

Dec. 12, 1939.

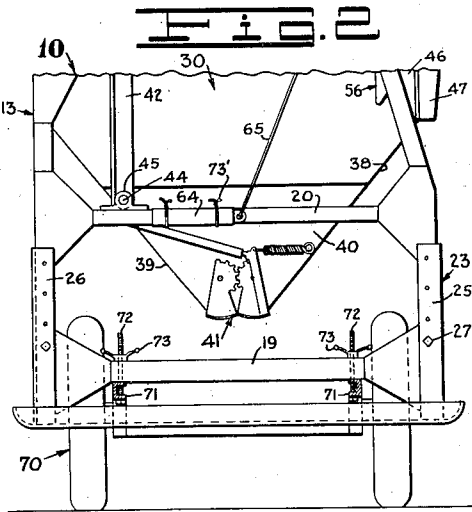
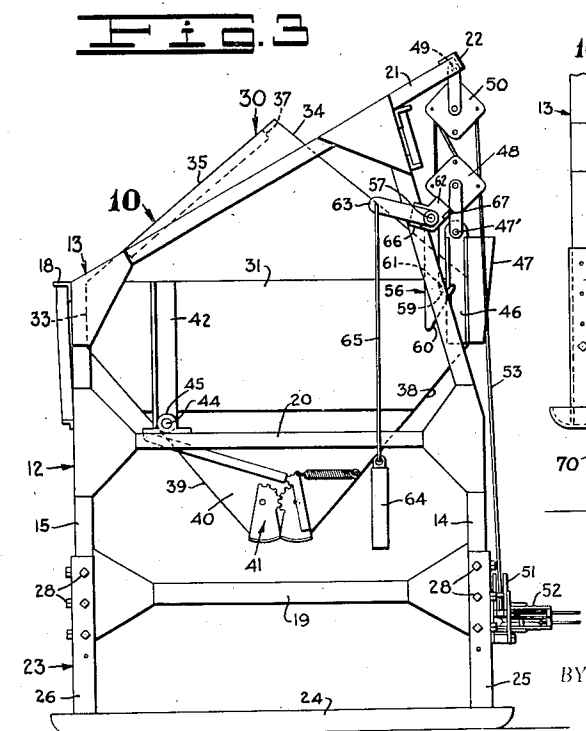
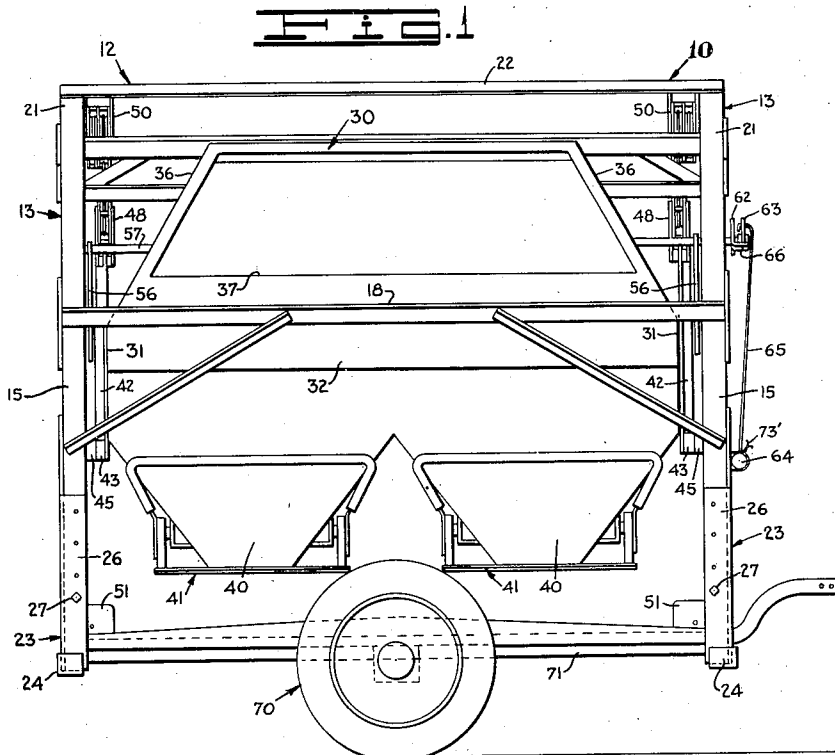
L. H. GARLINGHOUSE

2,182,893

HOPPER CONSTRUCTION

Filed March 4, 1938

3 Sheets-Sheet 1



INVENTOR.  
L.H. Garlinghouse.  
*L.H. Garlinghouse*  
ATTORNEY.

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L. H. GARLINGHOUSE

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3 Sheets-Sheet 2

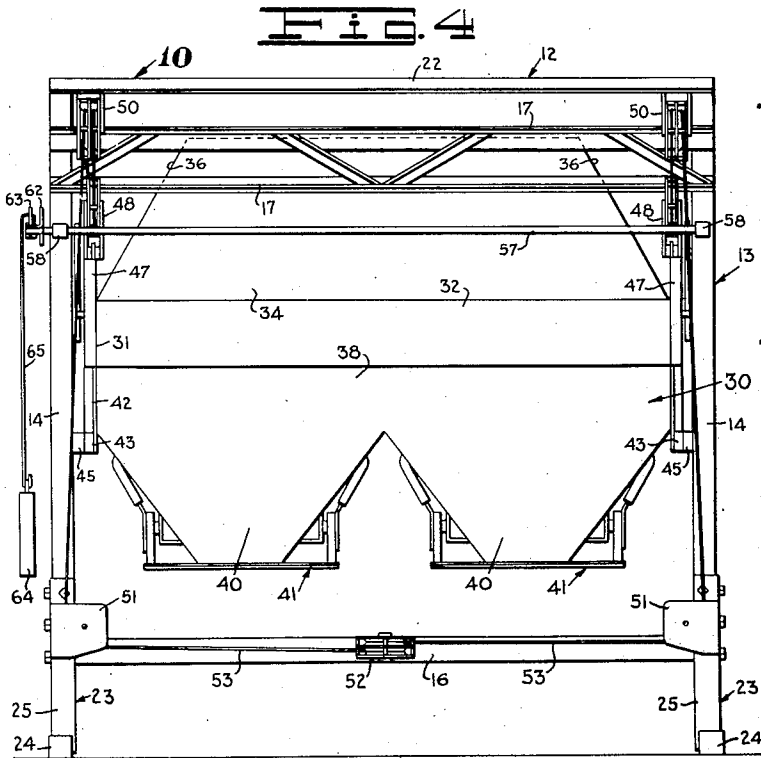


FIG. 6

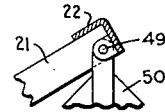


FIG. 7

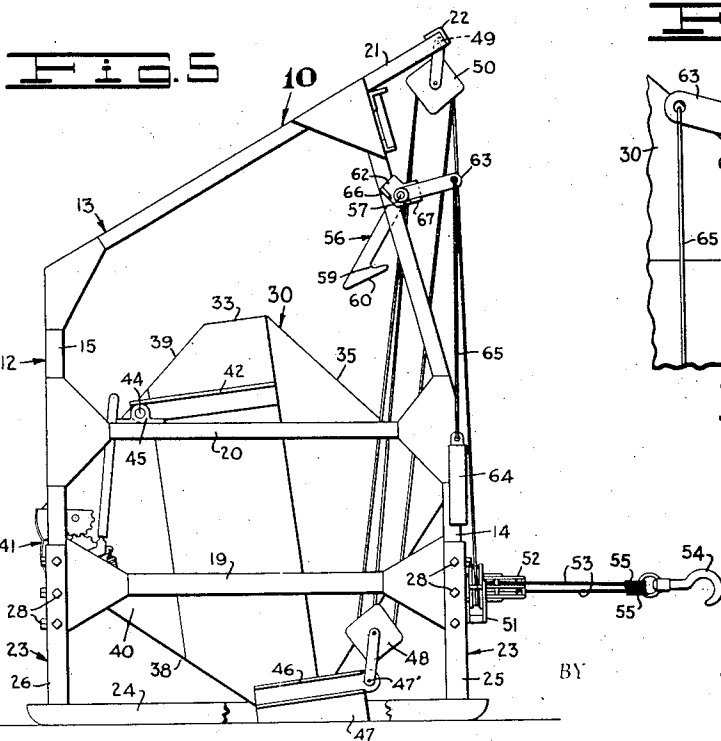
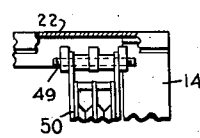


FIG. 8

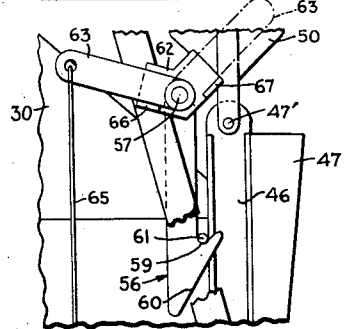
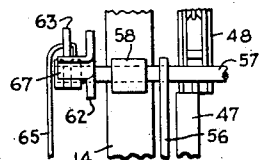


FIG. 9



INVENTOR.  
L. H. Garlinghouse.

BY *[Signature]*  
ATTORNEY

Dec. 12, 1939.

L. H. GARLINGHOUSE

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Fig. 10

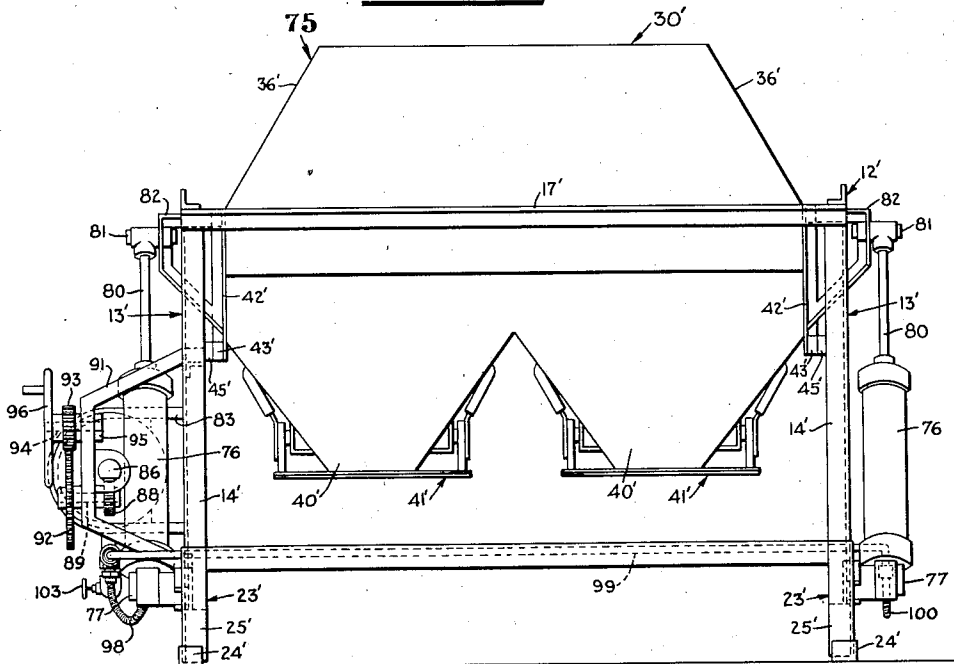
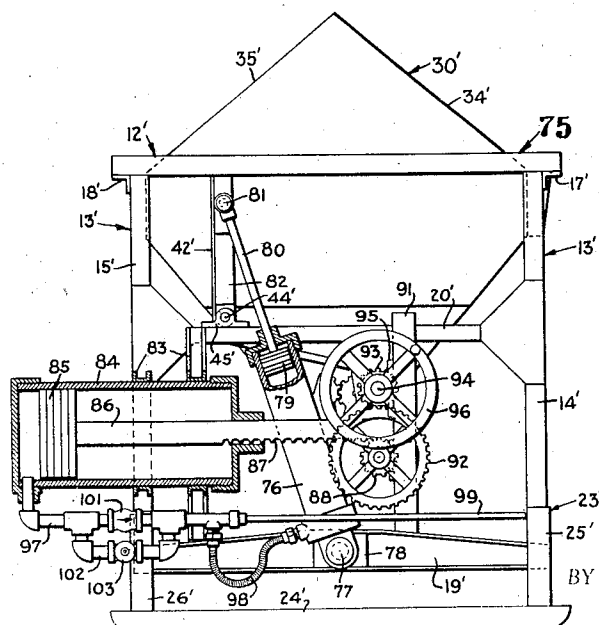


Fig. 11



INVENTOR.  
L. H. Garlinghouse.  
*L. H. Garlinghouse*  
ATTORNEY.

# UNITED STATES PATENT OFFICE

2,182,893

## HOPPER CONSTRUCTION

Leslie H. Garlinghouse, Los Angeles, Calif.

Application March 4, 1938, Serial No. 193,970

5 Claims. (Cl. 214-130)

In the use of transit or truck concrete mixers wherein concrete ready for use is transferred to the job the trucks are usually built in large sizes and on many jobs it is impractical for the contractor to handle all of the concrete from the truck mixer and carry it to the forms in wheelbarrows or carts in a reasonable length of time. This results in a delay in unloading the truck so that the latter may return to its base for additional concrete.

To overcome this difficulty it has frequently been the practice to build a ramp upon which the truck is backed and then the load is dumped into a hopper. This is necessary as the hopper must have a discharge opening a sufficient distance above the ground to allow a wheelbarrow to be loaded from the discharge opening. Another plan has been to equip each truck with a hydraulic hoist which would elevate the mixer high enough to discharge into the hopper. These expedients are both expensive and in some cases impractical.

The general object of my present invention is therefore to overcome the difficulties mentioned above by providing a hopper which is so mounted that it rotates from a lowered position where it has the requisite low filling aperture to a position wherein the discharge opening is in the required elevated position.

A more specific object of the invention is to provide a hopper including a frame in which the hopper body is pivoted and wherein the hopper is pivoted about an axis disposed on one side thereof and below the center of gravity and wherein a filling opening is provided in the upper portion of the hopper and wherein a discharge opening is provided in the lower portion of the hopper.

Another object of the invention is to provide an improved mounting for a hopper.

A further object of the invention is to provide novel means for shifting a pivotally mounted hopper.

Another object of the invention is to provide a novel latching means for a pivoted hopper.

Another object of the invention is to provide a novel raising and lowering means for a pivoted hopper.

A further object of the invention is to provide a novel adjustable supporting frame for a portable hopper.

Other objects and the advantages of my invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a rear elevation of a hopper embodying the features of my invention;

Fig. 2 is a fragmentary end view showing the hopper ready to be transported;

Fig. 3 is an end view of the hopper in the discharge position;

Fig. 4 is a front elevation of the hopper;

Fig. 5 is an end view of the hopper in the position to be filled from a truck;

Fig. 6 is an enlarged detail of one of the top sheave block mountings;

Fig. 7 is a rear view of the sheave block shown in Fig. 6;

Fig. 8 is an enlarged fragmentary end view showing the latch mechanism;

Fig. 9 is a front view of the device shown in Fig. 8;

Fig. 10 is a front view of a modified form of my invention; and

Fig. 11 is an end view of the device shown in Fig. 10.

Referring to the drawings by reference characters I have indicated my improved batch hopper generally at 10. As shown the device 10 includes a metal supporting frame which is indicated generally at 12. The various portions of the frame are preferably made of structural steel members suitably welded together.

The frame 12 includes end portions 13 each of which includes a front vertical leg 14 and a rear vertical leg 15. Adjacent the bottom the front legs 14 of the end portions are connected by a longitudinal member 16 and at other places are connected by other longitudinal members 17. Adjacent the tops thereof the rear legs 15 of the end portions are connected by a longitudinal member 18. The front and rear legs 14 and 15 of each of the end portions 13 are connected by lower transverse members 19, intermediate transverse members 20 and upper transverse members 21 which are inclined from the rear legs upwardly towards the front. At the front the inclined transverse members 21 are connected by a longitudinal member 2.

Each end portion 13 includes a movable base frame which is indicated generally at 23. Each of the base frames 23 includes a base member 24 having a vertical front leg 25 thereon which fits over one of the front legs 14 and a vertical rear leg 26 thereon which fits over one of the rear legs 15.

When the device 10 is in transit as shown in Fig. 1 the base frames 23 are raised and the legs 25 and 26 thereof are secured to the legs 14 and 15 as by bolts 27. When the device 10 is in an operative position as shown in Fig. 3 the base frame 23 is lowered and the legs 25 and 26 thereof

are secured to the legs 14 and 15 by a plurality of bolts 28.

Within the frame 12 I provide a hopper member indicated generally at 30. As shown the hopper 30 includes end walls 31, a front wall 32 and a rear wall 33. Above a predetermined location the front wall inclines upward and rearwardly as at 34 and the rear wall inclines upwardly and forwardly as at 35 and joins the wall 34. Similarly above a predetermined location the end walls 31 convergently incline upwardly as at 36. The inclined portion 35 has an inlet aperture 37 therein as clearly shown in Fig. 1.

Below a predetermined location the front wall 32 inclines downwardly and rearwardly as at 38 and the rear wall inclines downwardly and forwardly as at 39 to form the bottom of the hopper which is divided into two conventional outlet chutes 40. Each of the chutes 40 is provided with a suitable type of discharge gate mechanism such as indicated at 41.

On each of the end walls 31 of the hopper 30 I provide a vertical member 42 having a boss 43 thereon which is pivoted as at 44 to a bearing member 45 on the adjacent transverse member 20 of the frame 12. As shown the members 42 are secured to the rear portion of the hopper and the pivot 44 is positioned well below the center of the hopper, thus causing the hopper to tend to swing downwardly towards the front.

Mounted on each end 32 adjacent the front I provide a vertical member 46 having a shoe member 47 thereon which projects beyond the front wall 32. Pivotaly mounted on each of the members 46 as at 47' I provide a single pulley block 48 and thereabove pivotaly mounted as at 49 on the longitudinal member 22 I provide a double pulley block 50.

Mounted on each of the front legs 25 of the base frame 23 I provide a single pulley block 51 and mounted on the transverse member 16 intermediate the length thereof I provide a double pulley block 52 (see Fig. 4). Each set of blocks 48, 50 and 51 has a wire rope 53 suitably rove therethrough which are then rove through the block 52 and suitably connected to a hook 54 as indicated at 55 (see Fig. 5).

For retaining the hopper 10 in a raised position I provide between each end of the hopper and the frame 12 a latch member 56 (see Fig. 9). Each of the latch members 56 is welded to and depends from a longitudinal shaft 57 which is supported in bearings 58 on the front legs 14.

Each of the latch members 56 includes an upwardly opening hook portion 59 and a downwardly and rearwardly inclined front edge 60. The hook portion 59 is adapted to receive a pin 61 on the hopper 10. At one end the shaft 57 projects beyond the end of the frame 12 and has a plate 62 welded thereto. Loosely mounted on the shaft 57 adjacent the plate 62 I provide an arm 63 the outer end of which has a weighted member 64 suspended therefrom by a rod 65. The plate 62 has a front lip 66 and a rear lip 67 thereon which project therefrom into the path of movement of the arm 63 and are each arranged at a predetermined angle at each side of the shaft.

Thus when the arm 63 engages the rear lip 66 of the plate 62, as shown in Fig. 3, it tends to swing the latch member 56 forwardly and when it engages the front lip 67 it tends to swing the latch member 56 rearwardly as shown in Fig. 5.

For transporting the device 10 I preferably employ a two wheeled trailer such as indicated at 70 portions of the frame 71 of which may be

secured to the transverse members 19 of the ends 13 of the hopper by bolts 72 and nuts 73 as shown in Fig. 2. As previously stated when in transit the base frames are raised as shown in Figs. 1 and 2 and the weighted member 64 is wired as at 73' or is otherwise secured to the adjacent transverse member 20.

In operation after the device 10 has been properly set up in the desired location upon the arrival of a transit mix cement truck the truck backs up to the device 10 and the hook 54 is connected to a portion of the truck. At the same time the arm 63 is swung into engagement with the front lip 67 of the plate 62 as indicated by the broken line position in Fig. 9. Thereafter the truck moves ahead a slight distance thereby swinging the hopper 30 upward and the pins 61 out of the hook portions 59 of their associated latch members 56. Whereupon the latch members 56 swing to the positions shown in Fig. 5.

Thereafter the truck backs towards the device 10 and as it does the hopper 30 swings downward until the shoes 47 engage the ground as shown in Fig. 5. In this position the inclined wall 35 having the filling aperture 37 therein is directed towards the truck.

The truck then discharges its load into the hopper 30. After the hopper 30 has been lowered the arm 63 is swung into engagement with the rear lip 66 of the plate 62 thereby swinging the latch member 56 forward. After the truck has discharged its load into the hopper the truck moves away from the device 10 thereby swinging the hopper upward. As the pins 61 pass the latches 56 the latches swing rearwardly and allow the pins to pass. After the pins are above the hook portions 59 of the latches the truck reverses and backs towards the device 10 whereupon the pins 61 enter the hooked portions 59 of the latches and support the hopper. The hook 54 is then removed from the truck and the truck proceeds to its base for another load. After the hopper 30 has been filled and raised to the position shown in Fig. 3 the contents thereof may be withdrawn and discharged into wheelbarrows or carts by operating the hopper discharge gate mechanism 41.

In Figs. 10 and 11 I have indicated a modified form of my invention generally at 75. The device 75 is similar to the device 10 except for the means of raising and lowering the hopper and similar portions thereof are indicated by similarly primed reference numerals.

Upon the outside of each of the end portions 13' I provide a cylinder 76. Adjacent the lower end each of the cylinders 76 is pivotaly mounted as at 77 to a bearing 78 on the transverse member 19'. Each of the cylinders 76 has a piston 79 therein which includes a piston rod 80 the free end of which is pivotaly secured as at 81 to a bracket 82 which in turn is welded to the vertical member 41' a predetermined distance above the pivot 44'.

Extending outward from one of the end portions 13' I provide brackets 83 which support a cylinder 84 which is of greater diameter than the cylinder 76. The cylinder 84 has a piston 85 therein which includes a piston rod 86 which extends out of the cylinder. On the under side thereof a portion of the piston rod 86 is provided with gear teeth 87 as shown in Fig. 11 which are engaged by a gear 88. The gear 88 is mounted on a shaft 89 journaled in a bearing 90 on a bracket 91 which is welded to the transverse members 19' and 20'. Outward from the bracket 75

the shaft 89 has an enlarged gear 92 thereon which meshes with a gear 93. The gear 93 is mounted on a shaft 95 journaled in a bearing 95 on the bracket 91 and outward from the gear 93 the shaft 94 has a hand wheel 96 thereon.

Opening into the rear end of the cylinder 84 I provide a conduit 97 which has one end of a flexible conduit 98 communicating therewith. The opposite end of the flexible conduit communicates with the interior of the adjacent cylinder 76. Forward of the flexible conduit a reduced conduit 99 communicates with the conduit 97 and extends to the other end of the device to a point adjacent the other cylinder 76 where one end of a flexible conduit 100 connects it with the cylinder 76.

Intermediate the cylinder 84 and the flexible conduit 98 I provide a check valve 101 interposed in the conduit 97. This check valve 101 allows free flow of fluid away from the cylinder 84 but restricts the flow of fluid towards the cylinder 84. Straddling the check valve 101 I provide a shunt conduit 102 which communicates at both ends with the conduit 97. Interposed in the shunt conduit 102 I provide a shut off valve 103.

In operation the cylinders 76, the cylinder 84 and the associated conduits are filled with fluid such as oil. Thereafter when it is desired to swing the hopper 30' upwardly the operator first closes the shut off valve 103 and then rotates the hand wheel 96 which through the medium of the gears 93, 92 and 83 forces the piston rod 86 and piston 85 towards the rear end of the cylinder 84. As the piston 85 is thus moved it forces fluid through the conduits 97 and 99 and through the flexible conduits 98 and 100 into the lower ends of the cylinders 76 thereby forcing the pistons 79 therein and the piston rods 80 upward thus swinging the hopper 30 upward about its pivots 44'.

When it is desired to lower the hopper 30' the operator slowly opens the shut off valve 103 whereupon the weight of the hopper 30' forces the pistons 79 downward thereby forcing the fluid therefrom into the conduit 97, thence through the shunt conduit 102 around the check valve 101 and back into the conduit 97 and then into the cylinder 84 thereby forcing the piston 85 forward. When the hopper 30' is lowered to the desired position the operator again closes the shut off valve 103.

It will be understood that instead of operating the hoisting mechanism of the device 10 by a truck a manual or power driven winch may be used and likewise instead of manually operating the hydraulic hoist system of the device 75 suitable mechanical power means may be employed.

From the foregoing description it will be apparent that I have provided a novel hopper device which is simple in construction and highly efficient in use.

Having thus described my invention I claim:

1. In a hopper, a frame member including end portions longitudinal front and rear members connecting said end portions, a hopper member pivotally mounted on said end portions on an axis disposed at the rear of and below the center of gravity of said hopper, said hopper including a top having a front wall and a rear wall, said rear top wall having a filling opening therein, said hopper including a bottom wall having a discharge opening and including means for controlling discharge therefrom, a shaft journaled in bearings mounted on said frame ad-

5 adjacent the front thereof, a latch member on said shaft adjacent each end of said frame, each of said latch members including an open topped hook portion, pins mounted on said hopper for engaging said hook portions, inclined cam faces below said hooks, said shaft beyond one end of said frame having a plate member secured thereon, an arm, said arm being loosely mounted on said shaft adjacent said plate, a weighted member suspended from said arm, said plate having a pair of spaced lips thereon protruding into the path of movement of said arm, said lips being so positioned that when said arm engages one of said lips said plate rotates said shaft in one direction and when said arm engages the other of said lips said plate rotates said shaft in the opposite direction.

2. In a hopper, a frame member, said frame member including end portions, longitudinal front members and rear members connecting said end portions, a hopper member pivotally mounted on said end portions on an axis disposed at the rear and below the center of gravity of said hopper, said hopper including ends which are convergently and upwardly inclined, said ends having a front wall and a rear wall to form a top, said rear top wall having a filler opening therein, said hopper including convergently, downwardly, inclined bottom walls, said bottom walls including a plurality of discharge chutes, each chute including means for controlling passage therefrom, a vertical member on each end of said hopper adjacent the front thereof, a sheave block pivotally mounted on each of said vertical members, a sheave block mounted on one of said longitudinal front members above each of said hopper sheave blocks, lower sheave blocks mounted on the front of said frame adjacent each end and a center sheave block mounted on the front of said frame, a cable member rove through each of said hopper blocks, said upper blocks and said lower blocks and each cable rove through said center block in such a manner that said hopper may be lowered or raised by means of said cable.

3. In a hopper, a frame member including end portions, longitudinal front and rear members connecting said end portions, each of said end portions including a front and rear vertical leg, a base frame associated with each of said end frame portions, each of said base frames including a front and rear vertical leg connected by a transverse base member, said front and rear legs of said base frame engaging said front and rear legs of said end portions and secured thereto, said base frame legs being adapted to be raised and secured to said legs of said end portions, a hopper member pivotally mounted on said end portions on an axis disposed at the rear of and below the center of gravity of said hopper, said hopper including a top having convergently upwardly inclined ends and a front wall and a rear wall, said rear top wall having a filler opening therein, said hopper including a convergently downwardly inclined bottom wall, said bottom wall including a plurality of discharge chutes each chute including means for controlling discharge therefrom, a vertical member on each end of said hopper adjacent the front thereof, a sheave block pivotally mounted on each of said vertical members, a sheave block mounted on one of said longitudinal front members above each of said hopper sheave blocks, lower sheave blocks mounted on the front of said frame adjacent each end and a center block mounted on the front of said

frame, a cable member rove through each of said hopper blocks, said upper blocks and said lower blocks and each cable rove through said center block in such a manner that said hopper may be lowered or raised by means of said cable.

4. In a hopper, a frame member, said frame member including end portions, longitudinal front members and rear members connecting said end portions, a hopper member pivotally mounted on said end portions, said hopper including ends, a front wall and a rear wall forming a top, said rear top wall having a filler opening therein, said hopper including downwardly inclined bottom walls, said bottom walls including a discharge chute, a vertical member on each end of said hopper, a sheave block pivotally mounted on each of said vertical members, a sheave block mounted on one of said longitudinal front members above each of said hopper sheave blocks, lower sheave blocks mounted on the front of said frame adjacent each end and a center sheave block mounted on the front of said frame, a cable member rove through each of said hopper blocks, said upper blocks and said lower blocks and each cable being rove through said center block in such manner that said hopper may be lowered or raised by means of said cable.

5. In a hopper, a frame member including end portions, longitudinal front and rear members connecting said end portions, a hopper member pivotally mounted on said end portions, said hopper including a top having a filling opening therein, said hopper including a bottom wall having a discharge opening and including means for controlling discharge therefrom, a shaft journaled in bearings mounted on said frame, a latch member on said shaft adjacent each end of said frame, each of said latch members including an open topped hook portion, pins mounted on said hopper for engaging said hook portions, inclined cam faces below said hooks, said shaft beyond one end of said frame and having a plate member secured thereon, an arm, said arm being loosely mounted on said shaft adjacent said plate, said plate having a pair of spaced lips thereon protruding into the path of movement of said arm, said lips being so positioned that when said arm engages one of said lips said plate rotates said shaft in one direction and when said arm engages the other of said lips said plate rotates said shaft in the opposite direction.

LESLIE H. GARLINGHOUSE.