Nov. 10, 1953 J. L. BONANNO ET AL 2,658,602

TOY CAR LOADER

Filed Dec. 23, 1949 3 Sheets-Sheet 1

Fig. 1.

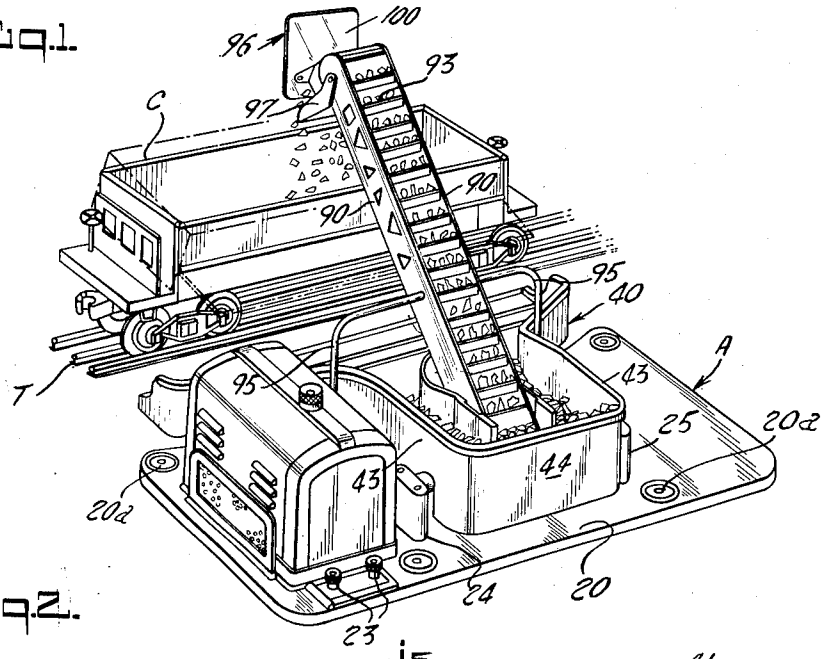
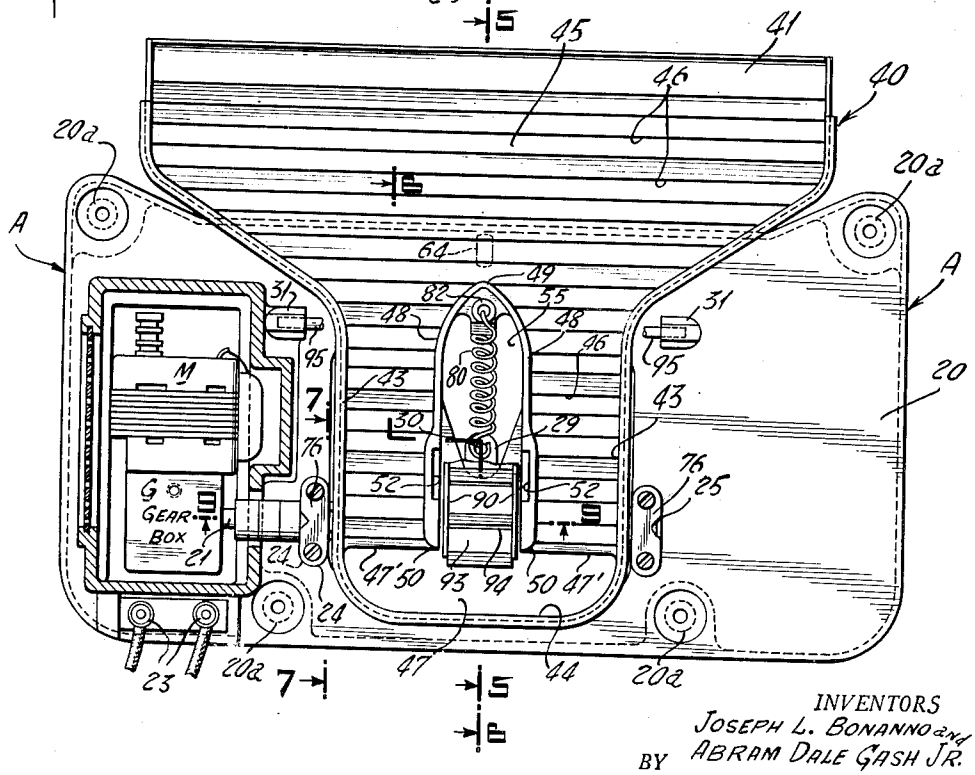


Fig. 2.

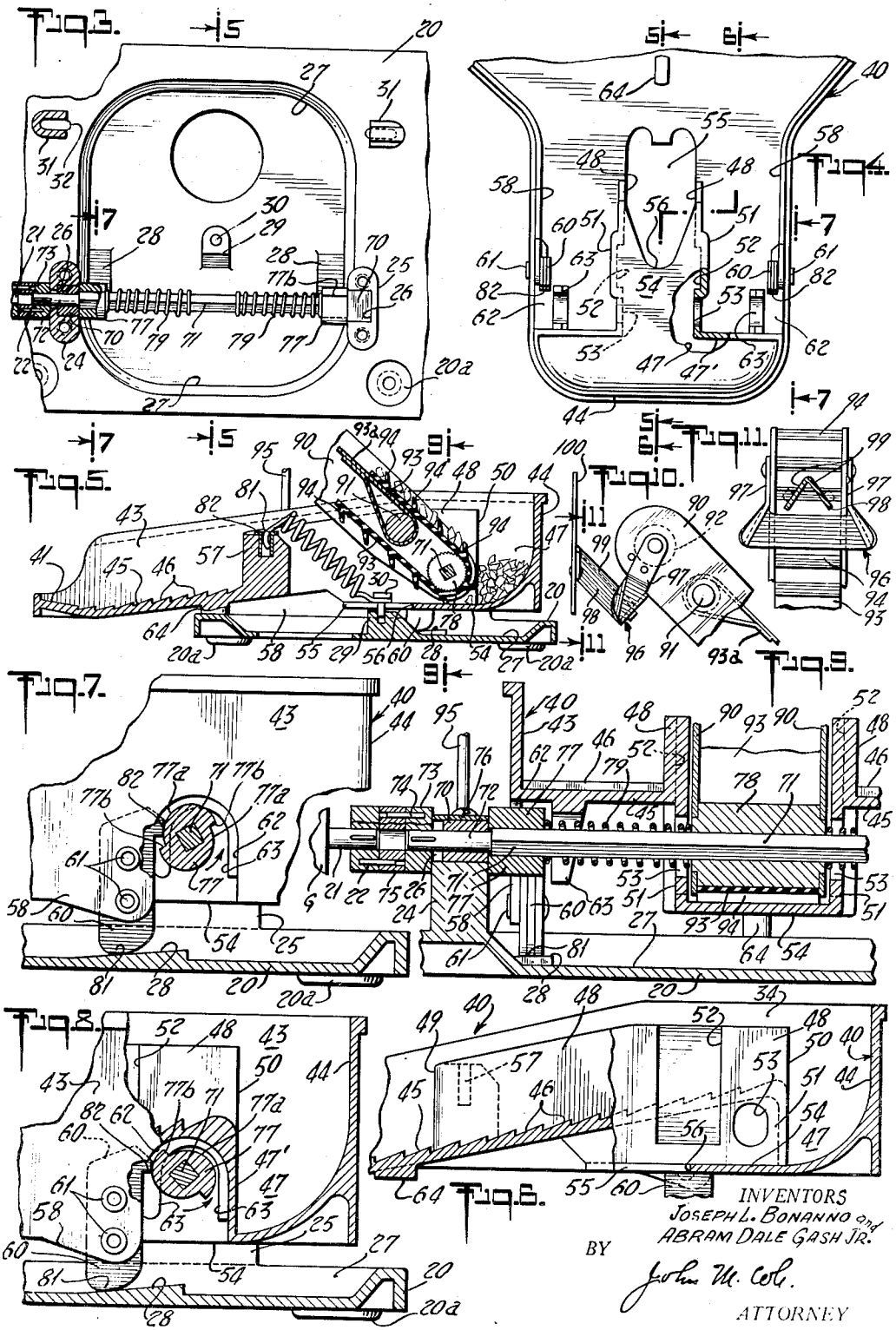


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Filed Dec. 23, 1949 3 Sheets-Sheet 2



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TOY CAR LOADER

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Fig. 12.

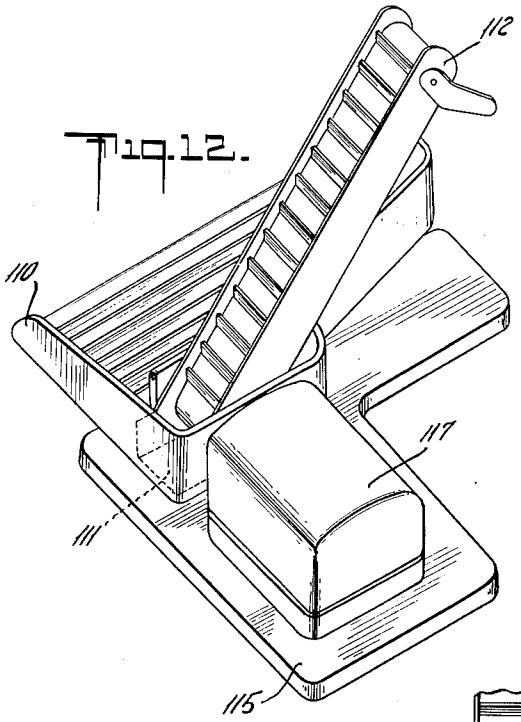


Fig. 14.

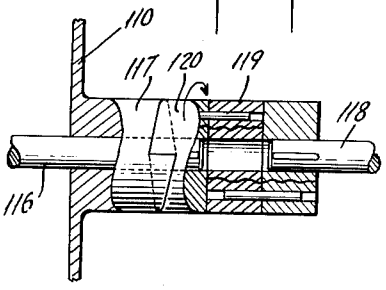


Fig. 15.

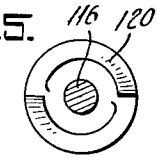


Fig. 13.

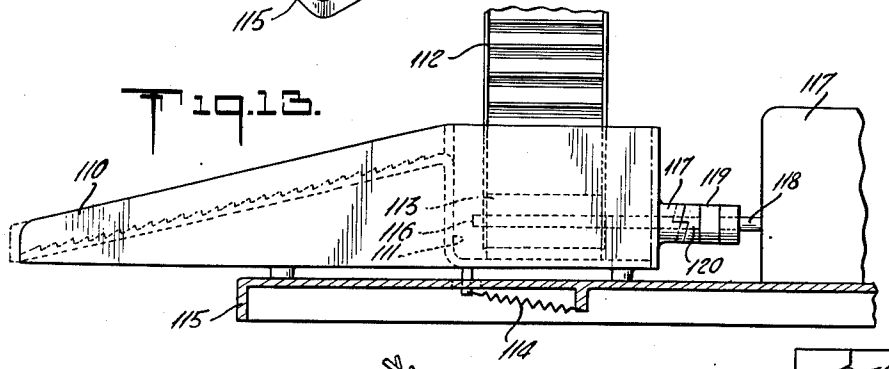
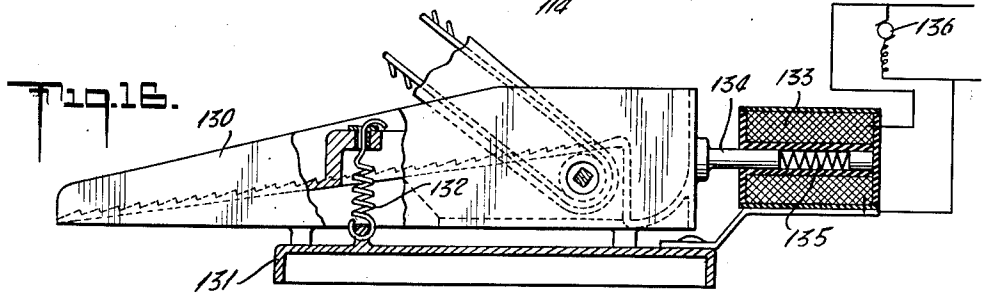


Fig. 16.



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Patented Nov. 10, 1953

2,658,602

UNITED STATES PATENT OFFICE

2,658,602

TOY CAR LOADER

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Application December 23, 1949, Serial No. 134,758

26 Claims. (Cl. 198—55)

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The present invention relates to toy car loaders and the like and is more particularly directed toward loaders suitable for use in handling discrete particles such as toy coal to be loaded onto conveyors such as toy cars.

The present invention contemplates a complete unitary railroad toy more suitable for use as a toy railroad accessory whereby a quantity of small particles, such for example as toy coal, may be stored in a hopper and by means of mechanism in the toy be shifted from the hopper onto a belt type conveyor whereby it may be conveyed upwardly and dumped into a receptacle such as a toy car.

According to the present invention the toy loader has a relatively stationary base which supports a vibratory hopper, a conveyor mechanism and all operating mechanism. In its preferred form the operating mechanism derives all power from a single motor through reduction gearing so that the motor not only drives the belt conveyor but also effects vibration or movement of the hopper back and forth to cause the loose particles on it to travel toward the part of the hopper from which the conveyor is adapted to remove the same. In order to increase the play value of the toy it is arranged so that it can receive the contents dumped from a toy car and hold the contents until it is desired to repile the material or reload it into the same or another car. This hopper is arranged so that the material can be transported upwardly and away from the car track where it falls into a well from which the conveyor carries it upwardly and forwardly for discharge into the car being loaded.

Instead of using a single motor drive for effecting the vibration of the hopper and actuating the conveyor, the present invention also contemplates the employment of an alternating current solenoid vibrator for actuating the hopper and the motor for actuating the conveyor.

Other and further objects will appear as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, three embodiments in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same.

In the accompanying drawings:

Figure 1 is a perspective view illustrating one form of accessory toy alongside a car track carrying a car to be loaded with the material or from which the material is to be unloaded;

Figure 2 is a top plan view of the device with parts broken away to show the power unit;

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Figure 3 is a fragmentary top plan view of the base and drive shaft with the hopper omitted and parts in section;

Figure 4 is a fragmentary inverted plan view of the central portion of the hopper;

Figure 5 is a vertical sectional view taken on the line 5—5 of Figures 2, 3 and 4 showing the base, the hopper and the conveyor;

Figure 6 is a sectional view on the broken line 6—6 of Figures 2 and 4 showing the hopper only;

Figure 7 is a sectional view taken on the line 7—7 of Figures 2, 3 and 4 showing the cams and cam followers employed to control the movement of the hopper over the base;

Figure 8 is a view similar to Figure 7 showing the parts in a different position with parts broken away to show interior construction;

Figure 9 is a vertical sectional view taken on the line 9—9 of Figures 2 and 5;

Figure 10 is a fragmentary side elevational view of the upper end of the conveyor beam;

Figure 11 is a cross sectional view taken on the line 11—11 of Figure 10;

Figure 12 is a perspective view of a modified form of construction;

Figure 13 is a side elevation with parts in section;

Figures 14 and 15 are enlarged views illustrating cam and cam follower details; and

Figure 16 is a fragmentary view of a device employing an alternating current solenoid.

In Figure 1 a length of toy track is illustrated at T and a side dumping toy car, such as shown in application Ser. No. 730,076, filed February 2, 1947 now Patent No. 2,585,731, is indicated at C. Such a car is adapted to contain a load of toy coal, ore, or the like to carry the same about on the toy track. It is adapted to dump the load when the parts are shifted by remote control to the dot and dash position.

The toy car loader designated generally by the reference character A, Figs. 1 and 2, is placed alongside the track and at the same level as the track. It has a metal base plate 20 of generally rectangular shape and preferably provided with resilient rubber feet indicated at 20a so as to facilitate vibration of the device and avoid shifting of it about on the table or other support. This base plate fixedly carries a power unit having a motor M and gear box G provided with a horizontal takeoff shaft 21 with driving prongs 22. The motor is connected to binding posts 23 so that the operation of the motor can be controlled remotely as desired. The motor and gear box are designed to drive the shaft 21 approximately 60 revolutions per minute.

In line with the axis of the shaft 21 the base is provided with two bearing posts 24, 25 with square recesses 26, 26. The base 20 is provided with a large centrally located recess 27 between the posts 24, 25 and extending from near the front to near the rear, as will be apparent in Fig. 3. Extending upwardly from the bottom of this recess are two upwardly and rearwardly sloping ramps or cam elements 28, 28 slightly to the front of the axis of shaft 21. Also extending upwardly from the center of the recess 27 is a post or boss 29 fixedly carrying a steel pin 30. Toward the front of the plate 20 and on opposite sides of the recess 27 the plate is provided with raised or dome-like portions 31, 31 downwardly recessed as indicated at 32, at the end left of Fig. 3.

The hopper 40 is a plastic molding with a long relatively low front portion 41 preferably dished as indicated in Figure 5, and adapted to receive and retain the material dumped from the car C onto it. The hopper is narrower toward the rear and has side walls 43, 43 and a rear wall 44. The bottom 45 preferably slopes upwardly and rearwardly as indicated in Figs. 5 and 6. It is provided with steps indicated at 46, 46 which in practice may be approximately ¼" wide and $\frac{1}{16}$" deep. Narrower steps may be used if desired. These steps extend up to the front wall 47' of a well 47, the other walls of the well being formed by the rear wall 44 of the hopper and the interconnecting portions of the side walls 43. The play value of the toy is enhanced by having the material climb up the sloping hopper bottom and the arrangement provides space above the base to accommodate the driving mechanism to be described. The upper rear portion of the hopper is also provided with two spaced walls 48, 48 which diverge as indicated at 49 and terminate at 50, 50 adjacent the front wall 47 of the well. The walls 48, 48 serve to divide the stream of material which moves up the hopper and provide space to accommodate the conveyor to be described.

The walls 48, 48 of the hopper extend downwardly as indicated at 51, 51, are grooved as indicated at 52 and the lower portions 51 are provided with vertically elongated apertures 53. The dependent walls 51, 51 of the hopper molding are interconnected by a bottom wall 54. The hopper is also provided with a comparatively large central opening 55 defined by the front edge 56 of the bottom wall 54 and by the side walls 48, 48. The hopper molding is provided with an upwardly opening hole or recess 57 immediately to the rear of the meeting point of the walls 48.

The side walls 43 of the hopper also extend downwardly as indicated at 58 and to these depending wall portions metal cam follower members 60 are secured by rivets 61. These metal members protect the softer plastic against wear. To the rear of the cam followers 60 the depending side walls 43, 43 of the hopper are notched as indicated at 62, these notches being wider than the holes 53 and higher. Close to the cam follower member 60 the hopper molding has downwardly extending abutment members 63, 63. Toward the front of the hopper the bottom surface is provided with a downwardly extending bearing lug 64.

The recesses 26, 26 in the posts 24 and 25 in the base receive bearing blocks 70. These blocks carry a shaft 71 made out of squared stock with turned down ends 72, 72. The end of the shaft 72 toward the motor carries a coupling member

73 with driving prongs 74 entering a flexible coupling member 75. This coupling member also receives the prongs 22 on the end of the shaft 20.

The bearing blocks 70 are held in place by cover plates 76. The squared portion of the shaft 71 carries two cylindrical cam members 77, 77 which are opposite the cam followers 60. These cam members have inclined faces 77*a* and shoulders 77*b* and are driven in a counterclockwise direction as viewed in Figs. 7 and 8. The shaft 71 passes through the oversize holes 53, 53 in the hopper mold and carries the driving roller 78 of the belt conveyor to be described. This roller is centralized by expansion springs 79 carried on the shaft 71 and bearing against the cam members 77.

The hopper is held in position on the base by a coiled spring 80 secured to the post 30 and having an end 81 received in a bushing 82 carried in the hole 57 in the hopper molding. This spring 80 is comparatively strong and urges the hopper downwardly and rearwardly. The downward movement is controlled by engagement of the lug 64 on the hopper with the front of the base 20 and by engagement with the lower ends 81 of the cam followers 60 with the ramps 28 carried by the base. These form a three point support. The rearward position of the hopper is controlled by engagement of the tips 82 of the cam followers 61 with the surfaces 77*a* of the cams 77.

When the cams 77 are in the position shown in Fig. 7 the spring 80 is contracted and the hopper is in its rearmost position, and when the cams are turned to the position shown in Fig. 8, the hopper is moved forwardly and the spring 80 stressed. When the cams 77 turn far enough the tips 82 of the cam followers drop off the shoulders 77*b* and the hopper is suddenly shifted to the rear so that a sudden impact is given to the material carried in the hopper, causing it to move rearwardly. Upon continued operation of the motor and cams the hopper is repeatedly moved gradually forward and then snapped back suddenly by the spring and the material in the hopper gradually moves up from the lower front part of the hopper to the upper rear part of the hopper where it falls into the well formed by the parts of the hopper above discussed. This upgrade movement is facilitated by the steps formed in the hopper bottom.

It will, of course, be understood that the shift of material to the well may be over a horizontal hopper bottom and that the shaft may be located in any convenient position where it can carry cam means for shifting the hopper against spring pressure.

The material is removed from the well in any desired manner, preferably by the conveyor above referred to. This conveyor is in the form of a preassembled unit having side plates 90, 90 secured together by a plurality of distance pieces 91. The side plates carry the lower drive roller 78 which has a squared opening to fit about the shaft 71, also an upper or idler roller 92. A rubber belt conveyor 93 extends about the rollers 78 and 92 between the side plates 90, 90. This belt has obliquely extending fins 94.

Diaphragm 93*a* extending between distance pieces 91—91 assists in preventing sifting of the material.

The lower end of the conveyor is held in place by the lower roller 78 carried on the shaft 71 and the heads of the lower distance piece 91 are accommodated by the grooves 52, 52 of the hopper.

The upwardly extending portion of the conveyor is held in place by a wire bale 95 having ends which enter into the dome-like lugs 31, 31 of the base. When the parts are in this position the conveyor belt is driven from the shaft 71 and the fins or projections 94 carried by the belt wipe across the upper surface 54 of the hopper well and pass up through the contents of the well so as to pick up such material and carry it up through the conveyor.

The upper end of the beam carries a deflector-spreader assembly shown at 96. It employs a separator hinge 97 pivoted to the shaft carrying the upper idler roller 92, a separator 98 having V-shaped cross section is indicated at 99, Figure 11, and a shield 100. The shield 100 acts to prevent over-shooting of the material discharged from the belt and the V-shaped separator 99 acts to spread the material lengthwise of the car.

In the form shown in Figs. 12 to 15, inclusive, the hopper or scoop 110 resembles the hopper or scoop above described. It is arranged to discharge the material laterally into a well 111 and this well receives a conveyor 112 similar to the conveyor above described and having a horizontal driving roller 113. The scoop or hopper 110 is biased downwardly and rearwardly by springs 114. The scoop bears on the upper surfaces of the base 115 in a manner similar to that above described. The roller 113 is carried on a shaft 116 extending rearwardly from the hopper and about this shaft the hopper carries fixed cam followers 117.

To the rear of the hopper the base carries a motor reduction gear assembly generally similar to that above described and herein indicated by reference character 117. It has a drive shaft 118 aligned with the shaft 116 and drivingly connected to it through a flexible coupling 119. The shaft 118 also carries a cam member 120, which faces the cam follower 117. The rear thrust produced by springs 114 is taken up by the cam follower and cam and the mountings of the motor reduction gear unit.

When the motor is operated, the shaft 118 turns slowly and the cam 120 revolves while the cam follower 117 is pushed forwardly to tension the springs 114. When the points of the teeth on the cam pass by the points of the teeth on the cam follower, the hopper is released so that the springs 114 snap the hopper rearwardly. It will thus be seen that in this construction, a single motor is utilized to operate both the vibrating mechanism and the conveyor mechanism, and that the material is discharged laterally from the device.

In the arrangement shown in Fig. 16, the hopper 130 and base 131 are similar to that above described. Instead, however, of having a spring with a horizontal component to urge the hopper rearwardly, this construction employs a spring 132 which pulls the hopper down on the base without interfering with back and forth movement. The base carries a solenoid coil 133 placed in any convenient location and supplied with alternating current. This coil operates on an armature 134 carried by the hopper and a cushion spring 135 is employed to return the hopper 130 forwardly after it has been vibrated rearwardly. The coil 133 and motor 136 employed for operating the conveyor are in parallel so that when the circuit is closed the conveyor is operated and the hopper is simultaneously vibrated.

Since it is obvious that the invention may be

embodied in other forms and constructions within the scope of the claims, we wish it to be understood that the particular forms shown are but three of these forms, and various modifications and changes being possible, we do not otherwise limit ourselves in any way with respect thereto.

What is claimed is:

1. A toy loader for discrete particles such as toy coal or the like, comprising a base, a horizontal motor driven shaft supported above the base, a conveyor including a rigid beam and a conveyor belt, means to support the beam from the base, means to drive the conveyor from the shaft, a hopper having a discharge well into which the lower end of the conveyor belt enters, means to secure the hopper to the base for vibratory movement relative to the base, the hopper having an extended bottom adapted to receive the particles, and hopper vibrating means operated concurrently with the motor driven shaft and effecting transfer of such particles across the bottom thereof and into the discharge well.

2. A loader such as claimed in claim 1, wherein the bottom of the hopper slopes upwardly and rearwardly.

3. A loader such as claimed in claim 1, wherein the upper surface of the hopper bottom has rearwardly facing steps.

4. A loader such as claimed in claim 1, wherein the bottom of the hopper slopes upwardly and rearwardly and the hopper has rearwardly converging side walls, a back wall behind the well, and deflecting walls at the sides of the conveyor.

5. A loader such as claimed in claim 1, wherein the bottom of the well extends under the conveyor belt and the belt has flexible scrapers bearing on the well bottom.

6. In a loader for discrete particles such as toy coal or the like, a base, a horizontal motor driven shaft supported above the base, a conveyor including a rigid beam and a conveyor belt, means to support the beam from the base, means to drive the conveyor belt from the shaft, a hopper having a discharge well into which the lower end of the conveyor belt enters, the hopper having an extended bottom adapted to receive the particles, and hopper vibrating means which effect transfer of such particles across the bottom thereof comprising means biasing the hopper rearwardly and shaft driven cam means which alternately move the hopper forwardly to tension the biasing means and then release the hopper so that the biasing means snaps it rearwardly.

7. A loader such as claimed in claim 6 wherein the shaft extends at right angles to the direction in which the cam means and biasing means shift the hopper.

8. A loader such as claimed in claim 6 wherein the shaft extends in the same direction as that in which the cam means and biasing means shift the hopper.

9. A loader such as claimed in claim 6, wherein the shaft is supported from the base and extends at right angles to the direction in which the cam means and the biasing means shift the hopper, the hopper having depending elements provided with oversize apertures to receive the shaft.

10. A loader such as claimed in claim 6, wherein the hopper is a plastic molding and carries metal cam followers bearing on the shaft driven cams and on the base.

11. A loader such as claimed in claim 6, wherein the conveyor belt is in the form of a rubber band

with outwardly extending transverse fins adapted to engage the material and hold it against sliding down the conveyor belt as the loader is vibrated.

12. A loader such as claimed in claim 6, wherein the shaft is non-circular and the conveyor has a drive roller with non-circular hole fitting the shaft.

13. A loader such as claimed in claim 6, wherein the shaft extends at right angles to the direction in which the cam means and biasing means shift the hopper and is non-circular and the cam means have non-circular openings fitting the shaft.

14. In a loader for discrete particles such as toy coal and the like, a base, a horizontal motor driven shaft, a conveyor unit including a beam extending upwardly from the shaft and shaft driven conveyor belt carried by the beam a hopper having a discharge well into which the conveyor extends, the hopper having a bottom leading to the well, and means to effect the transfer of discrete particles across the bottom comprising shaft driven cam means, hopper carried cam follower means and a spring biasing the hopper downwardly and rearwardly, the base having opposing surfaces on which the cam followers bear, the cam means having surfaces which move the follower means and hopper forwardly to tension the spring and past which the follower means move so that the spring snaps them and the hopper rearwardly.

15. A loader such as claimed in claim 14, wherein the surfaces on which the follower means bear are upwardly and rearwardly sloping, whereby the hopper also moves upwardly when snapped rearwardly.

16. A loader for toy cars and the like comprising a base adapted to be placed alongside and spaced from a toy track, a hopper having a relatively long front portion and a rear narrow portion over the base, means for locating the hopper on the base for movement forwardly and rearwardly comprising an upwardly and forwardly facing, base carried bearing surfaces engaging downwardly and rearwardly facing hopper carried bearing surfaces, a spring urging the hopper rearwardly and downwardly to hold said bearing surfaces in contact, and a base-carried shaft carrying a rotary cam having surfaces which force the hopper forwardly to stress the spring and shoulders which release the hopper for movement by the spring.

17. A toy material handling device for use with toy dump cars and the like, comprising a base, a hopper having a receiving portion adapted to accept material discharged from the side of the car, an upwardly and rearwardly sloping bottom with rearwardly facing steps and a discharge well beyond the rearmost step, means for vibrating the hopper to cause particles therein to fall into the well to the rear of the hopper and comprising a spring biasing the hopper rearwardly and downwardly, stops limiting its rearward and downward movement, and spring tensioning cam means having release shoulders which allow the spring to shift the hopper suddenly, and a belt conveyor extending upwardly from the bottom of the well.

18. In a loader for discrete particles such as toy coal or the like, a base having separated bearings, an operating shaft rotatably carried in the bearings, a hopper member having at its rear a discharge well with apertured walls through the side walls of which the shaft freely passes and a bottom extending forwardly from the discharge well at an elevation above the shaft, a conveyor extending upwardly from the discharge well and drivingly connected with the shaft, the hopper having vertical walls to guide material past the conveyor and into the well, a pair of cams drivingly carried by the shaft and spaced from the apertured walls of the well, cam followers carried by the hopper and bearings against the cams and the base, and a spring urging the hopper rearwardly and downwardly, the cams alternately moving the hopper forwardly and then releasing it so that the spring snaps its rearwardly.

19. A loader such as claimed in claim 18 having expansion springs about the shaft and bearing against the cams and the conveyor.

20. A loader such as claimed in claim 18 wherein the hopper has abutments adjacent the cams to limit movement of the hopper lengthwise of the shaft.

21. A toy for handling discrete particles such as toy coal, said toy having a flat base plate, a power supply unit including an electric motor and reduction gearing carried by the base and having a horizontal drive shaft above the top of the base, the base having two bearing posts aligned with the shaft spaced from one another and carrying shaft bearings, a driven shaft carried in the bearings and drivingly connected with the drive shaft, cam means carried by the shaft, a hopper spring-pressed rearwardly against the cam means and downwardly against the base, the cam means having inclined faces against which the hopper bears and inwardly extending shoulders, so as to be shifted back and forth as the shaft revolves, the hopper having a bottom over which the particles shift rearwardly as the hopper is vibrated and a well into which the particles drop.

22. A toy such as claimed in claim 20, having a conveyor with its lower end in the well and drivingly connected with the driven shaft.

23. In a toy coal loader or the like, a horizontally driven shaft drivingly connected to a pair of cylindrical cams having drop off shoulders and to the driving roller of a belt conveyor, a base supporting the shaft and conveyor, a hopper having a discharge well receiving said roller and oversize apertures through which the shaft passes so that the hopper is held against removal laterally, and a spring holding the hopper downwardly against the base and biasing the hopper toward the cams, the hopper having cam followers bearing on the cams so that the hopper is vibrated substantially horizontally relative to the base.

24. For use with a toy dump car or the like, a toy having a hopper adapted to be placed alongside track carrying the car and having at the front an elongated receiving portion for discrete particles dumped from the car, an upwardly and rearwardly supporting bottom and converging side walls so that the bottom narrows rearwardly, the bottom of the hopper having rearwardly facing steps, means for vibrating the hopper forwardly and rearwardly to cause such particles to move toward the rear, a discharge pocket beyond the uppermost step, a belt conveyor entering into the discharge pocket and common driving means for the hopper vibrating means and the conveyor.

25. A toy such as claimed in claim 24, having a motor operated shaft which actuates the vibrating means and drives the conveyor.

26. A toy such as claimed in claim 24, having an alternating current solenoid which effects

vibration of the hopper and a simultaneously operated motor driven shaft which drives the conveyor.

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