Feb. 9, 1926. 1,572,654

R. W. KALTENBACH

CAR DUMPING APPARATUS

Filed Dec. 10, 1923 5 Sheets-Sheet 1

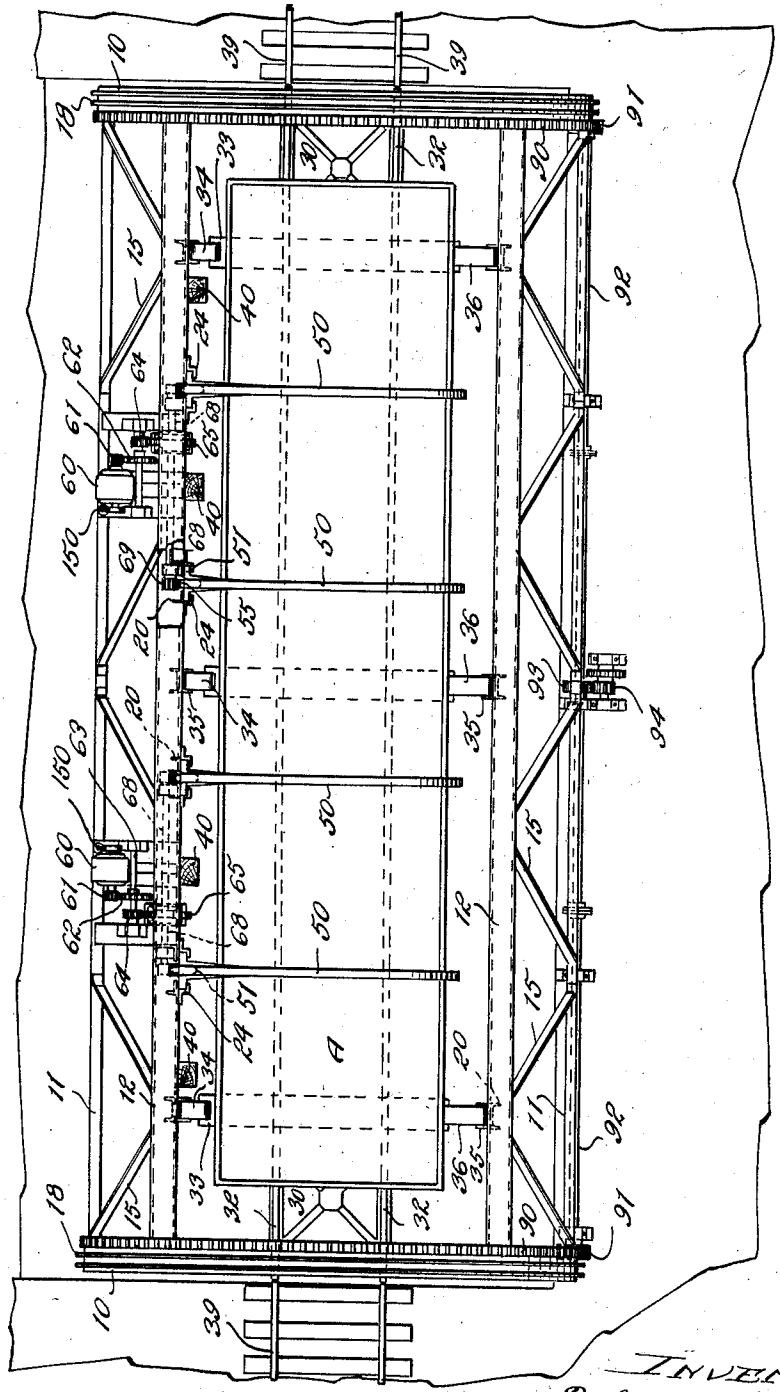


Fig. 1.

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Filed Dec. 10, 1923 5 Sheets-Sheet 2

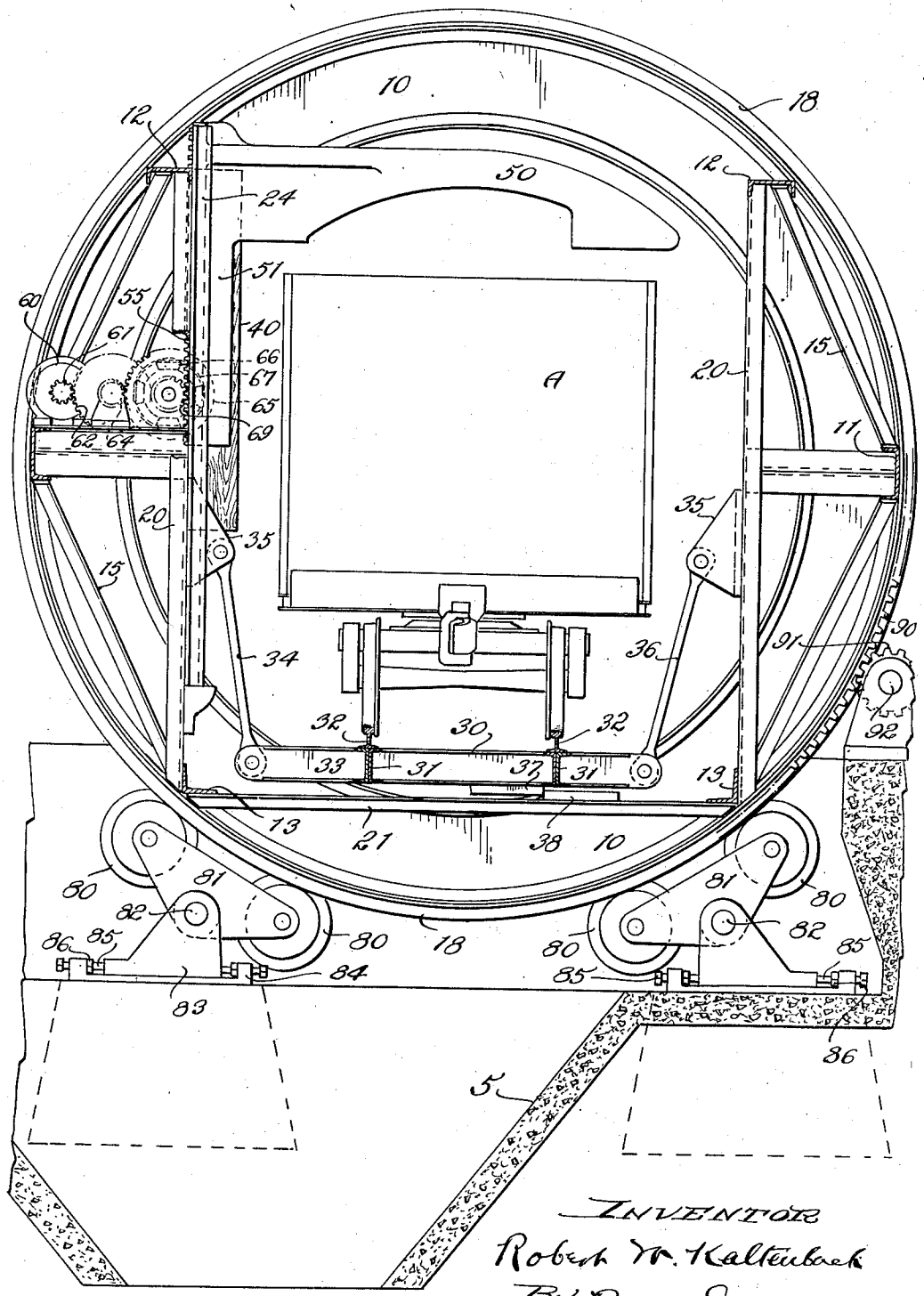


FIG. 2

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Filed Dec. 10, 1923

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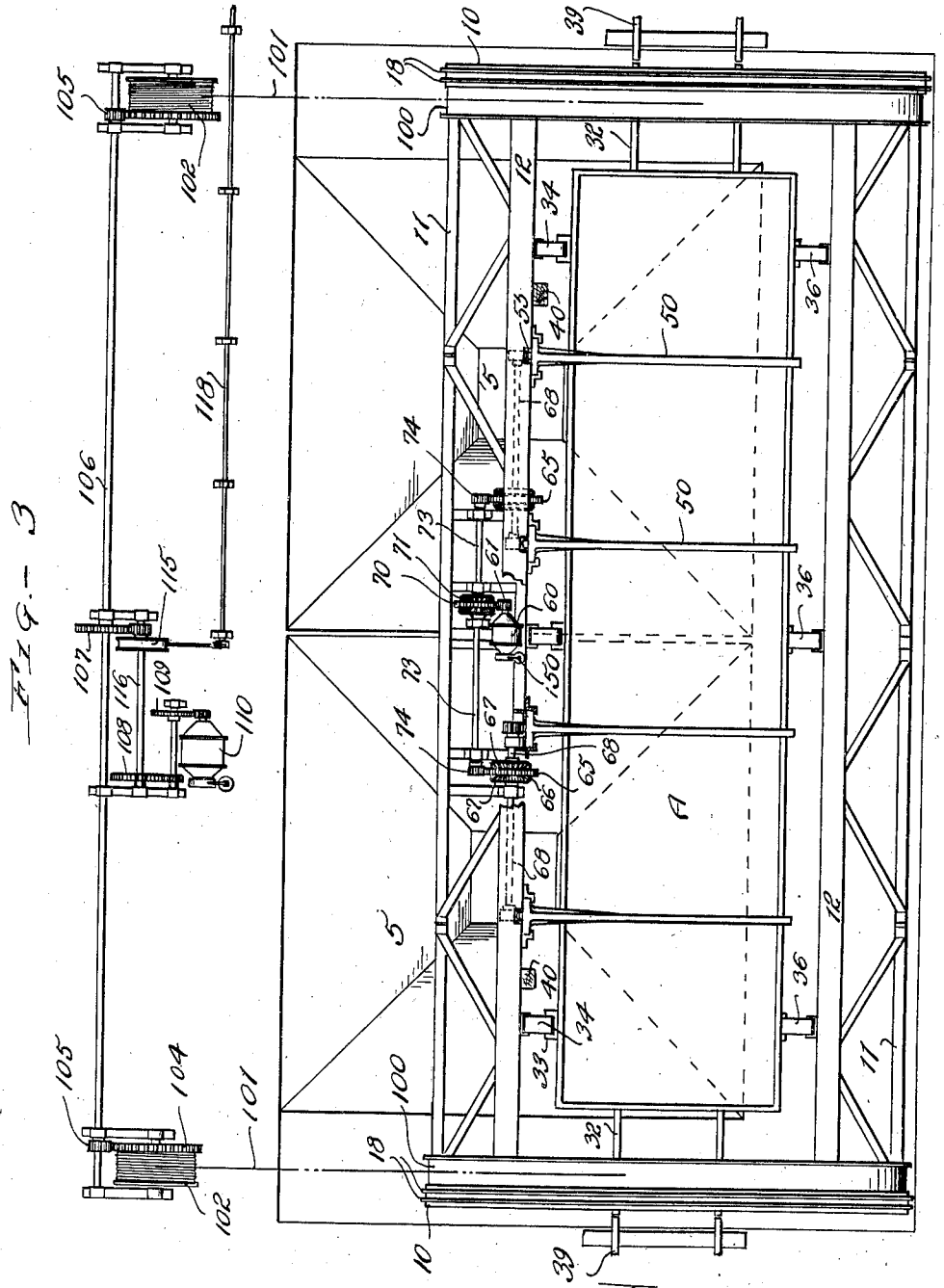


Fig. 3

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5 Sheets-Sheet 4

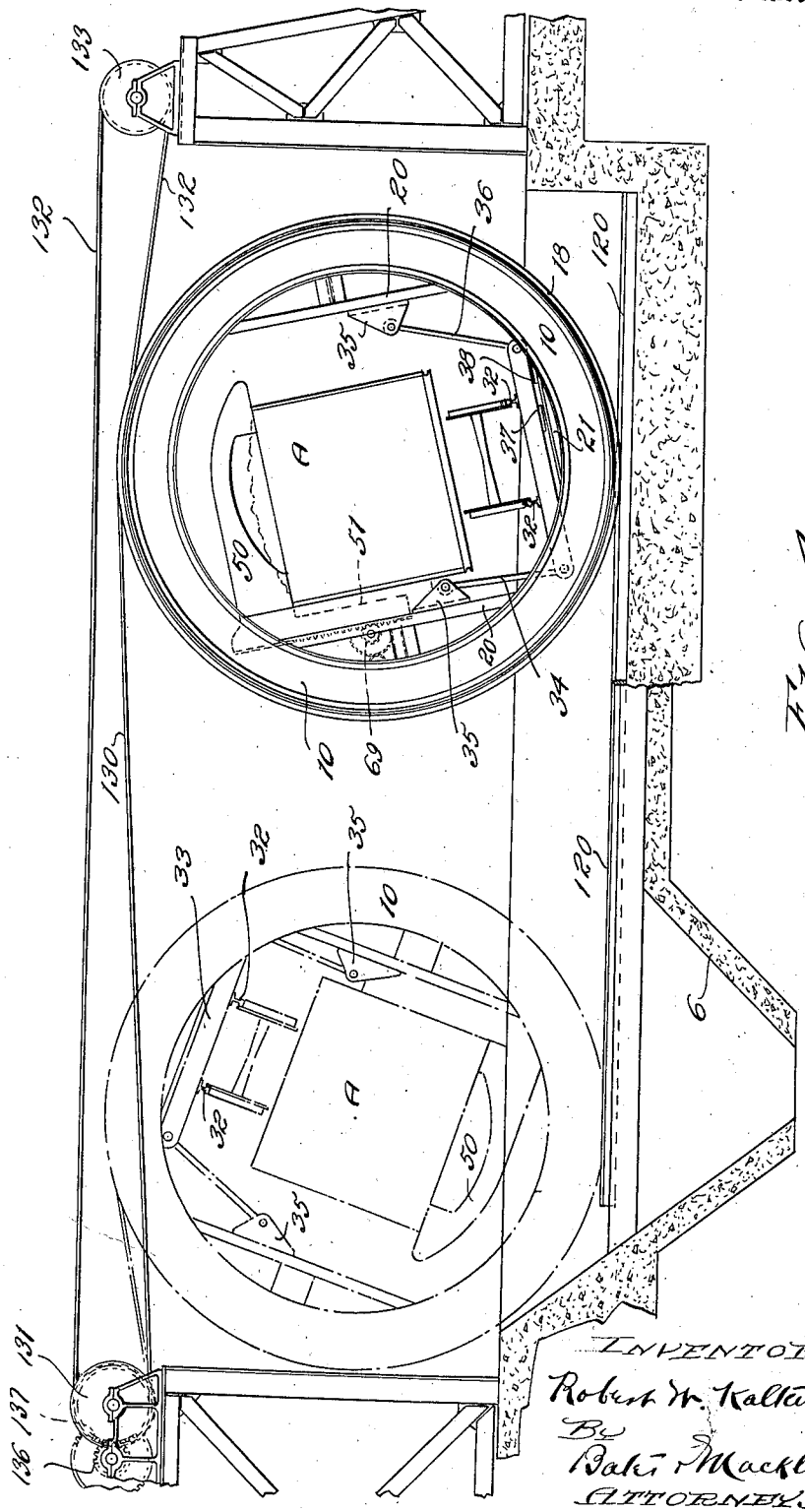


Fig. 4

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Filed Dec. 10, 1923 5 Sheets-Sheet 5

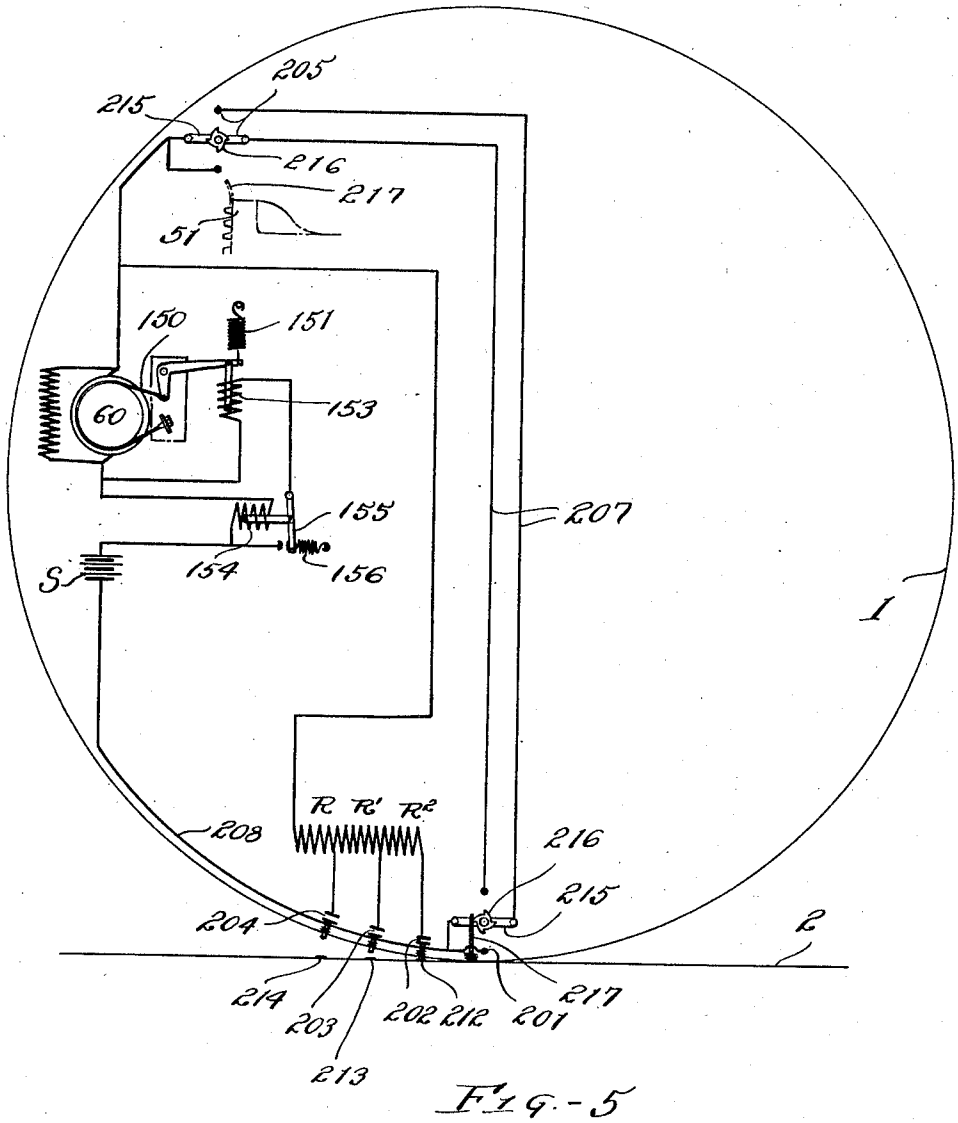


Fig.-5

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UNITED STATES PATENT OFFICE.

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CAR-DUMPING APPARATUS.

Application filed December 10, 1923. Serial No. 679,629.

To all whom it may concern:

Be it known that I, ROBERT W. KALTENBACH, a citizen of the United States, residing at Cleveland Heights, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in a Car-Dumping Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to car dumping apparatus of the type wherein there is a cradle adapted to receive the car and be tipped to dump the contents. The cradle is preferably an open-ended skeleton barrel, either adapted to rotate on its own axis or to roll along a support to invert the car sufficiently to effect the dumping.

The invention is concerned with a means for automatically positioning, supporting and clamping the car within the cradle during the turning thereof, toward dumping position, and for automaticaly freeing the car when the cradle returns.

In effecting the lateral positioning and supporting in a simple manner, I provide within the cradle a suspended swinging platform which is adapted to receive the car and allow it automatically to assume a position against side stops when the cradle turns, and I provide a clamp which drops by gravity into engagement with the car top under the retarding control of an electric motor geared with the clamp and non-effectively tending to rotate in the direction to raise the clamp and thus exercising a dynamic braking action thereon. An electromagnetic brake on the motor holds the clamp in engaged position. Suitable switches are provided, controlled automatically by the turning of the cradle, to properly energize the motor to effect the dynamic braking, to control the application of the friction brake on the motor for holding the clamp, and, at the end of the return movement of the cradle, to energize the motor effectively to raise the clamp into released position, and then stop the motor.

Another feature of the invention relates to the arrangement of a plurality of clamps in such manner that each clamp may operate independently in its clamping position, though all the clamps may be raised as a unit by the motor to release the car. This provides for the effective clamping of cars, notwithstanding the sides may be of uneven height, and causes the weight of the inverted car to be equalized on the several clamps.

The above mentioned features will be hereinafter more fully described in connection with embodiments of the invention illustrated in the drawings hereof, and the essential novel features will be summarized in the claims.

Fig. 1 is a plan of one embodiment of the invention, this view showing a cradle adapted to rotate and having two independent motors for operating the clamps; Fig. 2 is a sectional end elevation on a larger scale of the embodiment shown in Fig. 1; Fig. 3 is a plan of a somewhat different embodiment, wherein one motor is shown for operating all the clamps; Fig. 4 is an end elevation of an embodiment wherein the cradle rolls laterally on a transverse track instead of rotating on its axis, the clamps of this embodiment being operated by the mechanism of either Fig. 1 or 3; Fig. 5 is a diagram illustrating electric circuits and switches which may be employed for automatically controlling the clamp motor and brake.

The body of the cradle shown in Figs. 1 to 4 comprises essentially a pair of rings (which may be annular plates terminating at their peripheral edges in flanged structural shapes, providing an I-beam or box girder cross section), longitudinal structural beams as 11, 12 and 13, connecting the rings, and suitable lattice bracing 15 connected to the beams. Normally upright transverse beams 20 are connected at their upper ends to the longitudinal beams 12 and at their lower end to the longitudinal beams 13, and normally horizontal transverse beams 21 are connected at their ends to the beam 13, thus providing a rectangular open-top trough-like space for the reception of the car.

Within the open space above mentioned is the suspended platform 30. This comprises longitudinal beams 31 on which the tracks 32 rest, and lateral beams 33 suspended by

links 34, 36, connected to brackets 35 upon the inner faces of the beams 20.

It will be noticed from inspection of Fig. 2 that the links 36 on that side of the car from which the turning takes place incline toward the platform more than the links 34 which are on the side toward which the turning takes place. This results from the links 36 being slightly longer than the links 34, while the portion of the platform between the rails 32 and the pivot of the links 36 is correspondingly less than on the opposite side. Accordingly, when the car is in normal position, as shown in Fig. 2, the platform is horizontal but it has a gravitational tendency to swing toward the right or away from the dumping side. This movement is stopped by an abutment block 37 on the cradle engaging a corresponding abutment 38 on the transverse beam 21. By this means the platform is given a definite position of rest with the tracks in registration with the tracks 39 on the stationary part of the structure. The cradle may be stopped in the rest position when the platform is horizontal, and there locked, by any suitable means, not shown.

40 designates suitable bumper beams preferably of wood, carried vertically at the side of the car space and adapted to receive the impact of the car as it swings toward that side and support the car in its tipped position.

It will be seen from the construction described that whether the cradle rotates on its own axis or rolls on a transverse trackway, as soon as the turning begins the platform swings in the direction toward which the cradle is turning and thus brings the car against the bumper beams. As soon as this takes place the clamps drop by gravity on top of the car and are effectively held in this position, to receive the weight of the car as it is being inverted.

The clamps of L-shaped members having heavy overhanging portions 50 adapted to engage the top edges of the car and having legs 51 slidably mounted in the cradle parallel with the car side. As shown, the legs 51 are T-shaped in cross section and extend behind suitable frame bars 24 of the cradle which overhang the flanges of the T. The idle and active positions of the clamps are illustrated, relative to the car A in Figs. 2 and 4.

The clamp is raised from the car and is also controlled in its descent onto the car by means of an electric motor geared with the clamps. On the outer face of the leg 51 of the clamp I provide a rack 55 which meshes with a pinion connected through a suitable train of gearing to be described, with a pinion 61 on the armature shaft of the motor 60. By means of this gearing the motor when sufficiently energized, may operate to raise the clamp from the car; also during the lowering of the clamp the less powerful current acting on the motor in the same direction, will resist the lowering of the clamp and thus effect a dynamic braking, preventing it striking the car with undue impact, as well as preventing an undue strain on the gear train, due to the momentum of the motor when the clamp stops.

To allow each clamp to settle independently onto the car side, and at the same time to enable all the clamps to be raised as a unit to free the car, I provide differential or compensating mechanism in the train of gearing between the motor and clamps, two embodiments of which are illustrated respectively in Figs. 1 and 3. Referring to Fig. 1, there will be seen two motors 60, each of which operates two adjacent clamps 50. The pinion 61 of each motor is shown in this view as geared with an intermediate gear 62 on a lay shaft 63, which shaft carries a pinion 64 meshing with the gear 65 of the differential mechanism. As shown, this gear 65 carries internally on radial axes a plurality of bevel pinions 66, each of which meshes with two bevel gears 67 on opposite sides thereof. Each bevel gear 67 is connected with an individual shaft 68, each of which carries a pinion 69 meshing with the rack bar 55 on the outer side of the corresponding clamp leg.

As the clamps drop toward the car the slightly energized motor, through the mechanism described, will retard the movement, allowing the two clamps to come down as a unit gradually. As soon as one of the clamps engages the top of the car, the differential mechanism allows the other clamp of that pair to settle snugly against the car top. Then a brake applied to the motor will effectively hold both clamps in position. As the two motors in Fig. 1 are independent there is an equalization between the two sets of clamps, and thus every one of the four clamps shown obtains a firm seating on the car top and is then locked by the brake in such snug engagement.

Fig. 3 illustrates a single motor for positioning the four clamps and in this case this motor acts through compensating mechanism on the two compensating mechanisms for the respective pairs of clamps, thus producing an equalizing effect on the four clamps, though they are all controlled by one motor. In this view, the pinion 61 of the motor 60 is shown as meshing with the gear 70 which carries on radial axes bevel pinions 71 meshing with the two bevel gears 72 on the individual shafts 73. These shafts carry pinions 74 which mesh with the respective main gears 65 of the two differentials, controlling the individual shafts 68 geared with the racks 55, as previously referred to in describing gearing in Fig. 1.

To control the motor and motor brake for the car clamps automatically as the cradle turns, I arrange the circuits so that the motor when energized always tends to act in a direction to raise the clamps, and I provide a series of switches on the cradle controlling the circuits therefrom to the clamp motor and to an electromagnetic brake for that motor, so that as the cradle begins to turn the brake is first released and the clamp motor is successively given greater energizations to counteract but not overcome the force of gravity in bringing down the clamp. This operation occurs very soon after the cradle begins to turn. Then, as the clamps become seated, these switches open the circuit to the motor and cause the application of the brake to the motor armature, holding the clamps in position until the dumping is effected.

On the return movement of the cradle, the brake remains engaged until the cradle has nearly reached its normal position; as it comes to normal position the brake is disengaged and the motor circuit closed with a current of sufficient power to raise the clamps. As the clamps come into their final raised position they operate a limit switch to open the motor circuit and apply the brake to the motor armature, restoring the normal standing condition.

Fig. 5 illustrates, by way of example, an arrangement of switches, circuits, resistances and solenoids which may be employed to control the motor and the brake on the armature for effecting the operations just described. It is to be understood that the switches are designed to be mounted about the periphery of the cradle and to have movable operating members which coact with a suitable stationary member as the cradle turns, the stationary member being any suitable rail or series of stops arranged in a line tangential to the cradle.

Describing now the illustrative electrical connections illustrated in Fig. 5, 1 indicates the cradle, 2 the sationary rail forming the abutment for the switches, 60 the clamp-actuating motor on the cradle, 150 the solenoid-controlled brake on the motor armature. 151 the spring tending to apply such brake, and 201 to 205 inclusive, various switch contacts.

More specifically, the contact 201 controls the hoisting of the clamp; contacts 202, 203 and 204, on the line 208. control the gradually increasing energization of the motor to retard the clamp as determined by resistance R, R^1 and R^2; and the contacts 205 effect the opening of the motor and the application of the solenoid brake after the cradle has returned to normal position and the clamp has been hoisted to its uppermost position.

In the normal position of the cradle, the switch 201 has been closed by the return of the cradle and the switch 205 has been opened by the raising of the clamp to its maximum height. As shown, these switches 201 and 205 are substantially alike in that either will operate to open or close the motor circuit, each independent of the other by reason of the third wire connection 207. Each of these switches is provided with two pairs of opposing contacts across one pair of which is adapted to be snapped a bar 215. A ratchet mechanism consisting of a notched wheel 216 and an operating finger 217 throws the bars across a different pair of contact points for each successive complete operation of the cradle or clamp. The usual spring devices are used to insure the complete throwing of the switch bars.

In the normal position, all of the circuits are open, the motor is accordingly deenergized, as is also the solenoid of the electromagnetic brake, and the spring 151 of the latter maintains it applied.

As the cradle turns toward the left, the first switch closed is 202 by reason of engagement with the abutment 212. This connects the current from a suitable source indicated at S through the solenoid magnet to release the brake and through the entire resistance R, R^1 and R^2 and the motor, giving the motor a slight energization in the direction to raise the clamp. As the switch 203 engages the abutment 213 the resistance R^2 is cut out, strengthening the motor action; then as the switch 204 engages the abutment 214 the resistance R^1 is cut out leaving the circuit through simply the resistance R, which gives the motor its maximum dynamic braking action without giving it sufficient force to raise the clamp, the result being that the clamp gradually descends.

It should be noted that these switches 201 to 204 are all close together on the periphery of the drum and all act before the effect of gravity has been materially decreased by the tipping of the clamp. Each of the switches 202 and 203 is designed to retain the circuit closed until the succeeding switch is active. When the switch 204 clears the abutment 214, the circuit is open through the motor and the brake solenoid, and hence the spring 151 applies the brake on the motor and thus holds the clamp in active position. After the contact 204 clears the abutment 214, the parts remain with the clamp effectively locked against the car, and the clamp motor is idle for the rest of the turning of the cradle.

Upon the return movement of the cradle, after the car is dumped the switches 214, 213 and 212 may again act to close the motor circuit but this is idle as the energization is insufficient to raise the clamps. When the cradle returns to normal posi-

tion the closing of the switch 201 energizes the solenoid 154 which closes the switch 155 against the pull of a spring 156 tending to normally hold it open, thereby directing current through the solenoid 153 which releases the brake on the motor.

The motor then acts through the gear train to raise the clamp. Finally, as the clamp reaches its uppermost position it opens the switch 205 which is connected with the switch 201 by reason of the third line 207, and thus opens the motor circuit and the brake solenoid circuit, thus applying the brake to hold the clamp in elevated position.

It will be seen from the above description of illustrative circuits and switches that by a comparatively simple electromagnetic arrangement I am enabled to provide for the automatic control of the clamp as the cradle turns. In such turning operation, first the car moves over against the bumper beams, then the clamps are gradually lowered and easily seated effectively on the upper edge of the car and are then held in this position until the dumping is completed and the cradle returned, and then as the cradle comes into its final position, the clamp is automatically raised to its free position and there held. The empty car is now free and ready to be shoved out of the cradle and a new car shoved into its place and the action repeated.

The construction of the cradle, the suspension of the platform, the clamping of the car, and the electrical control above described, may be the same whether the cradle rotates or rolls. If it is to rotate it may be conveniently supported as shown in Fig. 2 wherein each of the two rings 10 track on wheels 80 carried by equalizer beams 81 pivoted at 82 to suitable brackets 83. These brackets are shown as adjustably mounted in seats 84 and locked in final position by bolts 85 and jamb nuts 86. The cradle so supported is designed to dump into suitable hoppers 5 beneath it.

To rotate the cradle, I may provide circular racks 90 on the cradle meshing with the pinions 91 of a suitable driving train. Fig. 1 shows the pinions 91 mounted on a longitudinal shaft 92 which carries a pinion 93 meshing with one member 94 of a suitable reduction gear train, not fully shown but designed to connect with a suitable motor.

Fig. 3 illustrates means for rotating the cradle by cables and drums. As shown in this view, adjacent each of the supporting tracks 18 on the rings 10 is a narrow drum 100 about which extends the proper number of turns of a cable 101 which is wrapped around the driving drum 102 supported at some suitable point on the stationary part of the equipment. Thus by rotating the driving drums the cradle may be rotated in a corresponding direction. Any suitable means may be employed for rotating the driving drums; Fig. 3 shows on each drum a gear 104 meshing with the pinion 105 on a shaft 106 which through suitable reduction gearing 107, 108 and 109 is connected with a driving motor 110.

Fig. 3 illustrates a brake drum 115 on the shaft 116 between the pairs of gears 107 and 108. This drum is controlled by a rock shaft 118 leading to suitable hand lever or other operating member not shown. By means of this brake and the control of the motor 110 the cradle may be stopped at any point in its rotation desired. It is to be understood that a similar motor and brake connection is provided for the train of gearing indicated in Fig. 1.

Fig. 4 illustrates my cradle mechanism embodied in a structure where the cradle rolls instead of rotating. The cradle construction is the same as already described. Instead, however, of the supporting wheels 80 for the circular track 18, this track rests on horizontal transverse rails 120. These rails extend from the receiving position, where the cradle rails 32 register with the stationary outside rails, laterally toward the left for a distance somewhat greater than half the periphery of the circular track to lie over a suitable receiving hopper indicated at 6.

The rolling of the cradle may be very conveniently effected by means of cables which pass about the cradle (as for instance on drums 100 illustrated in Fig. 3) and are anchored to the cradle and then pass to external winding drums. Thus in Fig. 4 one cable 130 anchored to the cradle passes therefrom onto the drum 131 while the other cable 132 anchored to the drum extends in the opposite direction and thence over an idler sheave 133 and finally passes onto the opposite side of the winding drum 131. The drum 131 is suitably geared through reduction gearing with a driving motor as indicated by the driving pinion 136 meshing with the gear 137 on the drum 131.

Having thus described my invention, I claim:

1. In a car dumping apparatus, the combination of a cradle adapted to tip and provided with means to support a car, clamp for such car, a motor connected with such clamp, and means controlled by the tipping of the cradle for controlling the motor.

2. In a car dumping apparatus, the combination, with a cradle provided with means for supporting a car, of means for clamping such car, and a motor connected to act as a dynamic brake against the application of the clamping means.

3. In a car dumping apparatus, the combination, with a cradle adapted to tip and

provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car and a motor connected with said clamp, means for controlling the motor to cause it to act as a dynamic brake on the descent of the clamp.

4. In a car dumping apparatus, the combination with a cradle provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car and a motor geared with said clamp, means for controlling the motor to cause it to act as a dynamic brake on the descent of the clamp and means for automatically increasing the resisting action by the motor as the clamp descends.

5. The combination of a cradle adapted to tip and provided with means for supporting a car, means for clamping such car, and a motor adapted to resist the application of the clamp and also to withdraw the applied clamp, and means actuated by the tipping of the cradle for controlling such a motor.

6. In a car dumping apparatus, the combination, with a cradle provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car and a motor geared with said clamp, means for variably energizing the motor in the direction to raise the clamp, one of such energizations being non-effective and another effective in raising the clamp.

7. In a car dumping apparatus, the combination, with a cradle adapted to tip and provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car and a motor geared with said clamp, means for controlling the motor to cause it to act as a dynamic brake on the descent of the clamp, and means controlled by the tipping of the cradle to increase the resisting action of the motor as the clamp descends.

8. In a car dumping apparatus, the combination of a cradle provided with means for supporting a car, a clamp slidably mounted in the cradle and having a rack, a motor geared with said rack and means for giving said motor a non-effective tendency to turn in the direction to release the clamp.

9. In a car dumping apparatus the combination of a cradle adapted to tip and provided with means for supporting a car, clamps slidably mounted in the cradle and having racks, a motor geared with said racks, and means for automatically controlling said motor consequent upon the tipping of the cradle.

10. The combination of a cradle adapted to tip and provided with means for supporting a car, a clamp adapted to descend by gravity, a motor adapted to resist such descent without overcoming it, means controlled by the tipping of the cradle to increasingly energize the motor as the clamp descends, and means controlled by the return of the cradle to still further energize the motor to raise the clamp.

11. In a car dumping apparatus, the combination with a cradle provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car, a motor connected with said clamp, means for controlling the motor to cause it to act as a dynamic brake on the descent of the clamp, and an electromagnetic brake for locking the clamp.

12. In a car dumping apparatus, the combination with a cradle provided with means for supporting a car, of a clamp for such car adapted to descend by gravity onto a car and a motor geared with said clamp, means for controlling the motor to cause it to resist the descent of the clamp, means for automatically increasing the resisting action by the motor as the clamp descends and an electromagnetic brake on the motor for holding the clamp engaged.

13. In a car dumping apparatus, the combination of a cradle adapted to tip and provided with means to support a car, a clamp for such car, a motor connected with such clamp, an electromagnetic brake for the motor, and means controlled by the tipping of the cradle for controlling the motor and electromagnetic brake.

14. In a car dumping apparatus, the combination with a cradle adapted to tip and provided with means for supporting a car, of a clamp adapted to descend by gravity onto said car, a motor geared with such clamp, an electromagnetic brake for such motor, and automatically controlled circuits for relieving the brake and increasing the energization of the motor as the cradle tips to allow the clamp to seat, for then applying said brake to lock the clamp, and after the car has been dumped and substantially righted to release the brake and still further energize the motor to raise the clamp.

15. In a car dumping apparatus, the combination of a cradle adapted to tip and provided with means to support a car, a movable clamp to clamp such car, a motor geared with such clamp, an electromagnetic brake for such motor, a series of switches successively actuated by the tipping of the cradle, and circuits from said switches to the motor and the electromagnetic brake and so arranged that when the cradle tips the electromagnetic brake is released and the motor increasingly energized in successive steps to retard the descent of the clamp and thereafter the motor circuit is opened and the brake is applied to lock the clamp and to hold it locked during dumping.

16. In a car dumping apparatus, the combination of a cradle adapted to tip and provided with means to support a car, a movable clamp to clamp such car, a motor

geared with such clamp, an electromagnetic brake for such motor, a series of switches successively actuated by the tipping of the cradle, and circuits from said switches to the motor and the electromagnetic brake so arranged that when the cradle tips to dump the electromagnetic brake is released and the motor non-effectively energized to retard the descent of the clamp and thereafter the motor circuit is opened and the brake is applied to lock the clamp end and to hold it locked during dumping, and a switch operated as the cradle returns to normal position to release the brake and energize the motor sufficiently to raise the clamp, and a switch controlled by the clamp in reaching its maximum elevation to open the motor circuit and apply the brake.

17. In a car dumping apparatus, the combination with a cradle adapted to be turned, of a suspended swinging platform within the cradle adapted to swing transversely of the cradle, a bumper carried by the cradle to abut the side of the car when the platform swings, and an L-shape clamp guided on the side of the cradle carrying the bumper and having an overhanging arm adapted to engage the tops of the opposite walls of the car.

18. In a car dumping apparatus, the combination with a cradle adapted to be turned, a platform thereon having a track for a car, upwardly extending links pivotally connected to the platform and to the cradle to suspend the platform and allow it to swing laterally, and a clamp carried by that side of the cradle toward which the platform swings and adapted to engage the top of both sides of the car.

19. In a car dumping apparatus, the combination with a barrel-like cradle having an open top trough-like space for a car, a platform therein adapted to support a car, upwardly extending links pivotally connected to the opposite sides of the platform and to the cradle to suspend the platform and allow it to swing laterally, and upright bumper beams carried by the cradle at the side of the platform.

20. In a car dumping apparatus, the combination of a cradle adapted to turn, a car supporting platform therein, links suspending said platform whereby it may swing, and coacting abutments on the platform and cradle positioned so as to be held in engagement by the action of gravity when the cradle is in normal position.

21. In a car dumping apparatus, the combination of a barrel-like cradle, a support therefor upon which the cradle may turn, said cradle having an open passageway adapted to house a car, a platform in said passageway for supporting the car, links pivoted at their upper ends to the cradle at the sides of said passageways and converging downwardly and pivoted at their lower ends to the opposite sides of the platform, the platform being materially narrower than the car space within the cradle, whereby the platform may swing within the cradle.

22. In a car dumping apparatus, the combination of a cradle, a platform for supporting the car, links pivoted at their upper ends to the cradle and converging downwardly and pivoted at their lower ends to the opposite sides of the platform, the links on the side toward which the platform swings in the dumping operation being shorter than links on the opposite side of the platform, and there being coacting abutments on the under side of the platform and the upper side of the cradle beneath the platform adapted to engage by gravity when the platform is central to the car space in the cradle.

23. In a car dumping apparatus, the combination with a cradle adapted to turn and having means for supporting a car, a plurality of clamps adapted to engage the car and to hold it in place, locking means for the clamps common to a plurality of them, and an equalizing mechanism between the locking means and said plurality of clamps.

24. In a car dumping apparatus, the combination with a cradle adapted to turn and provided with means for supporting a car, of a plurality of clamps adapted to engage the top of the car, a controlling member geared with such plurality of clamps by means including compensating mechanism whereby the clamps may seat independently, and means for holding the controlling member to lock the clamps in position.

25. In a car dumping apparatus, the combination of a cradle provided with means for supporting a car, clamps to engage the top of the car, racks carried by said clamps, a rotary member, a train of gearing between the rotary member and the clamps including rotary compensating mechanism to enable the clamps to move independently, and means for applying a brake to the rotary member.

26. In a car dumping apparatus, the combination of a cradle adapted to tip, means on the cradle to support a car, a plurality of clamps overhanging on the top of such car and provided with legs slidably engaging the cradle, racks on such legs, a controlling member geared with such racks through a train of gears, such train of gears including compensating mechanism to enable the clamps to seat independently, and means for locking such controlling member.

27. In a car dumping apparatus, the combination of a cradle adapted to tip and having a space for the reception of a car, a laterally moving platform carried by the cradle for supporting the car, a plurality of clamps adapted to engage the top of such

car, and having legs guided in ways on the cradle at the side of such car, racks on such legs, a rotary member, a train of gears between such member and racks, said racks including compensating mechanism, and a friction brake adapted to hold the rotary member.

28. The combination of a cradle adapted to tip and provided with means for supporting a car, clamps mounted on the cradle and each provided with a rack, a pair of pinions meshing with the respective racks, a pair of shafts for rotating the respective pinions, differential mechanism for connecting said two shafts, and means for operating the differential mechanism.

29. In a car dumping apparatus, the combination of a cradle adapted to tip and provided with means for supporting a car, clamps arranged in pairs for engaging the car, equalizing mechanism between the two clamps of a pair, equalizing mechanism between the respective pairs, and locking means acting on the latter equalizing mechanism.

30. A cradle adapted to tip and provided with means for supporting a car, pairs of clamps for locking the car, each clamp being provided with a rack, pinions meshing with respective racks, shafts connected with the respective pinions, compensating mechanisms respectively connecting the clamps of a pair, pinions and shafts for rotating respective compensating mechanisms, and a compensating mechanism connecting the two shafts last mentioned.

31. In a car dumping apparatus, the combination with a cradle adapted to tip and provided with means for supporting a car, of a plurality of clamps for such car, a motor, a train of gearing connecting the clamps and motor and including equalizing mechanism to enable the clamp to seat independently, and means for so controlling the motor that it resists but does not overcome the seating movement of the clamps on the dumping movement of the cradle.

32. The combination of a cradle adapted to tip and provided with means for supporting a car, a plurality of clamps adapted to descend onto the car, a motor geared with the clamps to resist their descent without overcoming it, compensating mechanism included in such gearing to enable the clamps to seat independently, and means controlled by the tipping of the cradle to control the motor.

33. In a car dumping apparatus, the combination with a cradle adapted to be turned, of a suspended swinging platform within the cradle adapted to swing transversely of the cradle, a clamp slidably mounted on the cradle at the side toward which the platform swings, a motor for controlling the descent of the clamp, and means controlled by the turning of the cradle to control the motor.

34. In a car dumping apparatus, the combination of a cradle adapted to turn, a laterally movable car supporting platform therein, a bumper on one side of the cradle for receiving the side thrust of the car when the cradle turns, links for so supporting the platform that it tends to move laterally away from the bumper when the cradle is in normal position, and coacting abutments on the platform and cradle preventing such movement.

35. In a car dumping apparatus, the combination of a cradle, a support therefor upon which the cradle may turn, a platform in said cradle for supporting the car, links pivoted at their upper ends to the cradle and converging downwardly and pivoted at their lower ends to the opposite sides of the platform, the platform being materially narrower than the space within the cradle whereby the platform may swing, abutments limiting the swing of the platform in one direction, and means receiving the side thrust of the car and limiting its movement in the opposite direction.

In testimony whereof, I hereunto affix my signature.

ROBT. W. KALTENBACH.