

Sept. 21, 1943.

R. C. FRANKE

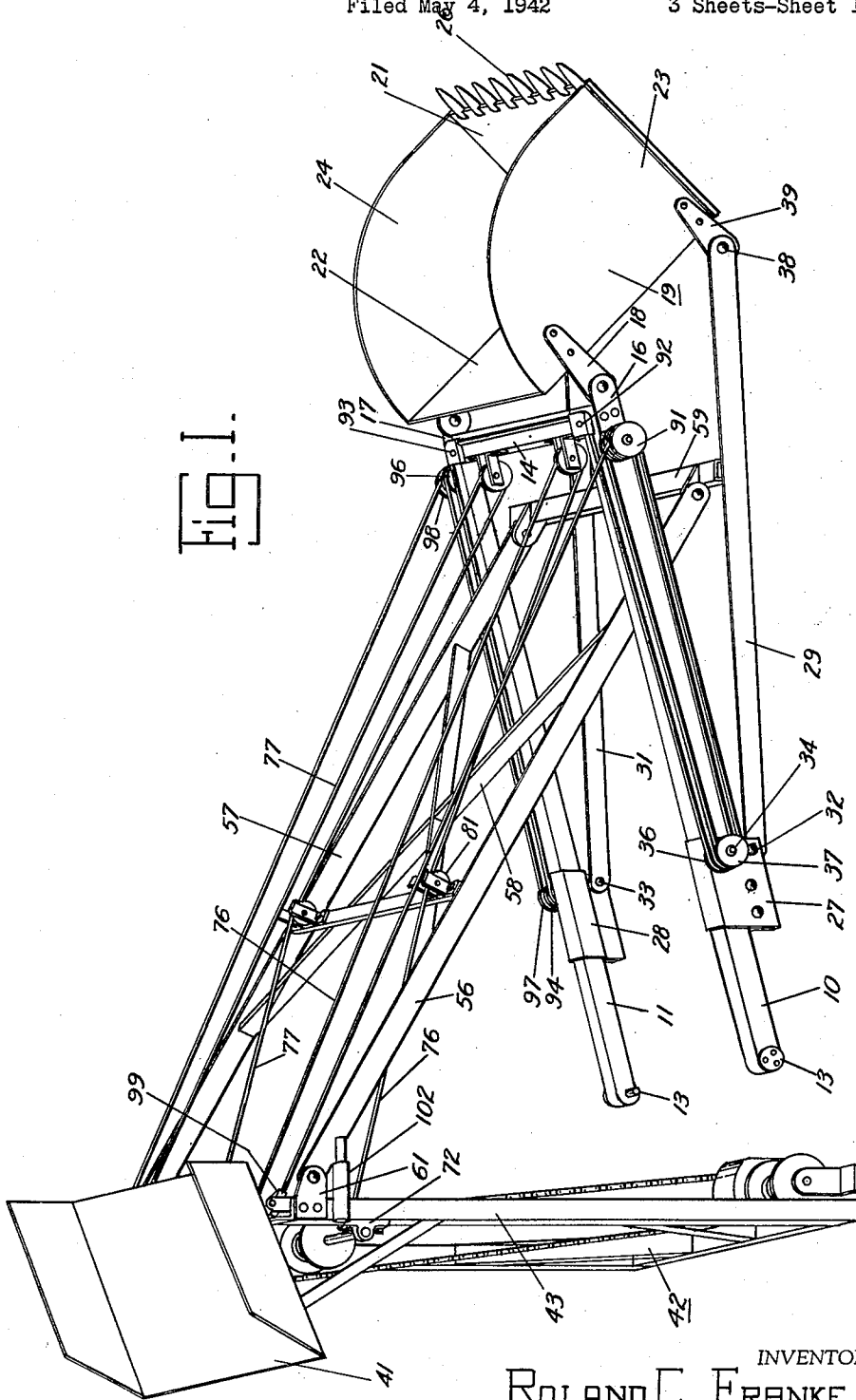
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3 Sheets-Sheet 1

FIG. 1.



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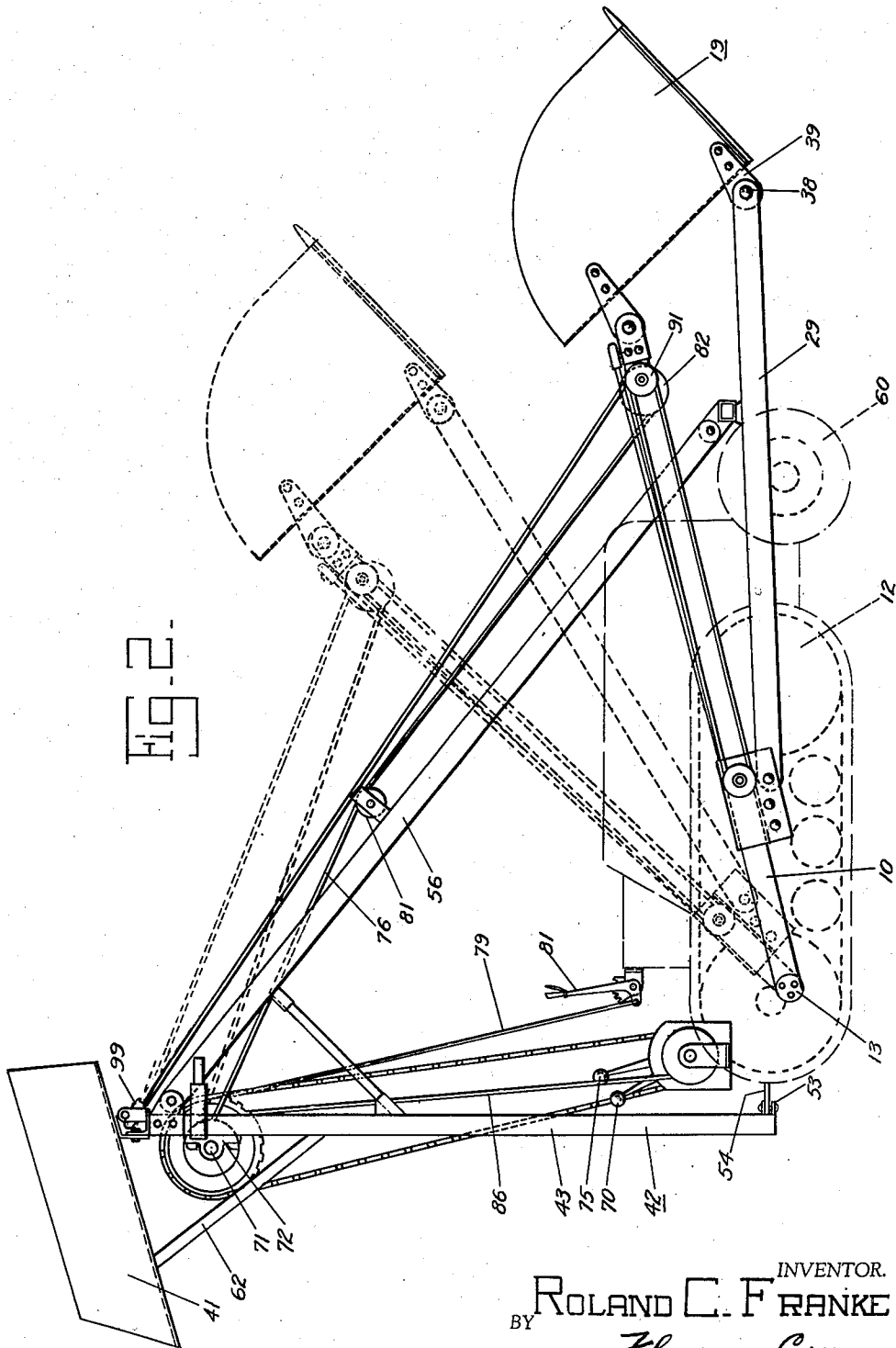


FIG. 2-

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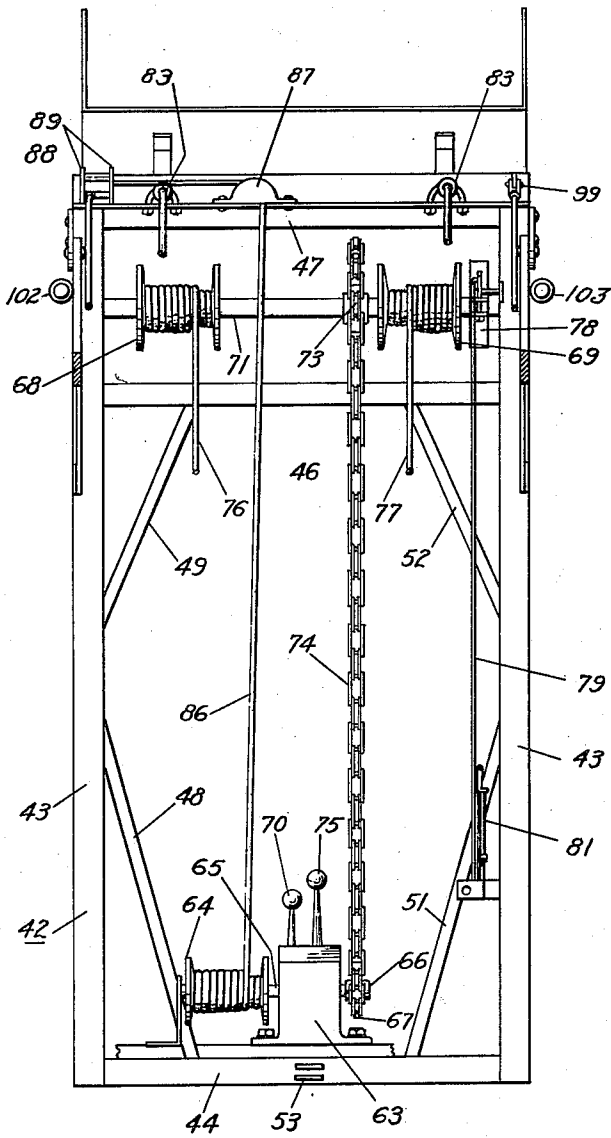


Fig. 3.

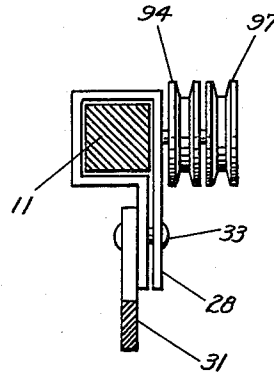


Fig. 4.

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UNITED STATES PATENT OFFICE

2,330,041

LOADER

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Application May 4, 1942, Serial No. 441,582

6 Claims. (Cl. 214—131)

This invention relates to material handling methods and devices and has particular relation to a loader adapted for loading sugar beets and the like from a stock pile into a railroad gondola or a truck or other vehicle.

In the process of transporting sugar beets to the market for processing, in the middle and far west, it is customary for the beet raisers to deposit the beets in stock piles in long rows beside the railroad track. A train of open gondolas is spotted on the track beside these stock piles and the sugar beets are loaded from the stock piles into the gondolas. These stock piles may be blocks long and the loading of these beets constitutes a tremendous job.

My invention is directed to a loader adapted to be mounted on a tractor or the like, which may be operated between the stock pile and the gondola to pick up the beets in a hopper or scoop, carry them upwardly over the loader, and dump them into the gondola. The tractor is maneuvered back and forth between the stock pile and the car to pick up a load of beets and then move in reverse to the gondola, after which the load of beets is lifted and discharged into the gondola. The tractor is maneuvered sideways so as to traverse the entire length of the space between the stock pile and the string of gondolas and to load the beets into the gondolas in relatively large quantities in each operation of the loader.

The simplest mechanism for an operation of this character is one in which a U-frame is pivotally attached to the rear of the tractor and a hopper disposed on the outer end of the frame for picking up the load and carrying it back over the tractor to a position where the load may be dumped into the gondola. However this introduces a problem in that the hopper must be tipped down to pick up the load of beets, then moved to a tilted carrying position, and this carrying position maintained with the hopper tilted to best carrying position while the angularity of the U-frame is changing as the load is carried up over the tractor. When the hopper has reached the upper point of its movement, means must be provided for dumping the load, and it is one of the main objects of my invention to provide a simple mechanism for accomplishing these results.

Other and further features and objects of the invention will be more apparent to those skilled in the art upon a consideration of the accompanying drawings and following specification, wherein is disclosed a single exemplary embodiment of the invention, with the understanding,

however, that such changes may be made therein as fall within the scope of the appended claims, without departing from the spirit of the invention.

5 In said drawings:

Figure 1 is a view in perspective showing the arrangement of the various structural members, the cables, the hopper, and the dumping chute as they appear with the hopper in carrying position. The tractor is not shown in this view.

10 Figure 2 is a view in side elevation of the structure of Figure 1, with the tractor shown in dotted outline. Other dotted lines show an intermediate position of the hopper as it is being carried up to dumping position.

15 Figure 3 is an elevational view of the chute supporting framework taken from the front or righthand side, illustrating the drive for lifting the hopper and the means for tilting the hopper, and

20 Figure 4 is a fragmentary view illustrating the connection between the slides and side arms of the device shown in Figures 1 and 2.

25 Referring now to the drawings, and more particularly to Figure 1 thereof; in practicing my invention I provide a pair of side arms 10 and 11 pivotally mounted on the frame of a tractor which is illustrated in dotted lines at 12. Any suitable pivotal connection, as for instance the pins 13, may be employed. These side arms are connected at their ends by means of a cross brace or cross arm 14 and the side arms are provided with extensions 16 and 17 which furnish means for pivotally attaching the lugs 18 of the hopper 19 to the side arms 10 and 11.

30 The hopper 19 is of more or less conventional shape consisting of the bottom plate 21, the back plate 22, sides 23 and 24, and digging teeth 26. A pair of brackets or slides 27 and 28 are slidably engaged upon the side arms 10 and 11. Pusher arms 29 and 31 are pivotally engaged to the plates 27 and 28 respectively by two pivot pins 32 and 33. Each of the slides 27 and 28 have outwardly projecting shafts, such as illustrated at 34, upon which inner and outer sheaves or pulleys 36 and 37 are rotatably mounted.

35 The pusher arms 29 and 31 are pivotally engaged, as by means of pivot pins 38, to lugs or extensions 39 on opposite sides of the hopper, and by inspection it is apparent that if the slides 27 and 28 are moved outwardly from the pivots 13, the pusher arms 29 and 31 will bear against the bottom of the hopper and tilt it in a clockwise direction, and furthermore, that if the slides 27 and 28 are permitted to move toward the piv-

ots 13, as would occur if they were released, the weight of the hopper and anything in the hopper would cause the hopper to tilt in a counter-clockwise direction.

Referring again to Figure 1; in dumping the loads from the loader, I preferably provide a chute such as illustrated at 41. This chute is preferably supported by a rectangular frame 42, such as illustrated in Figure 3, and includes uprights 43, cross members 44, 46 and 47, and is braced by the members 48, 49, 51 and 52. This chute frame is preferably supported on the tractor by means of lugs 53 which engage the hitch bar 54 of the tractor.

In order to brace this supporting frame 42, I preferably provide side braces 56 and 57 joined by suitable cross bracing members 58, and this bracing structure is secured to a cross beam 59 which is in turn secured to the front of the tractor. I preferably use wheels 60 on the front of the tractor to assist in carrying the load when the hopper is extended forwardly. Of course the upper rear portions of the members 56 and 57 are secured to the chute supporting structure 42 by means of suitable lugs 61. The rear portion of the chute 41 is supported by braces 62.

Power for operation of the machine is preferably furnished from the conventional power take-off of the tractor (not shown) which drives a worm gear in the gear housing 63 which in turn drives a cross shaft which may be connected at will to the shaft 65 and tilting drum 64 or the shaft 66 and sprocket 67 which drives hoisting drums 68 and 69. The engagement of the clutches to the hopper tilting drum 64 or hoisting drums 68 and 69 is controlled by the operating levers 70 and 75. The hoisting drums 68 and 69 are mounted on a cross shaft 71 which is mounted in suitable bearing blocks 72 on uprights 43.

The hoisting sheave shaft 71 is rotated in one direction by means of the sprockets 67 and 73 and the sprocket chain 74. The weight of the side arms 10 and 11, the pusher arms 29 and 31, and the hopper 19, are sufficient that when the clutch controlled by the lever 75 is released, the weight of these members exerts a sufficient pull on the cables 76 and 77 and the drums 68 and 69 to cause the hoisting drums to run backward to let the hopper down. The rate of lowering of the hopper is controlled by means of a foot brake 78 which is actuated by the pull rod 79 and the lever 81. The cables 76 and 77 pass forwardly over the idler pulleys 81, down to sheaves 82 on the ends of the side arms 10, and back upwardly to the dead-end connection 83 at the top of the support 43. The hoisting drums 68 and 69 may thus be driven to raise and lower the hopper 19.

Tilting of the hopper 19 is regulated by means of the pusher arms 29 and 31 and the position of the slides 27 and 28 on the side arms 10 and 11. The position of the slides 27 and 28 on the side arms 10 and 11 is determined by means of the cable 86. The cable 86 passes upwardly from the sheave 64 over a pulley 87 on top of the frame cross member 47, over a sheave 88 which is pivotally mounted in plates 89 on top of the cross member 47 and down to a sheave 91 on the outer end of the push arm 10.

The cable then passes to the sheave 37 on the slide 27, return to another sheave 92 on the end of the arm 11, back to the sheave 36 on the slide 27, outwardly to a sheave 92 on the cross member 14, over to a sheave 93 on the other end of the cross member 14, back to a sheave 94, return to a sheave 96 on the outer end of the arm 10, back

to the sheave 97 on the slide 28, up to the sheave 98 on the end of the arm 10, and back to a dead-end connection 99 at the upper end of the frame 43.

This cable and sheave system may be considered as two block and tackle systems, one on each side of the side frame 10—11, operated by one continuous cable and adapted to draw the slides toward the head of the side frame 10—11.

It is apparent that when the cable 86 is hauled in by the drum 64, the slides 27 and 28 will be drawn toward the outer ends of the side frame members 10 and 11 to thus tilt the hopper 19 in a counterclockwise direction. Now if the hoisting drums 68 and 69 are rotated to hoist the side arms 10 and 11, the space between the sheaves on the ends of the side arms 10 and 11 and the top of the frame 43 will be shortened and thus pay out the cable between the sheaves on the end of the arms 10 and 11 and the sheaves on the slides 27 and 28, to thus permit the weight of the hopper and its contents to push the slides 27 and 28 rearwardly on the side arms 10 and 11 and permit the hopper to swing in a clockwise direction.

It is apparent that as the hopper is lifted, it will swing more and more to a greater degree until it reaches a vertical position with the side arms 10 and 11 resting against the bumpers 102 and 103. When the side arms 10 and 11 rest against the bumpers, the cable 86 may be hauled in to shorten the distance between the sheaves on the ends of the side arms and the slides to tilt the hopper 19 in a counter-clockwise direction to discharge the contents thereof into the chute 41 and thus into a gondola, truck or the like. On releasing the clutch which controls the drive shaft 66, the bumpers 102 will start the hopper forwardly and downwardly and its weight will carry it downwardly to the forward position. The rate of descent is controlled by the brake 78. If the cable 86 is released, the hopper will rotate in a clockwise direction around the free ends of arms 10 and 11 to the loading position.

In loading, of course, the tractor is driven forward with the bottom plate 21 resting on the ground until the hopper is loaded. The hopper is then tilted in a counter-clockwise direction to the carrying position, shown in Figure 1, by hauling in on the tilting cable 86. It is then raised to the extreme lifted position with the arms 10 and 11 resting against the bumpers 102. The tilting cable is then hauled in to dump the load into the chute 41 which discharges the load into the vehicle. Due to the automatic paying out of the cable 86 between the sheaves on the side arms and the slides, the hopper remains in correct carrying position while it is being raised.

Although I have described a specific embodiment of my invention, and have described it in particular reference to its use for loading beets and the like, it is quite apparent that a machine constructed according to my invention may be used for a number of operations, not only for overhead delivery of materials, but also for picking materials up at the front of the machine, driving the tractor to a new position, and dumping the materials in front of the machine again. It may be used for stock pile loading, for handling sand and gravel and the like, for quarrying, in industrial plants and mines, loading coal, and many other uses. Modifications thereof may be made without departing from the spirit and scope of my invention as set forth in the appended claims.

I claim as my invention:

1. In a machine of the character described, side arms pivotally engaged to the tractor, slides on the side arms, a hopper pivotally engaged on the end of the side arms, push arms pivotally engaged to the slides and the hopper, and a cable having fixed connection to another part of the machine and running over pulleys on the slides and the side arms, whereby shortening of the distance between fixed points on the machine and the side arms causes paying out of the cable between the pulleys to permit tilting of the hopper by its own weight.

2. In a machine of the class described, including a tractor, side arms pivotally engaged to the tractor, a support, a framework engaged on the tractor, a hopper pivotally engaged on the free ends of the side arms, push arms also pivotally engaged to the hopper at spaced intervals from the engagement by the side arms, slides on the side arms pivotally engaged to the other ends of the push arms, and a cable rigged from a drum on the tractor over a sheave on the supporting framework to the two sheaves on the side arms and back and forth between sheaves on the side arms and sheaves on the slides, whereby raising and lowering of the side arms causes lengthening and shortening of the distance between the sheaves on the side arms and the sheaves on the slides to permit the hopper to tilt by its own weight.

3. In a machine of the class described including a tractor, a supporting framework above the tractor, a chute on the supporting framework, a pair of side arms pivotally engaged on the tractor, a hopper pivotally engaged on the ends of the side arms, push arms pivotally engaged to the hopper at spaced intervals from the first named pivotal engagement, slides on the side arms having pivotal engagement with the push arms, and means for shortening and lengthening the distance between the slides and the ends of the push arms to tilt the hopper, said means including a connection between the slides, an end of one of side arms, and a stationary point of the machine whereby shortening of the distance between the end of the side arm and the stationary point causes tilting of the hopper.

4. In a machine of the class described, a tractor, side arms pivotally engaged to the tractor, a hopper pivotally engaged to the free ends of the side arms and at least one push arm slidably

engaged at one end to the side arms and having the other end thereof pivotally engaged to the hopper at a spaced distance from the engagement of push arms and the hopper, and cables reeved between fixed points on the tractor and the ends of the side arms and the slides of the push arms, whereby movement of the side arms to or from the fixed point on the tractor results in letting out or pulling in the cables reeved over the ends of the side arms to thereby move the slides to tilt the hopper.

5. In a machine of the class described, a tractor, side arms pivotally engaged to the tractor and a hopper pivotally engaged to the free ends of the side arms, push arms also pivotally engaged to the hopper at spaced intervals from the engagement of the side arms, and slides on the push arms having pivotal engagement with the opposite ends of the push arms, and means for regulating and moving the slides to thus tilt the hopper through the agency of the push arms, including flexible connections engaged to the slides passing through suitable direction changing means at the ends of the side arms and engaged on hoist drums on the tractor, other direction changing means being provided at fixed points on the tractor and engaging the flexible means so that when the side arms are raised and lowered the distance between the ends of the side arms and the last named direction changing means is varied to cause movement of the slides on the side arms and consequent tilting of the hopper.

6. In a machine of the class described, a tractor, side arms pivotally engaged on the tractor, a hopper pivotally engaged on the ends of the side arms, push arms also pivotally engaged to the hopper at spaced intervals from the engagement of the side arms therewith, the opposite ends of the push arms being pivotally engaged to slides on the side arms, a hoist drum on the tractor and a hoisting cable reeved on the drum over a pulley above the drum, over pulleys on the ends of the side arms, and to the slides, means for lifting and lowering the side arms to thus raise and lower the hopper, the pulleys for the cables being so positioned that on raising of the side arms the distance between the pulleys and the ends of the side arms is decreased to thus permit the slides to move downwardly on the side arms and permit the hopper to turn in a clockwise direction to thus maintain it in carrying position.

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