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H. A. WAGNER ET AL
MATERIAL HANDLING APPARATUS

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2 Sheets-Sheet 1

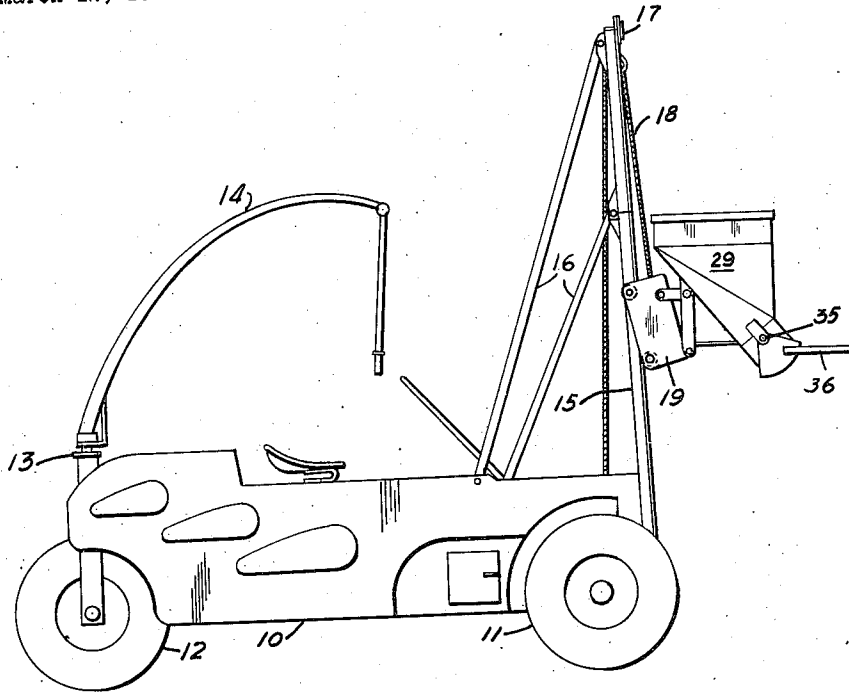


FIG. 1

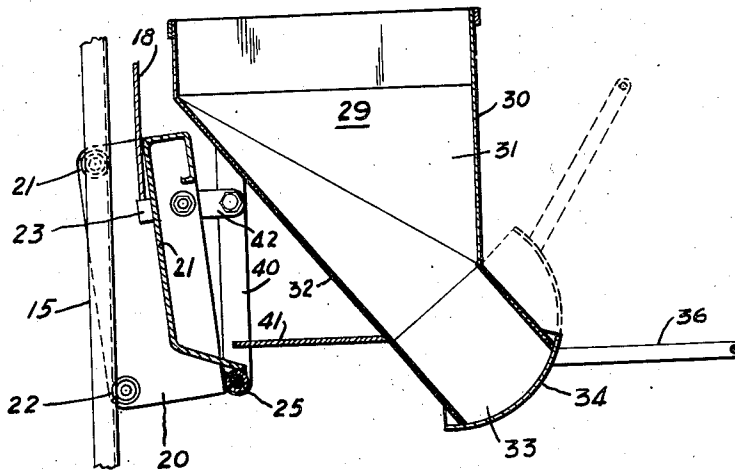


FIG. 2

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2 Sheets-Sheet 2

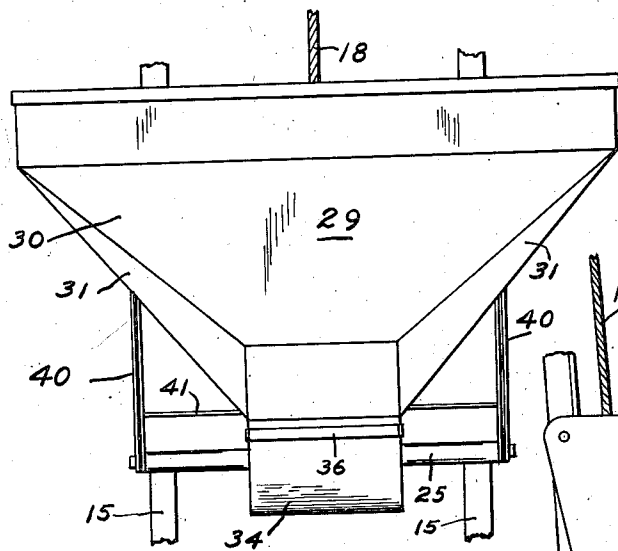


Fig. 3

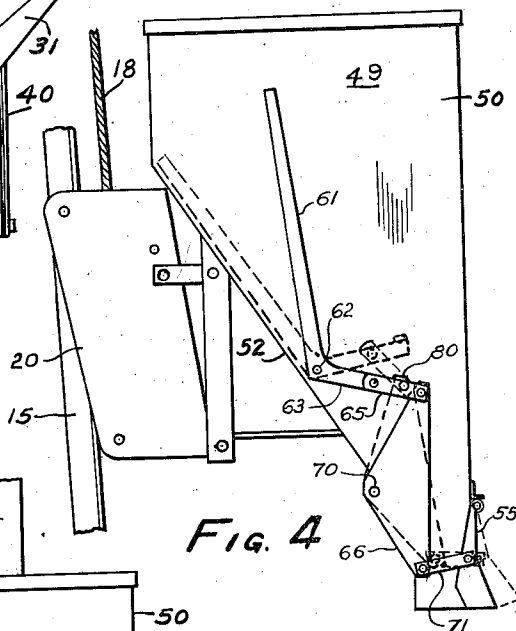


Fig. 4

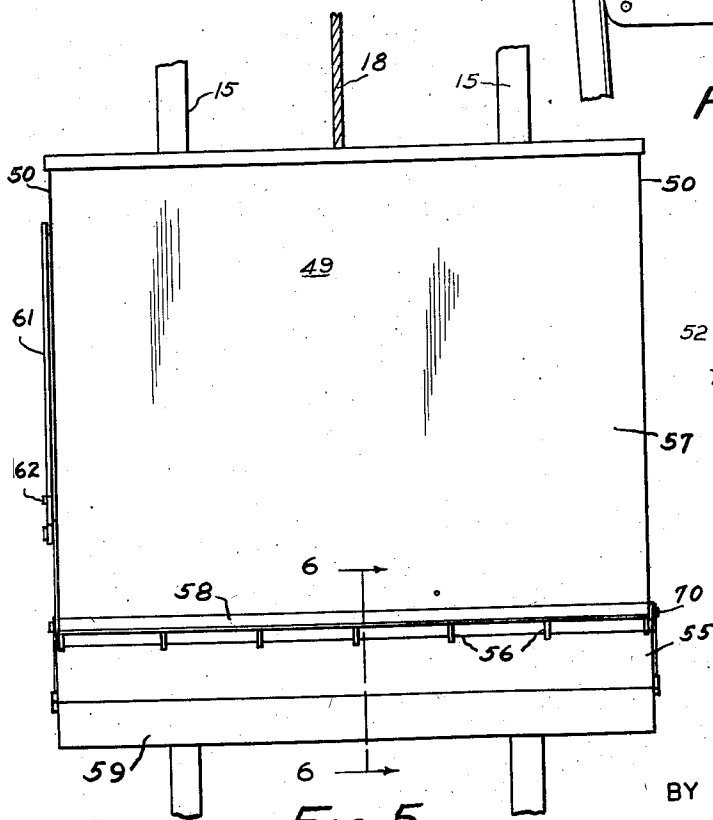


Fig. 5

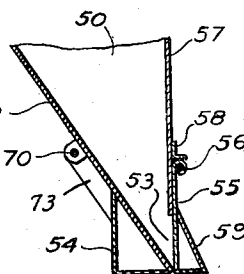


Fig. 6

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MATERIAL HANDLING APPARATUS

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5 Claims. (Cl. 214-117)

1 The present invention relates to material handling apparatus and while it is not necessarily limited thereto it is particularly concerned with concrete batch hauling and distributing vehicles.

Concrete is usually distributed from the mixer or delivery truck to the forms by means of wheelbarrows or push carts. Motor driven vehicles of various types have been devised heretofore for use in distributing concrete batch but such apparatus has not been widely accepted principally because of lack of maneuverability or flexibility sufficient to meet the varied circumstances usually surrounding an ordinary construction project.

It is an object of the present invention, therefore, to provide a new and improved concrete batch handling vehicle which is of relatively simple inexpensive construction and which is highly maneuverable and flexible.

A further object is to provide a new and improved concrete batch hauling and distributing apparatus including a hopper which may be loaded directly from a mixer or delivery truck and unloaded directly into forms of varying heights.

A more specific object is to provide a new and improved concrete hopper arrangement designed for mounting upon a supporting vehicle interchangeably with other forms of load handling means.

A further specific object of the invention is to provide a new and improved hopper arrangement which is particularly suitable for laying concrete slabs.

Additional objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings while the features of novelty will be pointed out with greater particularity in the appended claims.

In the drawings, Fig. 1 is a side elevation of the apparatus constructed in accordance with one form of the present invention; Fig. 2 is a sectional view through the concrete hopper unit and supporting carriage therefor illustrated in Fig. 1; Fig. 3 is a front view of the apparatus shown in Fig. 2; Fig. 4 is a side elevation illustrating a further modification of the invention; Fig. 5 is a front view of the apparatus shown in Fig. 4 and Fig. 6 is a fragmentary sectional view taken along the line 6-6 of Fig. 5.

Referring first to Fig. 1 a vehicle is shown at 10 having a pair of spaced apart front wheels 11, adapted to be driven by an engine (not shown) mounted within the body of the vehicle, and a

2 rear wheel 12. The rear wheel is supported upon the lower end of a vertical column 13 to the upper end of which a tiller arm 14 is mounted whereby steering movements of the vehicle may be controlled.

An upright structure is provided upon the forward end of the vehicle consisting, in this instance, of a pair of parallel, spaced apart angle members 15 the lower ends of which are welded directly to the forward end of the vehicle body and the upper ends braced by rearwardly extending members 16. A crosshead 17 is mounted on the upper end of the upright including a sheave block over which is trained a cable 18 extending from a winch drum (not shown) arranged within the forward end of the vehicle body, the opposite end of which is connected to a carriage 19 mounted for vertical movement upon the upright structure.

As illustrated more clearly in the enlarged sectional view of Fig. 2, the carriage is comprised of a pair of parallel spaced apart side plates 20 rigidly welded to the opposite ends of a transversely extending cross member 21. The space between the side plates 20 is slightly greater than the width of the upright structure. Upper rollers 21 are mounted on the inner sides of the side plates 20 adjacent the upper ends thereof for riding upon the rear surfaces of the forward flanges of the angle members of the upright structure while lower rollers 22 are provided on the side plates 20 adjacent the lower ends thereof for riding upon the forward surfaces of the angle iron flanges. The lifting cable 18 is connected as indicated at 23 to the rear side of the cross member 21 substantially centrally thereof. A tubular member 25 is welded transversely of the carriage structure along the lower edge of the cross member 21 and to the forward edges of the side plates 20, the tubular member being adapted to receive a shaft therethrough for supporting different types of load receiving elements to be mounted upon the carriage.

The load receiving element according to the present invention consists of a hopper 29 adapted for handling loose bulk material such as concrete batch. It will be obvious, however, that while the invention is described with particular reference to concrete handling it is not to be necessarily so limited since it may be equally well used for handling other similar material. The hopper is of generally rectangular shape at its open upper end and consists of a forward wall 30, sidewalls 31 and a bottom wall 32. The bottom wall 32 slopes forwardly and down-

3

wardly and at its lowermost end defines in part a pouring spout 33 toward which the lower portions of the side walls 31 also converge. A gate 34 is pivotally mounted as at 35 on the outside of the hopper and is adapted to slide cooperatively over the open end of the spout 33 so as to control the flow of material therefrom. A suitable handle 36 is connected to the gate 34 for effecting manual operation thereof.

The hopper 29 is mounted upon the carriage 19 of the vehicle by means of a framework secured to the underside of the bottom wall 32. This framework includes a pair of vertical spaced apart members 40, the lower end portions being welded to the opposite rear corners of a horizontally extending plate 41 the forward edge of which is welded to the bottom wall 32 of the hopper adjacent the upper end of the spout 33. The lowermost ends of the vertical members 40 are provided with openings for cooperatively receiving the ends of a supporting shaft extended through the tubular member 25 of the carriage. Short strap members 42 fasten the upper portions of the vertical members 40 to the adjacent upper portions of the carriage side plates 20.

Attention is directed to the fact that the lower portion of the hopper 29, or the lower end of the spout 33, depends beneath the carriage so that as the carriage is moved to its lowermost position upon the upright structure the spout is lowered substantially into contact with the ground. The upper end of the hopper is thus brought as low as possible permitting it readily to be filled directly from the discharge chute of the concrete mixer or from a truck used to deliver ready mixed concrete to the site of the project from a remote mixing plant. After being loaded the hopper may be raised up on the upright structure a slight distance sufficiently to clear the ground in which position it may be transported to the pouring location. If the tops of the forms into which the concrete is to be poured are relatively high above the ground the hopper may be raised to any position upon the upright structure and the hopper contents discharged directly thereinto. It will be observed that the discharge spout of the hopper projects a considerable distance forwardly of the vehicle so that the spout may be brought into a position over the upper end of the forms without requiring any other conveyor or chute. In this connection it will also be noted that the spout depends below the supporting frame member 41 so that the lower edge of the spout may also be dropped a slight distance into the form to insure that none of the concrete will be spilled on the outside and thus wasted.

For removing the hopper from the carriage it may be lowered onto a block of wood positioned beneath the horizontal plate 41 which is substantially beneath the center of the hopper. The fastening links 42 may then be disconnected from the carriage side plates and the supporting shaft withdrawn whereupon the vehicle may be backed away and another type of load lifting element secured in place.

In Figs. 4 to 6 is shown another form of hopper arrangement which may be mounted upon the vehicle as previously described interchangeably with the hopper 29 and which is particularly suitable for use in laying concrete slabs. In this instance the opposite side walls 50 of the hopper 49, instead of converging toward a relatively narrow pouring spout at the lower

4

end, are perpendicular throughout their entire height. The hopper is of a width substantially equal to the width of the supporting vehicle 10 and is provided with a downwardly and forwardly sloping bottom wall 52, an elongated discharge opening 53 being provided at the lower end extending the full width of the hopper. As illustrated more clearly in the detail view of Fig. 6 the lower edge of the bottom wall 52 is reinforced by a right angular member 54 welded thereto throughout the full length of the wall so as to prevent bulging of the bottom wall when the hopper is fully loaded. A gate 55 is hinged as at 56 onto the front wall 57 of the hopper for controlling flow of material through the opening 53. Outward bulging of the forward wall is prevented by the provision of an angle iron 58 adjacent the hinge 56. The lower edge of the gate 55 is also stiffened throughout its entire length by an angular member 59 welded thereto.

The gate 55 is controlled by means of a lever mechanism shown more clearly in the view of Fig. 4 and comprising a manual operating lever 61 pivotally secured as at 62 onto one of the side walls of the hopper. An angular extension 63 of the lever 61 is pivotally connected intermediate its ends to an overcenter link 65, the opposite end of link 65 being connected to the upper end of the triangular plate 66. The plate 66 is rigidly welded to one end of a shaft 70 rotatably mounted upon the lower surface of the bottom wall of the hopper and extending the full width thereof, the lower end of the plate 66 being connected by means of link 71 to the side flange of the gate 55. On the opposite side of the hopper with respect to that shown in Fig. 4 the shaft 70 is similarly connected by means including plate 73 to the corresponding end of the gate 55. The gate 55 is locked in the closed condition by virtue of the overcenter position of the link 65, the end of the lever portion 63 being provided with a stop 80 which bears against the upper edge of the link 65 to retain the linkage connection in the overcenter condition. Upon movement of the operating lever 62 to the position shown in dotted line the gate 55 is swung to the open condition.

The hopper 49 is mounted upon the carriage 19 of the vehicle by means of a framework secured to the bottom wall of the hopper substantially similar to that previously described.

It will be noted that the lower end of the hopper depends a considerable distance below the lowermost portion of the carriage 19 so that as the carriage is moved to the lowermost position upon the upright structure of the vehicle the lower end of the hopper extends relatively closely adjacent the ground. By reason of the fact that the discharge opening at the bottom of the hopper extends the full width thereof the hopper contents may be spread out in a layer of substantially uniform depth the full width of the hopper thereby saving considerable time which is ordinarily required for spreading concrete which is dumped in a pile. It will be understood that in spreading concrete from the hopper the vehicle is driven in reverse direction. By reason of the reinforcing members 54 and 59 the concrete dumped from the hopper may be smoothly spread across a surface being covered. When the vehicle is driven in reverse the horizontal leg of the member 59 acts as a spreader and the vehicle may be driven forward while the horizontal leg of the member 54 acts as a follow-up spreader. The vertical leg members may act as bulldozer blades to respread

5

surfaces which may have been covered too deeply in the first distribution of the material. Likewise, the horizontal legs of the members 54 and 59 may be used as tampers or packers, to insure the formation of dense concrete, by raising and lowering the carriage short distances when the vehicle is stationary or moving slowly.

Having described the invention in what are considered to be preferred embodiments thereof it is desired that it be understood that the specific details shown and described are merely illustrative and that the invention may be carried out by other means.

What we claim is:

1. In a vehicle apparatus of the class described, an upright on the forward end of said vehicle, a carriage mounted for vertical movement on said upright, a hopper secured to said carriage and movable vertically therewith, said hopper having a bottom wall sloping downwardly and forwardly of said vehicle and extending substantially the full width thereof, a horizontal opening extending the full width of the lower end of said bottom wall, and a gate controlling flow of material from said opening.

2. In a vehicle apparatus of the class described, an upright on the forward end of said vehicle, a carriage mounted for vertical movement on said upright, a hopper mounted on said carriage, said hopper having a bottom wall sloping downwardly and forwardly of said vehicle, bracket frame means secured to the lower side of said bottom wall, means for removably attaching said bracket frame means to said carriage, and a gate controlled opening at the lower end of said hopper, said bracket frame means comprising a substantially horizontal portion located centrally of said hopper and upon which said hopper may rest when removed from said carriage.

3. In a vehicle apparatus of the class described, an upright on the forward end of said vehicle, a carriage mounted for vertical movement on said upright, a hopper mounted on said carriage, said hopper having a bottom wall sloping downwardly and forwardly of said vehicle, bracket frame means secured to the lower side of said bottom wall, means for removably attaching said bracket frame means to said carriage, and a gate controlled opening at the lower end of said hopper, said bracket frame means including a lowermost horizontally extending member substantially under the center of said hopper by means of which said hopper may be supported in removing same from said carriage.

6

4. In a vehicle apparatus of the class described, an upright on the forward end of said vehicle, a carriage mounted for vertical movement on said upright, a hopper mounted on said carriage and including a forwardly inclined bottom wall and an upright front wall terminating at a level above the lower edge of said bottom wall, said hopper having a width substantially equal to the width of said vehicle, an upright gate pivoted at the lower edge of said front wall and extending to the lower edge of said bottom wall to define a substantially horizontal opening extending the full width of said hopper when the gate is swung open, and reinforcing members extending the full width of the outer surface of the lower edges of said bottom wall and of said gate, each of said reinforcing members comprising a portion extending substantially horizontally outward from the lower edge of the reinforced edge and a portion extending upwardly and spaced from the reinforced edge.

5. In a vehicle apparatus of the class described, an upright on the forward end of said vehicle, a carriage mounted for vertical movement on said upright, a hopper mounted on said carriage and including a forwardly inclined bottom wall and an upright front wall terminating at a level above the lower edge of said bottom wall, said hopper having a width substantially equal to the width of said vehicle, an upright gate pivoted at the lower edge of said front wall and extending to the lower edge of said bottom wall to define a substantially horizontal opening extending the full width of said hopper when said gate is swung open, and a reinforcing structure extending along the lower edge of each of said bottom wall and of said gate and including a horizontal portion extending upwardly from the reinforced edge.

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