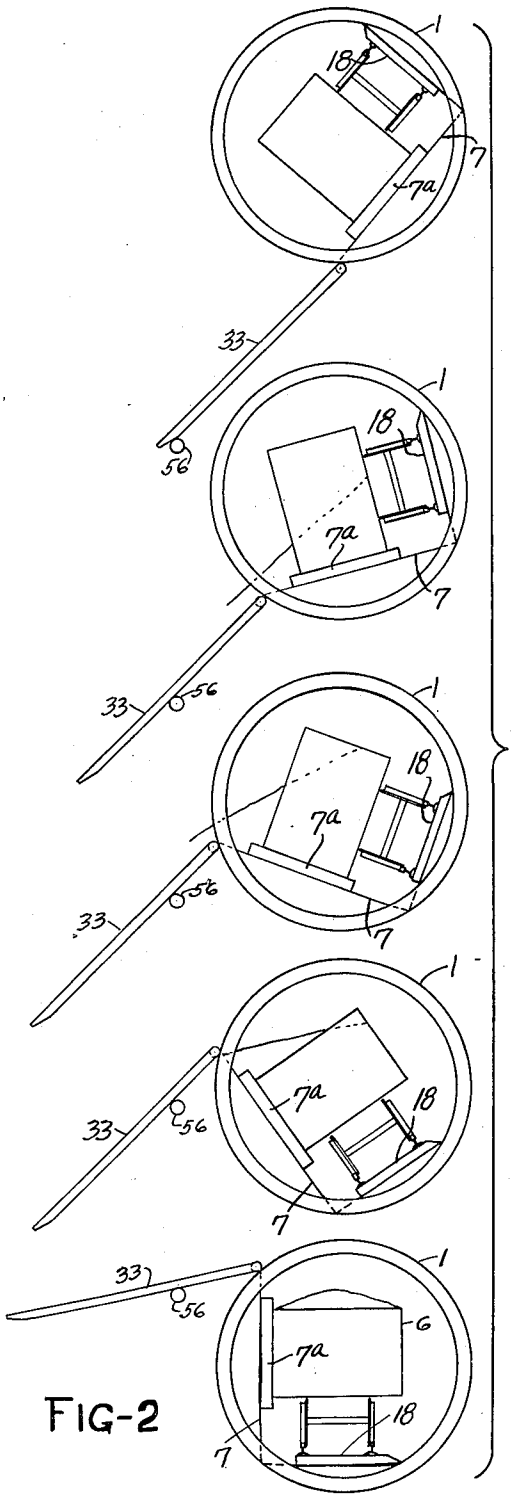


FIG-2

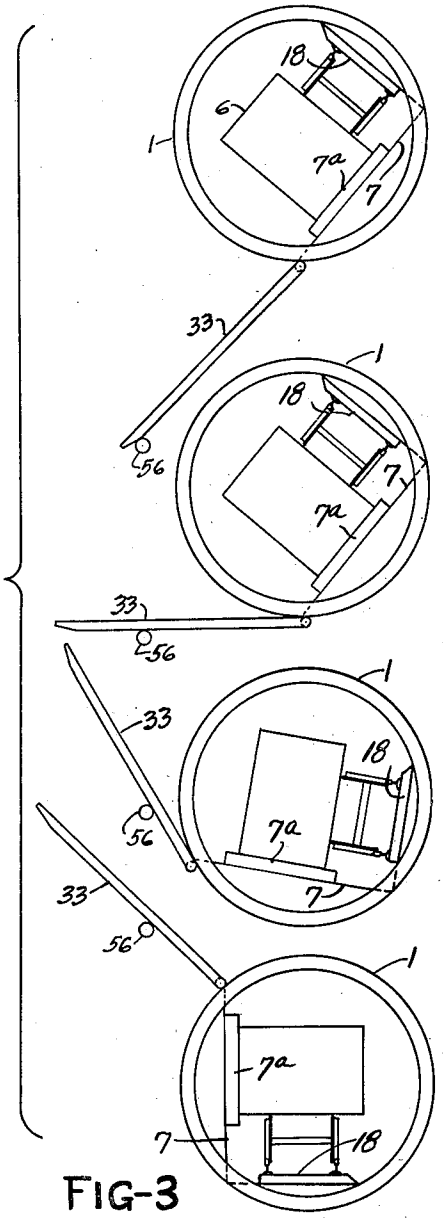


FIG-3

INVENTOR.
Percival A. Fanner
BY Hull, Brock & Webb
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 3

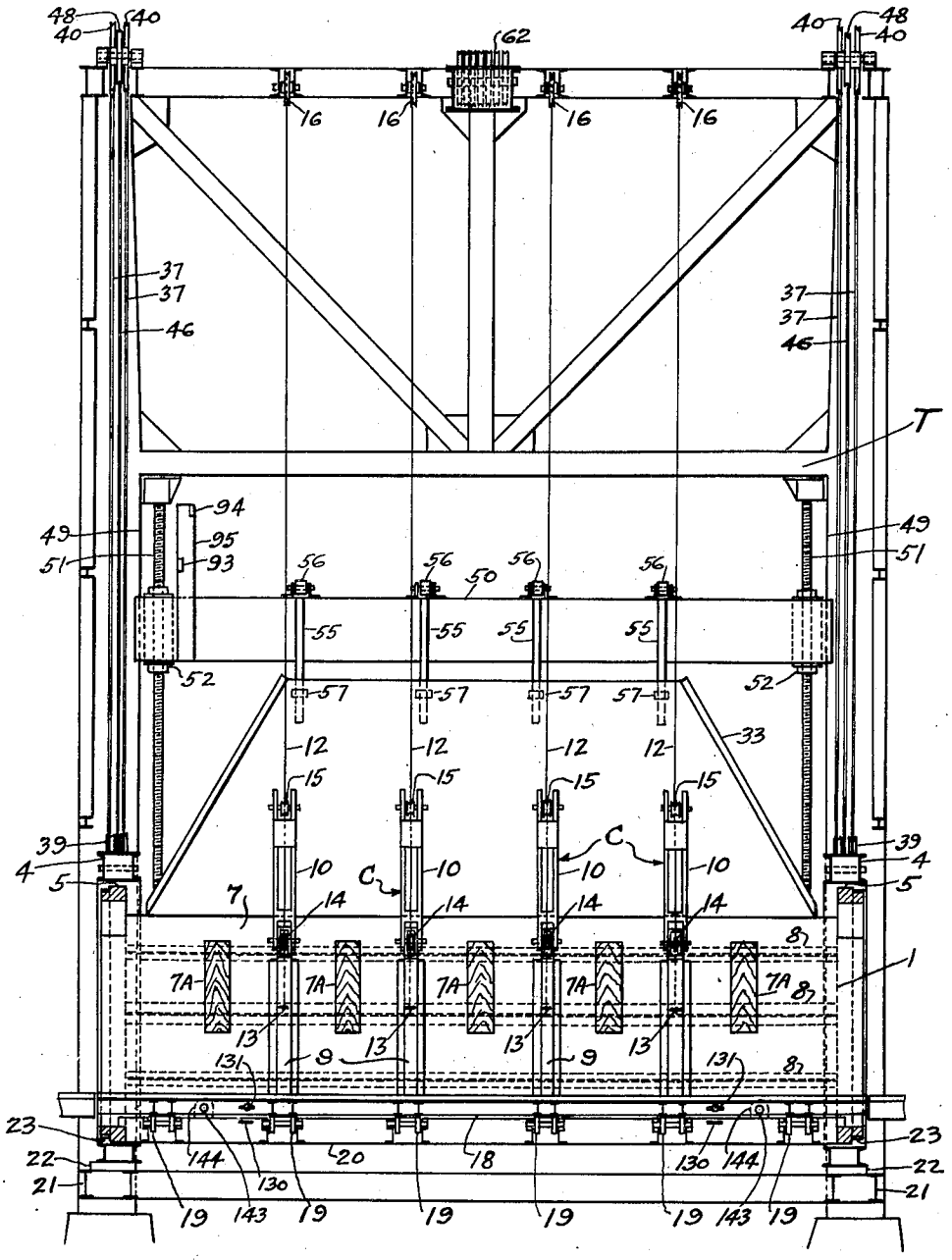


FIG-4

INVENTOR.
Percival A. Fanner
BY Hull, Brock & Webb
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 4

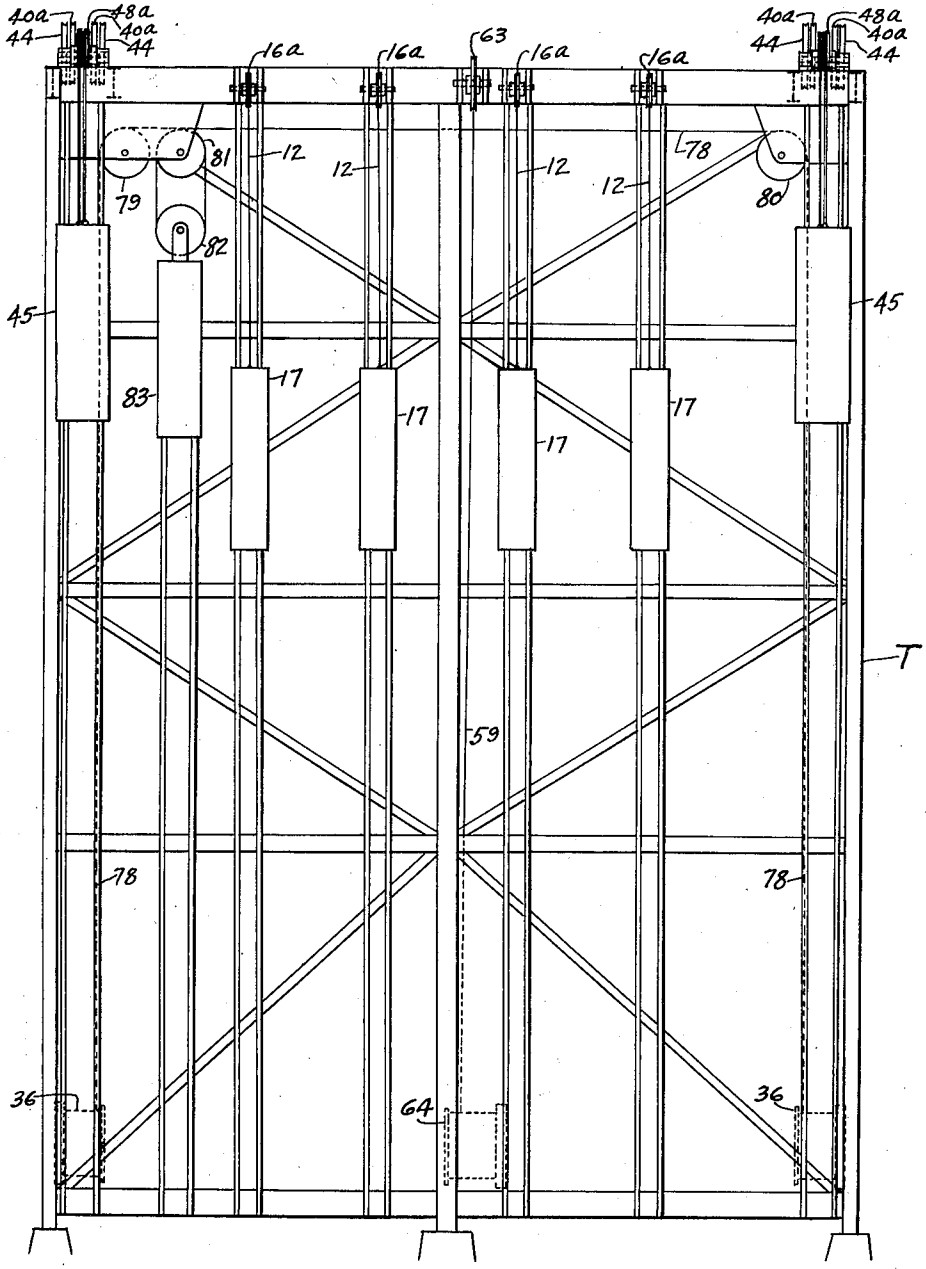


FIG-5

INVENTOR.
Percival A. Fanner
BY Hull, Brock & Wear
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 5

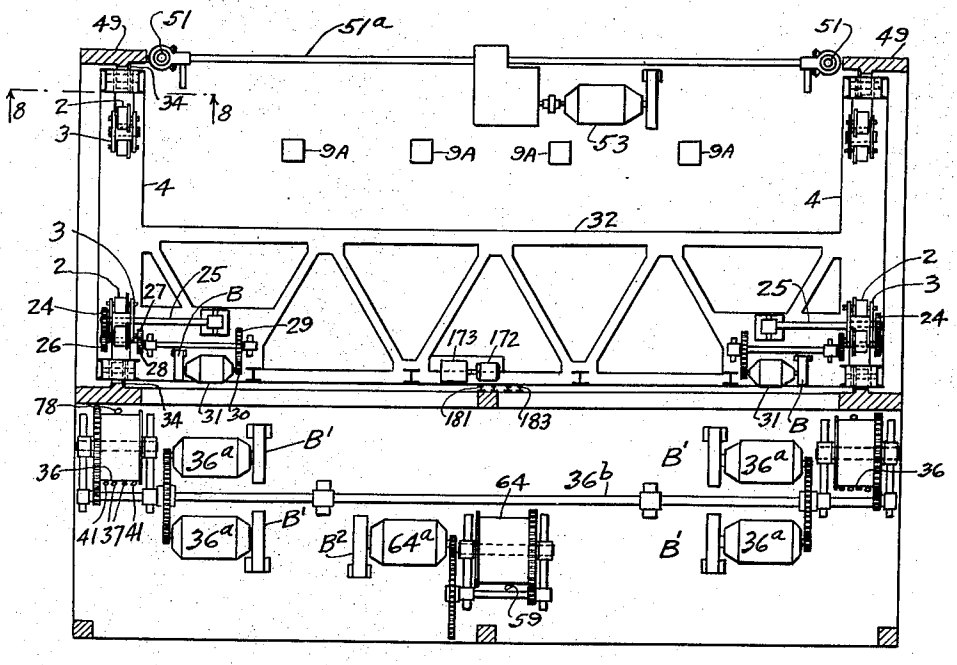


FIG-6

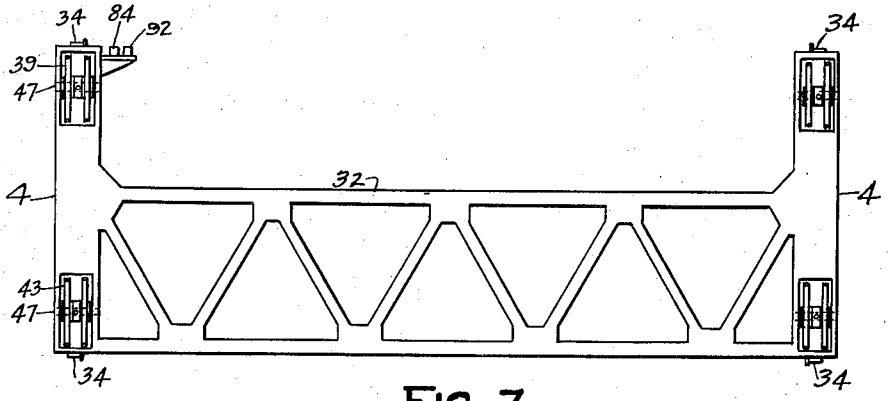


FIG-7

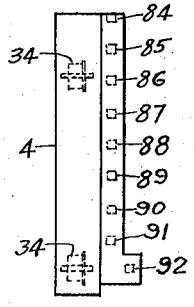


FIG-8

INVENTOR.
Percival A. Fanner
BY Hull, Brock & West
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 6

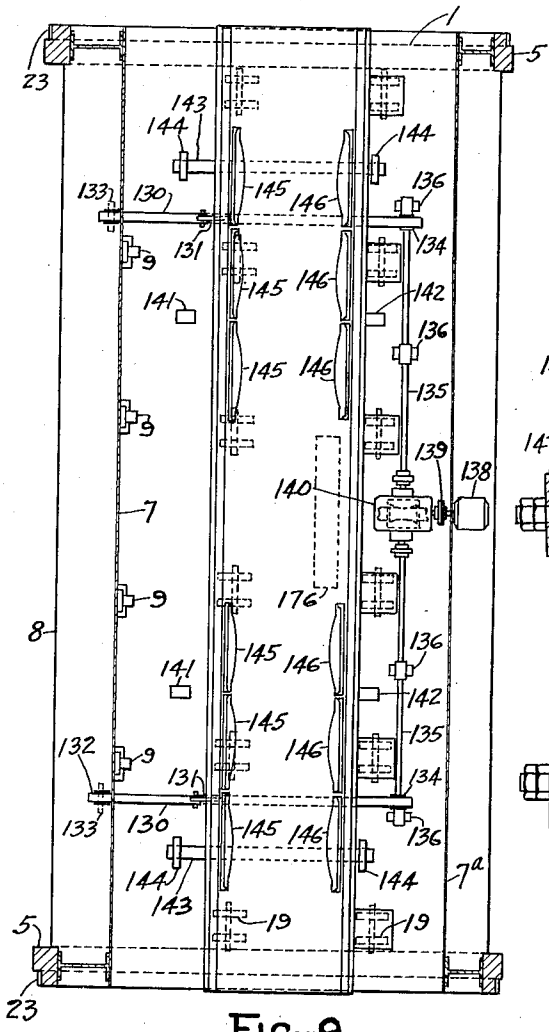


FIG-9

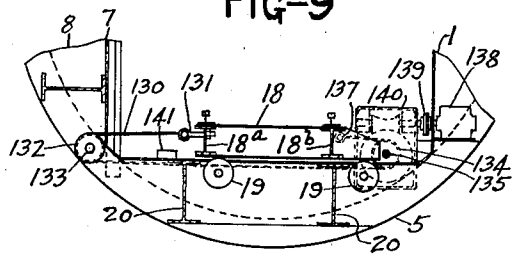


FIG-10

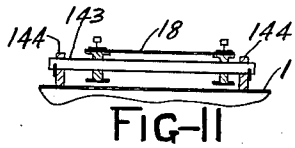


FIG-11

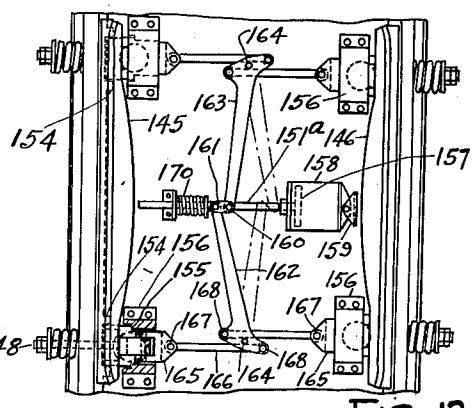


FIG-12

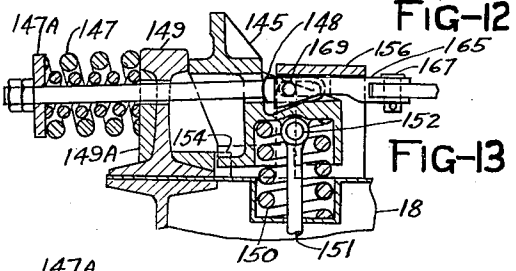


FIG-13

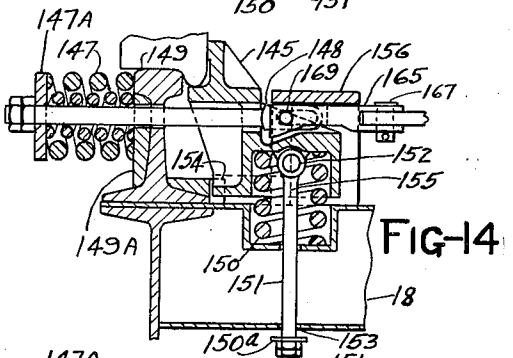


FIG-14

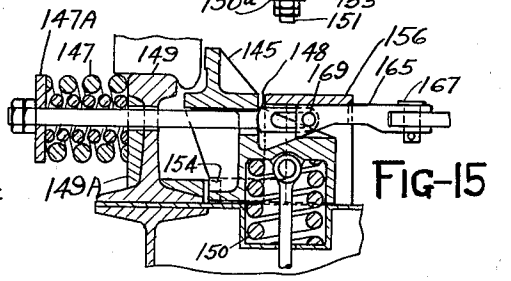


FIG-15

INVENTOR.
Percival A. Fanner
BY Hull, Brock & West
ATTORNEYS.

May 20, 1941. P. A. FANNER 2,242,819

CAR DUMPING MACHINE

Filed June 19, 1939 7 Sheets-Sheet 7

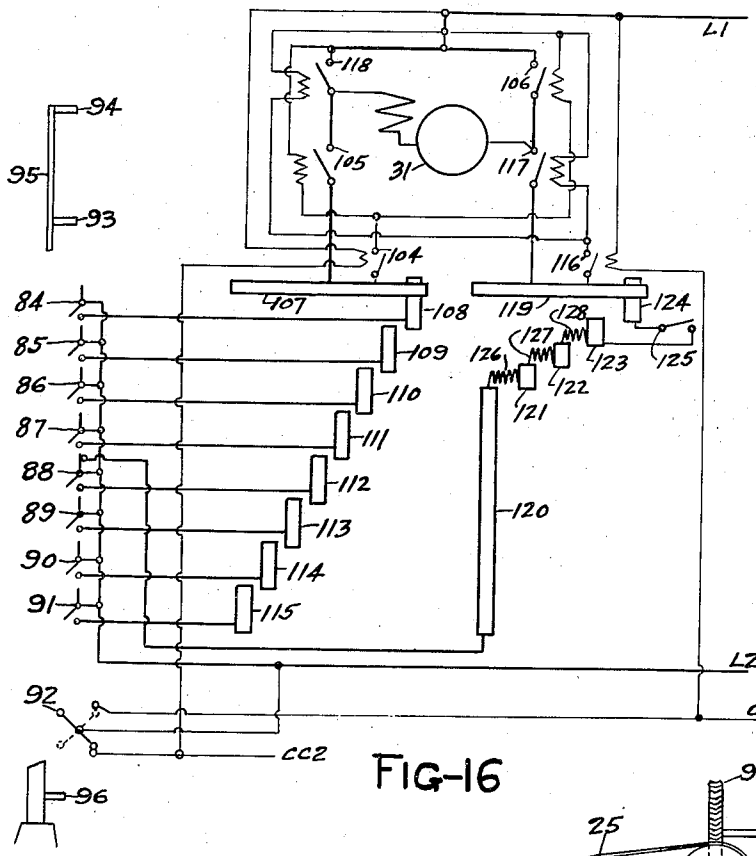


FIG-16

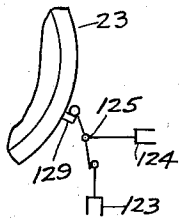


FIG-17

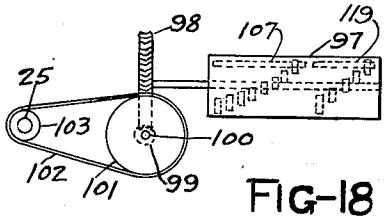


FIG-18

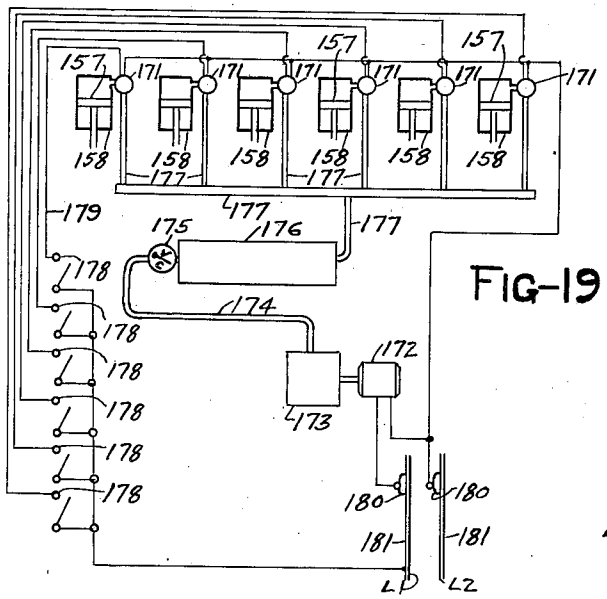


FIG-19

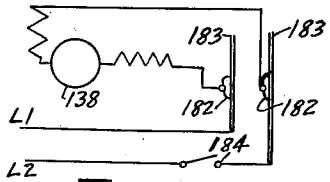


FIG-20

INVENTOR.
Percival A. Fanner
BY Hull, Brock & Hull
ATTORNEYS.

Patented May 20, 1941 2,242,819

UNITED STATES PATENT OFFICE

2,242,819

CAR DUMPING MACHINE

Percival A. Fanner, Lakewood, Ohio

Application June 19, 1939, Serial No. 279,880

17 Claims. (Cl. 214—123)

My invention relates to improvements in car dumping machines used principally for loading vessels with bulk materials such as coal, ores, building materials, etc.

Particularly in the handling of coal, breakage of lumps is very undesirable and reduces the marketability of the product considerably. One object of my invention is to minimize the breakage of lump material such as occurs in present methods of handling where the material is dumped by means of a car dumper into hoppers and rehandled and transported by conveyors and elevators to holds of boats, or where cars are dumped by the well known L type pivoted cradle and the material is thrown violently into a pan by the swinging action of the cradle. To this end, I rotate the car about an axis near its center of gravity so that the contents of the car is least disturbed in dumping.

Another object of my invention is to provide a unique design and construction for the main structural tower of my machine whereby it can be made simpler, can be braced better in all directions, and accordingly made lighter and cheaper than in existing lift car dumpers.

Another object of my invention is to provide a construction whereby the vertical hoist motion of the carriage that carries the rotating car supporting element or cylinder is rendered continuous, thus obviating the use of much expensive electrical control apparatus such as has to be employed on present lifting dumpers with L type pivoted cradles, said expensive control apparatus being necessary to slow down the hoist motors to a practical stop under full torque just before the pivoted L type cradle enters the hook prior to the final turnover.

Important advantages resulting from the continuous carriage hoist motion of my machine are: that greater hoist speeds may be used, resulting in faster dumping of cars; and greater lift is possible, thereby lowering the approach to the dumper, reducing cost of dock construction, and permitting easier handling of cars to and from the dumper.

With these and other objects in view, my invention consists in the combinations and arrangements of parts set out in the claims appended hereto.

In the accompanying drawings Fig. 1 is an end view, partly diagrammatic, of my improved car dumping machine, showing in full lines, a car in the cylinder of the liftable carriage while the latter is down, and indicating, in dot-and-dash lines, the position of the cylinder when the carriage is elevated and the car is in dumped position; Fig. 2 is a series of diagrams representing the action of the cylinder and chute during the upward travel of the carriage and the dumping of the load, the carriage being omitted for clearness; Fig. 3 is a similar view representing the action of the parts as the carriage descends to normal position; Fig. 4 is a section on the line 4—4 of Fig. 1, looking in the direction of the arrows; Fig. 5 is a rear elevation of the car dumping machine; Fig. 6 is a horizontal section on the line 6—6 of Fig. 1, with the cylinder removed; Fig. 7 is a plan view of the carriage; Fig. 8 is a detail showing the arrangement of coordinating control switches mounted on the carriage; Fig. 9 is a top view of the movable track platform incorporated in the cylinder showing the car retarder shoes in place; Fig. 10 is a fragmentary vertical transverse section through the cylinder and movable track platform showing mechanism for moving the latter; Fig. 11 is a vertical section through the movable track platform showing the platform guides; Fig. 12 is a detail assembly of one of the car retarder units; Fig. 13 is an enlarged sectional detail of a part of said unit showing the retarder shoe in engaged position against the rail in the absence of a car wheel; Fig. 14 is a similar view showing the retarder shoe in engaged position against a car wheel; Fig. 15 is a view of like character showing the retarder shoe disengaged; Fig. 16 is a diagram showing coordinating controls for the cylinder rotating motors; Fig. 17 is a diagrammatic detail showing how a part on the cylinder knocks out the limit switch to stop rotation of the cylinder; Fig. 18 is a detail of the drive for the drum controller of the cylinder rotating motor; Fig. 19 is a diagram showing the arrangement of air piping and magnetic valves and switches for controlling the car retarder units; and Fig. 20 is a wiring diagram of the circuit for the motor that moves the track platform.

An element in the nature of a cylindrical frame structure, herein termed a cylinder, designated generally by the reference numeral 1, and of a size to receive the largest standard cars of the type used for transporting coal, ores, etc., is mounted to revolve or turn on flanged rollers 2 that are carried in equalizing or rocking frames 3 journaled in end frames 4 of a lifting carriage 32. Two annular rails or riding rings 5, one at each end of the cylinder, support the same and engage the flanged rollers 2 which, by coaction of their flanges with the sides of said rings, hold the cylinder against endwise movement. The

cylinder 1 is preferably of skeleton construction so as to permit the contents of a car 6 to be readily discharged therefrom when the cylinder is rotated and is provided internally at one side with an upright partition 7 and wood blocks 7A against which the car rests when the cylinder is rotated to its dumping position, partition 7 being braced by girders 8 which are also within and constitute parts of the cylinder.

Secured to the inner face of the upright partition 7 are clamp guides in which clamps C are slidable. Any number of these clamps may be used and they may be of any type suitable for the purpose. The one shown is automatic in operation and is of very simple construction, and much used on prevailing lifting dumpers.

Each clamp C is composed of a sliding member 9 that is mounted in a guideway on the upright partition 7, and a clamping arm 10 that is pivoted at one end to the upper end of the sliding member 9 and is free at its other end. The sliding member of each clamp is provided adjacent its upper end with a shoulder 11 adapted to engage the top edge of the adjacent side of the car 6 and the clamping arm 10 is sufficiently long to rest on the opposite top edge of the car as shown in dot-and-dash lines in Fig. 1. Clamp operating ropes 12 (Figs. 1, 4 and 5) are anchored to the cylinder 1 at 13 and pass over sheaves 14 and between sheaves 15 and 15a in the clamp, thence over sheaves 16 and 16a journaled in the main tower T to counterweights 17. Sliding members 9 are raised relative to the car 6 by stops 9A when the carriage 32 is lowered onto seats 22, thereby releasing the car.

Adjacent to the riding rings 5 near the ends of the cylinder 1 are two spur gear segments 23, engaged by pinions 24 on short shafts 25 extending through and journaled in the rear equalizing or rocking frames 3. Motors 31 rotate the cylinder 1 through the gears 24, 26, 27, 28, 29 and 30 (Figs. 1 and 6). The motors 31 are supported on the carriage 32 and are equipped with solenoid brakes, represented conventionally at B, for locking the cylinder 1 when at rest, all as shown in Fig. 6. The fact that the mechanisms for revolving the cylinder 1 are located, one on each end, minimizes the stresses in the cylinder due to rotation and car clamp pulls.

The liftable carriage 32, shown in Figs. 1, 4 and 7, consists of a stiff structure including end frames 4 that are tied together by longitudinal girders and cross bracing. The front or dumping side, between the end frames 4, must be open so as not to obstruct movement of a hinged chute 33 pivotally fastened to the cylinder 1. Approximately one-half of the bottom must be void of bracing also to provide clearance for the chute 33. However, the back and about one-half of the bottom and top may be braced to form a structure of considerable rigidity. The end frames 4 carry the beforementioned rollers 2 and frames 3 for supporting the cylinder 1 on its riding rings 5. Flanged rollers 34 (Figs. 1 and 7), journaled in the end frames 4, engage guides 35 in the main tower structure T and guide the liftable carriage 32 laterally in all directions throughout its vertical movement. The carriage 32 is raised and lowered by two hoisting drums 36 (Figs. 1, 5 and 6), that are driven through suitable gearing by electric motors 36a equipped with solenoid brakes B', one hoisting drum being located at each end of the machine. The two hoisting drums 36 may be operatively connected together by a long shaft 36b so as to assure the carriage being raised and lowered squarely. Hoist ropes 37 are dead ended at 38 in the top of the main tower structure T and pass downwardly around sheaves 39, journaled in end frames 4, thence over sheaves 40 and 40a in the top of the tower structure and then downward to drums 36. Hoist ropes 41 are dead ended at 42 in a similar fashion, and extend downwardly and over sheaves 43, journaled in the end frames 4, thence over sheaves 44 to drums 36. It will be understood that there are two ropes 37 and two ropes 41. Much of the dead weight of the carriage 32, with that of the rotating cylinder 1, is counterweighted by slidably mounted counterweights 45 on the back of the main tower structure T. The counterweight ropes 46 are dead ended at 47, in the end frames 4, and pass upwardly over sheaves 48 and 48A, journaled in top of the main tower structure T, and thence to the counterweights 45. The work of the hoist engine may be further reduced by counterweighting the weight of the empty car through means comprising ropes 78 that pass from hoisting drums 36 over sheaves 79, 80 and 81 (Fig. 5), supported in the upper frame of the tower T and thence around sheave 82 supporting a slidably mounted counterweight 83.

Between the two front posts 49 of the main tower structure T there is a heavy raisable girder 50 (Figs. 1 and 4). This girder 50 extends along the entire front of the car dumping machine and, for a reason presently to appear, is raised and lowered to suit the draught of vessels by large vertical screws 51 running through nuts 52, fastened to the ends of the girder, the latter being slidably guided vertically by the front posts 49 of the tower. Said screws 51 are suitably journaled in the tower structure adjacent said posts 49 and are operatively connected together and to an electric motor 53 by a cross shaft 51a and suitable gearing associated therewith, as shown in Fig. 6.

The previously mentioned hinged chute 33 is pivotally fastened to the cylinder 1 at the top of the upright partition 7 for the full length of cylinder between riding ring 5, and forms a spillway to a pan 54 when the car is dumped. When the carriage 32, and consequently the cylinder 1 are in lowest position, the hinged chute 33 rests against guides 55 which extend down from the girder 50 in a position almost vertical, and as the carriage 32 is hoisted, the tip of the chute 33 slides up the guides 55 and thence over rollers 56 journaled in the top of the girder 50. Rollers 57 near the tip of the hinged chute 33 facilitate this movement. As the carriage rises, the chute 33 assumes the positions indicated in Fig. 2. During the hoisting period, as the carriage 32 nears the girder 50, electrical contacts are made which causes energization and starting of the motor 31 (Figs. 1 and 16) responsible for the rotation of the cylinder 1. The speed of rotation of the cylinder 1 and the hoisting speed of the carriage 32 are so coordinated as to keep the hinged chute 33 inclined at a suitable angle to slidably convey material from the car to the pan 54. After the dumping of the car 6, the carriage 32 descends automatically to lowest position preparatory to receiving the next car. During the descent of the carriage 32, as illustrated in Fig. 3, the motor 31 returns the cylinder 1 to normal position, but this backward rotation of the cylinder 1 may be and preferably is delayed so that the hinged chute 33, in rocking over the rollers 56, may be withdrawn from a position over the

top edge of the pan 54 without coming in contact with the dumped material in said pan.

The rotary motion of the cylinder 1 is controlled by eight track type switches 84, 85, 86, 87, 88, 89, 90 and 91 and a double throw limit and reversing switch 92 (Figs. 8 and 16) that is mounted on the carriage 32 in conjunction with a drum type controller 97 (Fig. 18). The controller 97 is positively driven by the shaft 25 of one of the cylinder rotating mechanisms through a driving connection including parts designated 98, 99, 100, 101, 102 and 103. For a complete cycle, the cylinder 1 revolves through about 160° in reverse directions. During this time the drum controller 97 turns in reverse directions a little less than one revolution. The switches 84, 85, 86, 87, 88, 89, 90 and 91 are knocked in and out by a projecting arm 93, supported by a part 95 on the girder 50, shown in Figs. 4 and 16. A second projecting arm 94 on the part 95 is provided for actuating the reversing switch 92 at the upper limit of travel of the carriage 32. A definite relationship must always exist between the girder 50 and the cylinder 1 during the latter's rotation regardless of the vertical position of the girder 50 in order to control the discharging angle of the chute 33. The switch 92 is knocked out by an arm 96 (Figs. 1 and 16) at the lowest point of travel of the carriage and brings the carriage to rest in the position shown in full lines in Fig. 1. In the diagrams of Figs. 16, 19 and 20, L' and L^2 represent the electric power feed lines.

The control of the cylinder motors may be as follows: Switch 92, when the carriage 32 is down, closes magnetic control switch 104 (Fig. 16) which in turn closes switches 105 and 106 in the motor circuit. The operator in the house 77 starts the carriage hoist and the carriage rises until the arm 93 closes the switch 84. At this time a bar 107 associated with the drum controller 97 is in contact with bar 108 which completes the motor circuit and the motor starts turning the cylinder 1 and also the drum controller which moves the bar 107 successively over bars 108, 109, 110, 111, 112, 113, 114 and 115. When the bar 107 moves off 108, the motor circuit is broken unless the carriage 32 has raised high enough to close the switch 85. By gearing the drum controller faster with respect to the carriage speed, the bar 107 may be caused to make contact before the switches 84 to 91 inclusive are closed. This assures the cylinder moving a definite fraction of a revolution to every increment of vertical travel of the carriage. If the carriage hoisting mechanism stops for any reason, the cylinder rotating motors are automatically stopped very soon thereafter. After the switches 84 to 91 inclusive have been closed and the bar 107 has moved into engagement with the bar 115 and the cylinder has reached the end of its rotative movement which brings it to dumping position, the arm 94 throws the switch 92 over to the dotted line position shown in Fig. 16, thereby reversing the carriage hoisting mechanism, opening switches 104, 105 and 106 and closing switches 116, 117 and 118 which reverses the cylinder rotating motor. Under these conditions, the bars 107 and 119, associated with the drum controller, are on bars 115 and 120, respectively. As the carriage descends, switches 91, 90 and 89 are knocked open by arm 93, and the cylinder motor circuit is not completed until the switch 88 is operated. This has the effect of drawing the chute 33 quickly out of the pan 54 (Fig. 1). The cylinder motors now travel under full current supply at high speed, moving the drum controller bar 119 throughout the length of bar 120 and thence over bars 121 to 123 at successively reduced speeds by reason of cutting in resistances 126, 127 and 128. Shortly after the bar 119 passes onto bar 124, a lug 129 on one of the gear segments 23 (Fig. 17) knocks out the limit switch 125 (Figs. 16 and 17) opening the motor circuit, setting brakes and stopping the cylinder 1.

Located within the cylinder 1 (see Figs. 1, 9 and 10) is a laterally movable track platform 18 that is mounted on rollers 19. Six sets of such rollers are shown equally spaced apart throughout the length of the platform. Girders 20 run longitudinally of the cylinder and, with transverse members, provide suitable supports for the journals of the rollers 19. The platform 18 is moved laterally by an electrically driven mechanism including two belts 130, desirably of the roller chain type, that have one of their ends anchored at 131 to a longitudinal platform girder 18^a and extend over sprockets 132, journaled at 133 in cylinder 1, thence over driving sprocket wheels 134, mounted on a drive shaft 135 that is journaled at 136 in supports on the cylinder structure and have their opposite ends anchored at 137 to a second platform girder 18^b (Fig. 10). The belts 130 may be adjusted for tightness, and platform 18 adjusted for proper alignment within the cylinder 1, by eye bolts incorporated in the anchorage means 131. A motor 138 drives the shaft 135 through a coupling 139 and a self-locking worm gear speed reducer 140. The lateral motion of the platform is limited by stop blocks 141 and 142. The motor 138 may be either a torque motor, or a series wound D. C. motor controlled between a small no load speed and a zero full load speed. The coupling 139 may be a plain flexible coupling, or one of the controlled torque type. The motor must have a light torque so that the car will not be jammed against the partition 7 and blocks 7^A too hard, but the drive mechanism must be very strong so as to hold the dead weight of the platform and the car with its contents when rotating a loaded car. The platform 18 is prevented from moving longitudinally in the cylinder 1 by shafts 143 (Fig. 11) that are supported at 144 by the cylinder structure, the platform being slidably mounted on the shafts 143 for lateral motion only.

According to prevailing practice, a car is pushed into a car dumper and bumps off the car just dumped. The oncoming car still retains considerable momentum and is stopped and "spotted" in the proper place by manually operated chocks or other devices. In Figs. 12, 13, 14 and 15 I have shown an improved and effective electrical means for "spotting" and stopping the cars after they are pushed into the dumper preparatory to dumping. This device is simpler, cheaper and more flexible than those now in common use. Any number of units may be employed, and they may be operated singly or in groups. The electric means of operation simplifies the parts and the control, as will be apparent from the description below: Pairs of shoes 145 and 146 are arranged to exert pressure against both the inside of the wheel and the periphery of its flange. By having the shoes press against the edge of the flange, some of the weight on the wheel is made to create greater pressure on the inside of the wheel, making the shoe more effective in creating greater friction and producing greater retarding effect. An elongated eye bolt 148 passes through an aperture in the web of each of the

track rails designated 149, reinforced at 149A, and holds the corresponding shoe 145 tightly against said rail 149 due to the action of a compression spring 147 that surrounds said bolt and is confined between the rail and a washer 147A on the bolt. A compression spring 150 forces the shoe 145 vertically until a stop 150a on an eye bolt 151 that is pivoted at 152 to said shoe, strikes against the platform 18 at 153 (Fig. 14). If a wheel passes over the rail 149 (Fig. 13) the shoe 145 is forced away from the rail and is depressed, increasing the compression in both springs 147 and 150 and assuming the position shown in Fig. 14. The compressing of the spring 150 puts considerable pressure on the edge of the flange and causes a braking effect at this point. The downward flange pressure and the upward pressure of the spring 150 create a couple which is resisted by another couple consisting of a horizontal wheel pressure against the shoe and a corresponding pressure of the shoe against a yoke 156 at a point 155 on the center line of the spring 150 (Fig. 14). All of this has a tendency to build up pressure against the inside of the wheel. Braking forces in a direction longitudinally of the track are resisted by lugs 154 (Fig. 12) welded to the rail bases for engaging the shoes 145. The car wheel may engage the shoe when the latter is in the position shown in Fig. 13, or the shoe may be released, as shown in Fig. 15, and then allowed to engage the wheel.

The shoes 145 and 146 of each pair are retracted by means of a piston 157 in a pressure fluid cylinder 158 that is pivoted at 159 to a support on the movable platform 18. The piston rod 151a is loosely connected, through a link pivoted at 160 and 161, to T-levers 162 and 163. These levers are fulcrumed at 164 and move sliding wedges 165 that are connected to the ends of their heads through links 166 and pins 167 and 168. When the piston is forced out by either air or hydraulic pressure supplied through a conduit 177, incorporating a valve 171 (Fig. 19), the wedges 165 are pulled away from the rails 149 and engage the underside of the tops of yokes 156 and the sloping top surfaces of shoes 145. This forces the shoes down and compresses the springs 150. As the wedges 165 are pulled farther from the rails 149, pins 169 thereon engage the ends of slots in the heads of eye bolts 148 through which they extend and pull inwardly on said bolts thereby to further compress the springs 147, causing all pressure of said springs 147 to be released from the shoes 145. The vertical pressure of the wedges 165 on the shoes 145 puts a friction drag on the latter which pulls them away from the car wheels and rails. This condition is illustrated in Fig. 15. When pressure in the cylinder 158 is released all compressed springs relax and bring the mechanism back to the position shown in either Fig. 13 or 14. A compression spring 170, acting through the piston rod 151a, assures positive release of the mechanism when the valve 171 associated with the cylinder in question, is actuated to exhaust the pressure fluid from the cylinder.

Fig. 19 shows an arrangement of piping and wiring if air pressure is used. An electric motor 172 is coupled to an air compressor 173 both being supported on the carriage 32 (Figs. 6 and 19). The air compressor 173 is connected to a reservoir 176 on the movable platform 18 (Fig. 9) through a flexible hose 174 which allows for cylinder motion relative to the carriage. A check valve 175 keeps air under pressure in the reservoir 176 and piping 177. The valves 171 are magnetically operated and are controlled by a track spotter near the entrance of the car dumping machine by switches 178. These switches may be operated singly or in groups. Flexible cables 179, similar to those in use on elevators, connect the switches 178 with the magnetic mechanism of the valves 171. The motor 172 receives its current through contact shoes 180, supported on the carriage, and engaging conductors 181 connected to the two legs L' and L^2 of the main electric circuit, said conductors running the full length of travel of the carriage so that air pressure may be built up between applications of the car retarder shoes. The location of the motor 172, compressor 173 and conductors 181, is shown in Fig. 6.

Fig. 20 is a diagram showing the wiring for the movable platform 18 on the cylinder 1. Shoes 182 travel with the carriage 32 and are connected by flexible cables to the previously mentioned motor 138 to allow for relative motion between the cylinder 1 and the carriage 32. The conductors 183 are on the tower structure and are relatively short and so arranged that they are engaged by the shoes 182, with the consequence that the motor 138 may be energized, only when the carriage is down and cars may be moved on and off the dumping machine. The switch 184 is located in the operator's house 77 (Fig. 1).

The car dumping machine in other respects than as above described is similar to those now in use. The pan 54 for receiving the dumped material is hinged at 58 in the vertical plane of the girder 50 and is adapted to be adjusted to different angles of inclination by ropes 59 dead ended at 60 on the pan and, according to common practice, engaged about the sheaves 61 and 62 and thence extended over sheaves 63 to the pan hoist drum 64 below (Figs. 1 and 6). The pan hoist drum is driven through suitable gearing by an electric motor 64a equipped with an approved type of solenoid brake B^2. The pan, in plan view, is generally triangular in shape and terminates at what corresponds to the apex of the triangle in a discharge opening that communicates with a telescopic spout 65 hinged at 66 to the pan. Said spout 65 is telescoped and swung to and fro, as across a boat, by ropes 67 and 68 dead ended at 69 and 70 and extended thence over sheaves 71 and 72 to winding drums 73 and 74. The drums 73 and 74 are driven separately through suitable gearing by electric motors with solenoid brakes (not shown) supported on top of the pan 54. At the bottom of the telescopic spout 65 is means for regulating the discharge of material to the vessel or other discharge point. This means may comprise electrically driven double undercut gates 75, as shown in Fig. 1, although any means which will serve to dam the material back in the spout and regulate the speed of discharge may be used. Means may also be used to control the direction of flow of material from the spout, as will be readily understood by those familiar with the art. A house 76 is provided for an operator whose duty it is to manipulate the spout 65, said house accommodating all the necessary electrical controls. The previously mentioned house 77 contains all the necessary electrical controls for the carriage hoist, pan hoist, and screw girder hoist.

A cycle of operation may be briefly described

as follows: A car 6 is pushed into the cylinder 1, and the operator in house 77 starts the carriage hoist. The car is then raised, clamped, dumped and returned to lowest level automatically, to be pushed out of the cylinder by the next car to be dumped. During the foregoing operation, the material has been discharged from the car over the hinged chute 33 to the pan 54 and thence to the telescopic spout 65, and according to the will of the operator in the house 76, to the desired point of discharge, as the hold of a boat.

When the car dumping machine is not in use, the spout 65 is contracted and the pan 54 is raised as high as possible by the hoist drum 64.

It should be understood that the cylinder 1, carriage 32 and hinged chute 33 may be of any approved construction that will render them suitable to perform the duties outlined above; and that the structural details shown, and to which the invention is not confined, may be modified to any degree within the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a car dumping machine, an element whereon a loaded car is adapted to be secured, said element being supported for reciprocation in a substantially vertical direction between low and high positions and for rotation on an axis extending longitudinally of the car at about the center of gravity of the rotatable mass, a load receiving and directing means supported adjacent the path of movement of said element at an elevation near said high position, mechanism for reciprocating said element and for simultaneously rotating it, first, continually in a direction to discharge the load when the element travels to high position and then continually in a reverse direction to normal condition when the element descends to low position, and a movably supported chute pivoted adjacent one end to said element and that automatically adjusts itself to the relative positions of said element and the load receiving and directing means and across which the load is discharged to said means.

2. In a car dumping machine including an element wherein a loaded car is adapted to be disposed, said element being rotatable on an axis extending longitudinally of the car, with load receiving means supported in operative relation to said element, and mechanism for rotating the element thereby to cause the load to be discharged from the car to the load receiving means; stop means incorporated in said element on the side thereof toward which the car is dumped, a platform movable horizontally in the element toward and from said stop means and on which the car is supported, power means for positively shifting said platform independently of and prior to the rotation of said element in a direction to engage the adjacent side of the car with said stop means, and means for clamping the car against the stop means preparatory to dumping the car.

3. In a car dumping machine including an element wherein a loaded car is adapted to be disposed, said element being rotatable on an axis extending longitudinally of the car, with load receiving means supported in operative relation to said element, and mechanism for rotating the element thereby to cause the load to be discharged from the car to the load receiving means; a partition incorporated in said element on the side thereof toward which the car is dumped and which is substantially vertical when the element is in normal position, a platform movable horizontally in the element toward and from said partition and on which the car is supported, power means for positively shifting said platform independently of and prior to the rotation of said element in a direction to engage the adjacent side of the car with said partition, and means for clamping the car against the partition preparatory to dumping the same.

4. In a car dumping machine, a tower structure, a carriage guided for substantially vertical movement within said structure between low and high positions, an element supported by the carriage and whereon a loaded car is adapted to be secured, said element being rotatable on an axis extending longitudinally of the car, a load receiving and directing means supported in operative relation to the tower and at an elevation somewhat below the aforesaid high position, a chute pivoted adjacent one end to the aforesaid element and free at the other end, means for reciprocating the carriage, and mechanism for rotating said element in a direction to discharge the load as the carriage ascends to high position and for returning the element to normal condition as the carriage descends to low position, the aforesaid chute being so arranged that its free end assumes discharging relation to the load receiving and directing means when the carriage rises to high position and the element is rotated to discharge the load.

5. In a car dumping machine, a tower structure, a carriage guided for substantially vertical movement within said structure between low and high positions, an element supported by the carriage and whereon a loaded car is adapted to be secured, said element being rotatable on an axis extending longitudinally of the car, a load receiving and directing means adjustably supported in operative relation to the tower so that it may be located at an elevation near the aforesaid high position, a chute pivoted adjacent one end to the aforesaid element and free at the other end, means for reciprocating the carriage, and mechanism for rotating said element in a direction to discharge the load as the carriage ascends to high position and for returning the element to normal condition as the carriage descends to low position, the aforesaid chute being so arranged that its free end assumes discharging relation to the load receiving and directing means when the carriage rises to high position and the element is rotated to discharge the load.

6. In a car dumping machine, a tower structure, a load receiving pan supported adjacent one side of the tower structure, a carriage guided for vertical movement within the tower structure, an element whereon a loaded car is adapted to be secured, said element being supported by the carriage for rotation on an axis extending longitudinally of the car, a chute pivoted adjacent its receiving end to said element, guides supported by the tower structure along which the discharge end of the chute is movable, means for raising and lowering the carriage between low and high positions, and mechanism for rotating the element as the carriage ascends to high position thereby to discharge the load across said chute to the pan, the discharge end of the chute extending over said pan as the carriage rises and assuming operative relation thereto when the carriage is in high position, said mechanism acting to return the element and chute to nor-

mal condition as the carriage descends to low position.

7. In a car dumping machine, a tower structure, a girder supported across one side of the tower structure for adjustment vertically thereof, a pan pivoted to said girder, a carriage guided for vertical movement within the tower structure, an element whereon a loaded car is adapted to be secured, said element being supported by the carriage for rotation on an axis extending longitudinally of the car, a chute pivoted adjacent its receiving end to said element, guides on the aforesaid girder along which the discharge end of the chute is movable, means for raising and lowering the carriage between low and high positions, and mechanism for rotating the element as the carriage ascends to high position thereby to discharge the load across said chute to the pan during such ascent of the carriage, the discharge end of the chute extending over said pan as the carraige rises and automatically assuming a proper discharge position with its discharge end adjacent the pivoted side of the pan when the carriage is in high position, said mechanism acting to return the element and chute to normal condition as the carriage descends to low position.

8. In a car dumping machine, a tower structure, a girder supported across one side of the tower structure for adjustment vertically thereof, a pan pivoted to said girder, a carriage guided for vertical movement within the tower structure, an element whereon a loaded car is adapted to be disposed, said element being supported by the carriage for rotation on an axis extending longitudinally of the car, a chute pivoted adjacent its receiving end to said element, guides on the aforesaid girder along which the discharge end of the chute is movable, means for raising and lowering the carriage between low and high positions, mechanism for rotating the element as the carriage ascends to high position thereby to discharge the load across said chute to the pan during such ascent of the carriage, the discharge end of the chute extending over said pan as the carriage rises and automatically assuming a proper discharge position with its discharge end adjacent the pivoted side of the pan when the carriage is in high position, said mechanism acting to return the element and chute to normal condition as the carriage descends to low position, and clamping means on the element for securing the car to the element, said means automatically assuming effective condition as the carriage rises.

9. In a car dumping machine, a tower structure, a carriage guided therein for vertical movement, an element whereon a loaded car is adapted to be secured, said element being supported in the carriage for rotation on an axis extending longitudinally of the car, load receiving means adjacent the side of the tower structure toward which the load is dumped, a chute pivoted adjacent one end to the element and free at the other end and across which the load is adapted to be discharged to the receiving means, a guide on the tower structure for the free end of the chute, mechanism for raising and lowering the carriage and for rotating the element, and means automatically coordinating the speeds of the carriage and element so as to control the angle of the chute during discharge of the load.

10. In a car dumping machine, a tower structure, a carriage guided therein for vertical movement, an element whereon a loaded car is adapted to be secured, said element being supported in the carriage for rotation on an axis extending longitudinally of the car, load receiving means adjacent the side of the tower structure toward which the load is dumped, a chute pivoted adjacent one end to the element and being free at the other end and across which the load is adapted to be discharged to the receiving means, a guide vertically adjustable on the tower structure for guiding the free end of the chute, and mechanism for raising and lowering the carriage and for rotating said element.

11. In a car dumping machine, a rotatable element wherein a loaded car is adapted to be disposed, a track platform whereon the car is supported and which is shiftable laterally of said element for properly positioning the car for dumping, a prime mover, and power transmitting means between said prime mover and the platform including a self-locking worm gear whereby the platform may be shifted to any lateral position and held in such position by virtue of said means.

12. In a car dumping machine, a tower structure, a carriage guided for substantially vertical movement within said structure between low and high positions, an element supported by the carriage and whereon a loaded car is adapted to be secured, said element being rotatable on an axis extending longitudinally of the car, a load receiving and directing means supported in operative relation to the tower and at an elevation somewhat below the aforesaid high position, a chute pivoted adjacent one end to the aforesaid element and free at the other end, means for reciprocating the carriage, and mechanism for rotating said element in a direction to discharge the load as the carriage ascends to high position and for returning the element to normal condition as the carriage descends to low position, the aforesaid chute being so arranged that its free end automatically assumes at all times discharging relation to the load receiving and directing means when the carriage rises to high position and the element is rotated to discharge the load.

13. In a car dumping machine, a tower structure, a load receiving pan supported adjacent one side of the tower structure, a carriage guided for vertical movement within the tower structure, an element whereon a loaded car is adapted to be secured, said element being supported by the carriage for rotation on an axis extending longitudinally of the car, a chute pivoted adjacent its receiving end to said element, guides supported by the tower structure along which the discharge end of the chute is movable, means for raising and lowering the carriage between low and high positions, and mechanism for rotating the element as the carriage ascends to high position thereby to discharge the load across said chute to the pan, the discharge end of the chute extending over said pan as the carriage rises and automatically assuming proper relation thereto at all times during rise of the carriage and rotation of the element, said mechanism acting to return the element and chute to normal condition as the carriage descends to low position.

14. In a car dumping apparatus, the combination of a tower having a wide clear space or opening on the front side thereof, a horizontal beam vertically movable on said side, a pan or chute hinged to said beam, a cylindrical or barrel-like element reciprocable substantially vertically within said tower and rotatable about its approxi-

mate center of gravity, suitable means for respectively holding a car within the element, raising and lowering the element, and rotating the element to dump a car held therein, means pivotally connected to and movable with said element for conducting material from the rotating element through the aforesaid space or opening in the tower over the movable beam to above the pan or chute, means for raising and lowering the beam, and means for raising and lowering said pan or chute around its hinged connection with said beam.

15. In a car dumping machine, an element wherein a car is adapted to be supported for dumping, said element having a cycle of operation including a lateral turn-over action, a side rest on the element against which the side of the car body bears during the lateral turn-over action, a track platform mounted on the element and whereon the car is supported and which is shiftable laterally of the element thereby to engage the side of the car body with the aforesaid rest, means for moving said element through a cycle of operation, and further means including a prime mover that is exclusive to said further means for shifting the platform as aforesaid before a cycle of operation of the element is started.

16. In a car dumping machine, a rotatable element wherein a loaded car is adapted to be disposed, a track platform whereon the car is supported and which is shiftable laterally of said element for properly positioning the car for dumping, and mechanism including a self-locking means whereby the platform may be shifted laterally and held in the position to which it is shifted by virtue of said means.

17. In a car dumping machine, a rotatable element wherein a loaded car is adapted to be disposed, a track platform whereon the car is supported and which is shiftable laterally of said element for properly positioning the car for dumping, a shifting means, and a motion-transmitting self-locking mechanism through which motion is adapted to be transmitted from said means to the platform and which mechanism serves to lock the platform against movement when the transmission of motion ceases.

PERCIVAL A. FANNER.