April 27, 1948. H. A. WAGNER ET AL 2,440,495

HOISTING TOWER APPARATUS

Filed June 24, 1946 4 Sheets-Sheet 1

Fig. 1

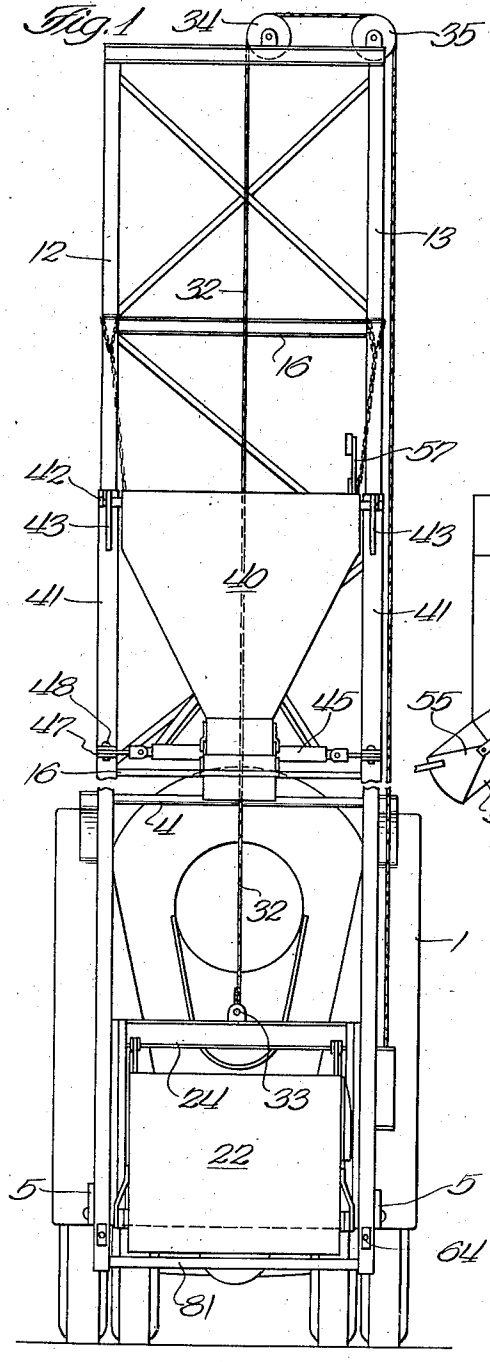
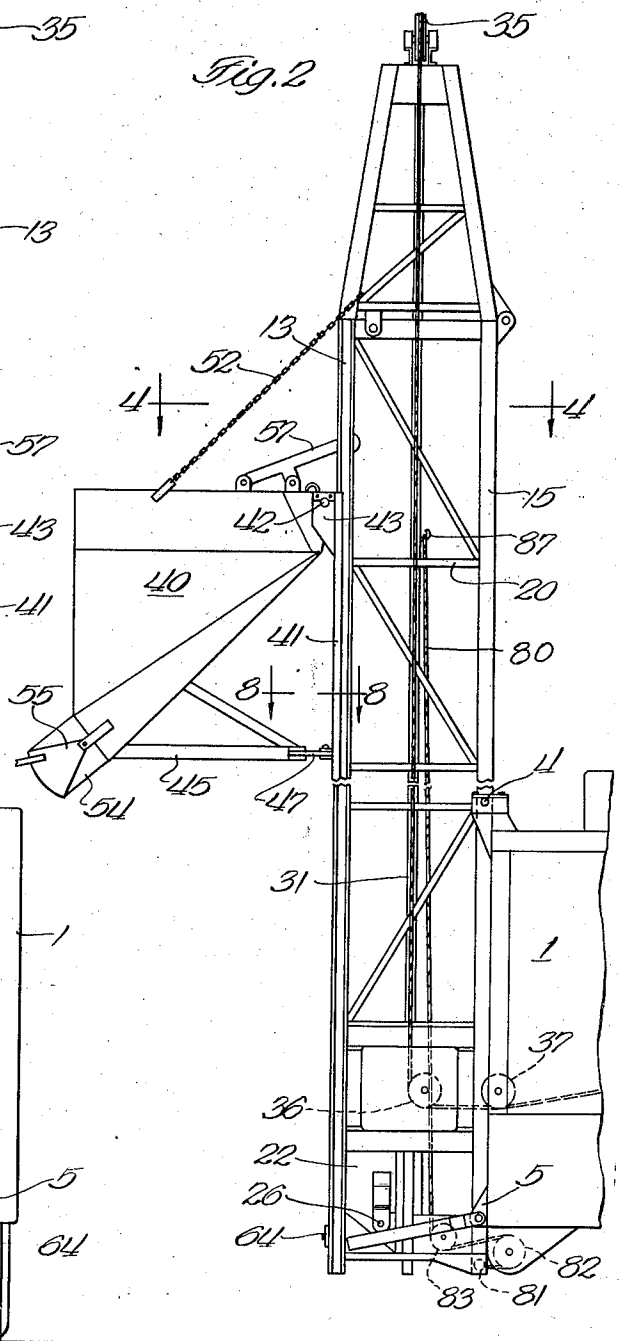


Fig. 2



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HOISTING TOWER APPARATUS

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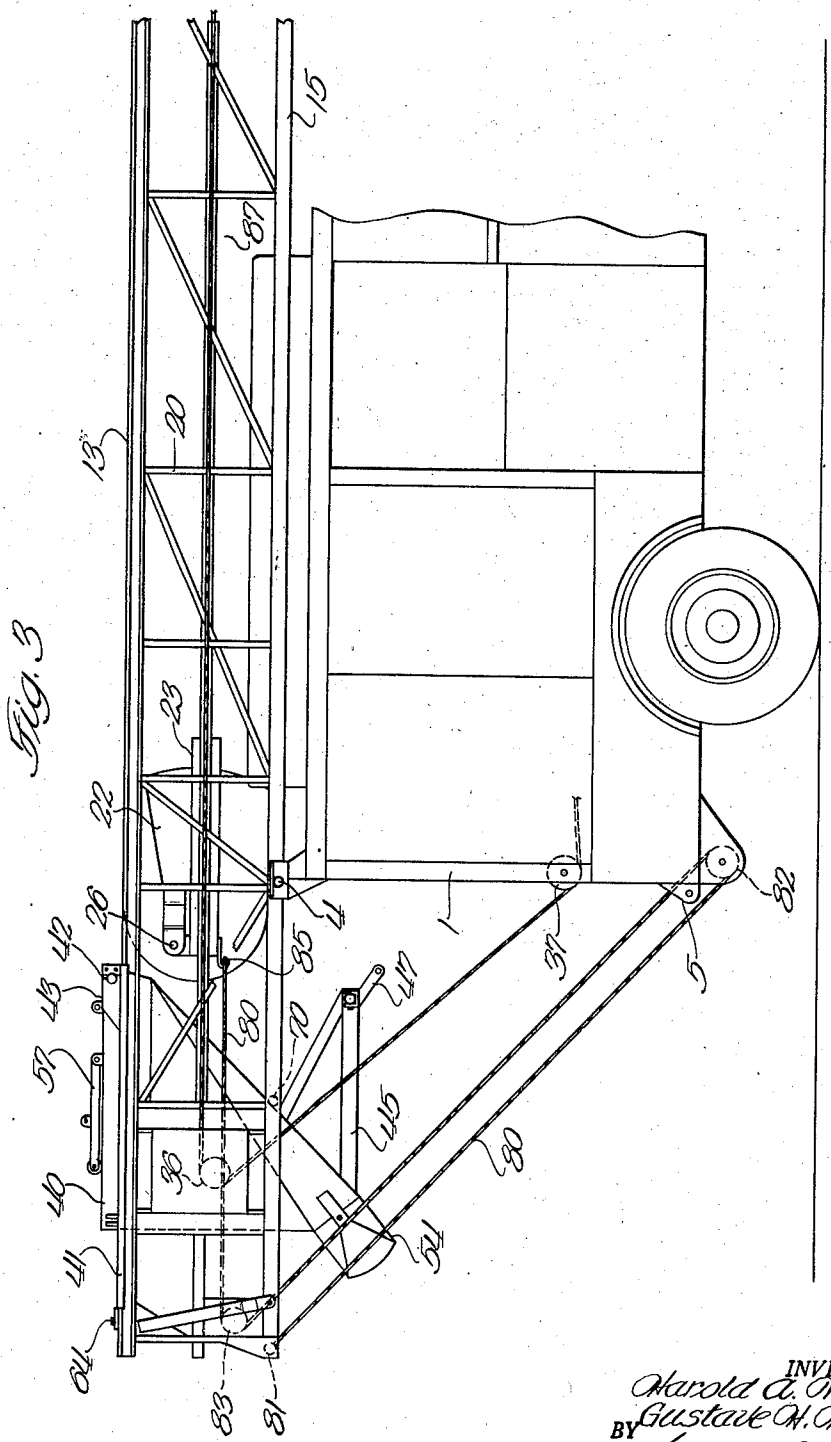


Fig. 3

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HOISTING TOWER APPARATUS

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Fig. 4

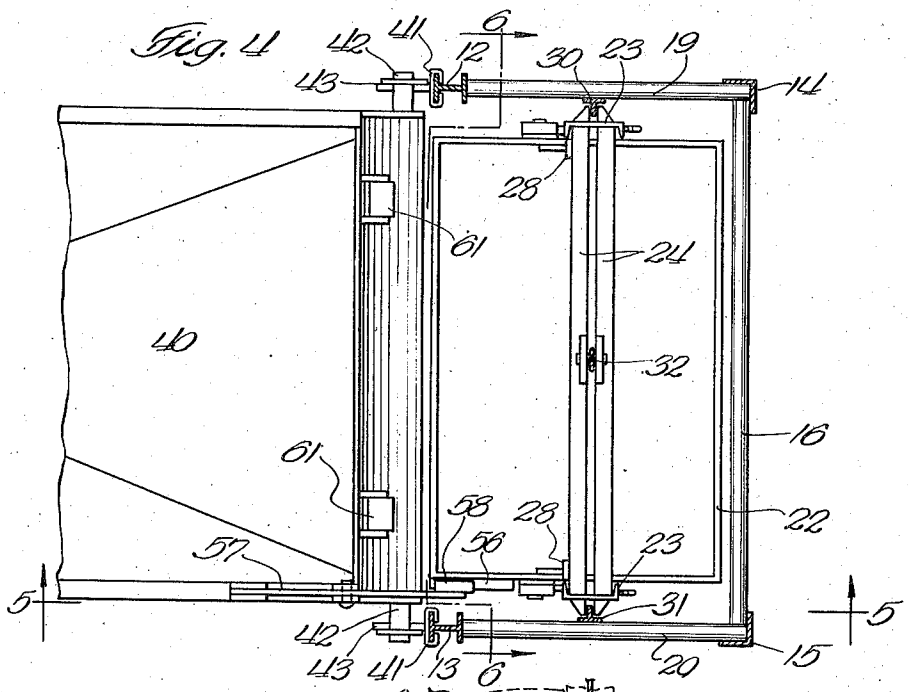
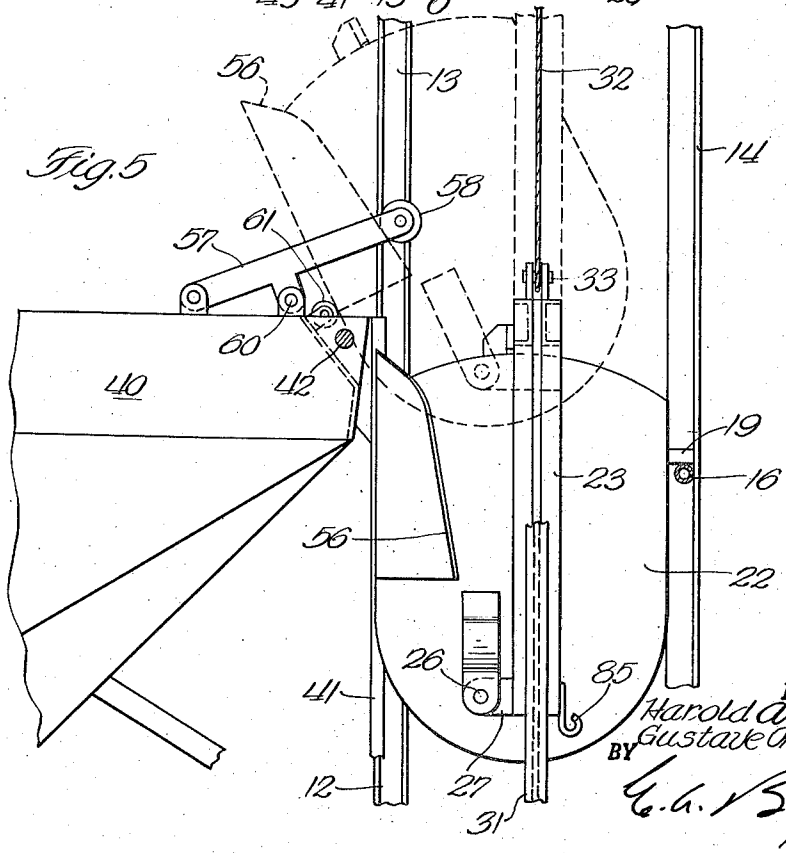


Fig. 5



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HOISTING TOWER APPARATUS

Filed June 24, 1946 4 Sheets-Sheet 4

Fig. 6

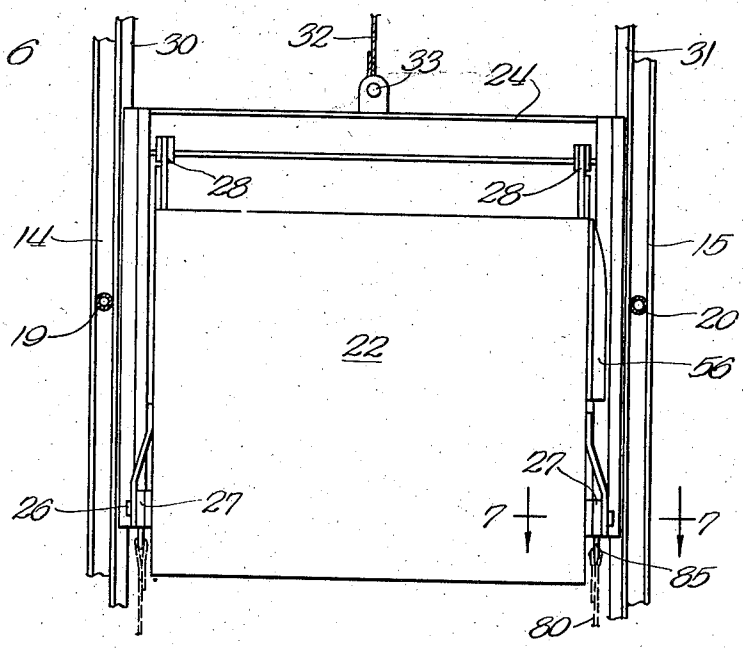


Fig. 8

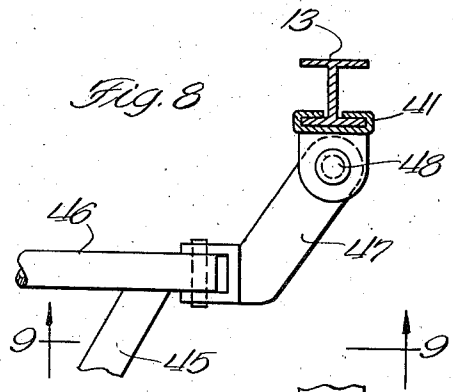


Fig. 9

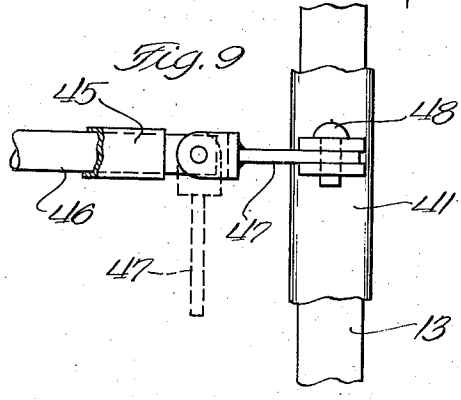
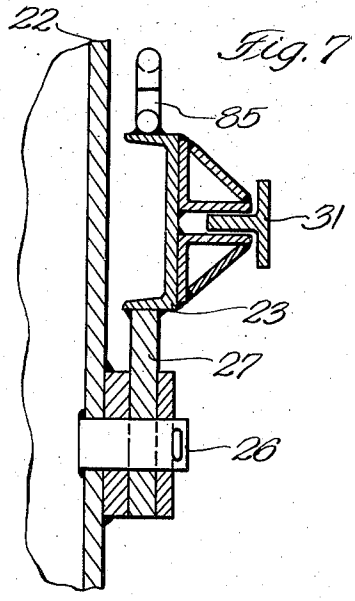


Fig. 7



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UNITED STATES PATENT OFFICE

2,440,495

HOISTING TOWER APPARATUS

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Application June 24, 1946, Serial No. 678,842

10 Claims. (Cl. 214—120)

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The present invention relates to material hoisting towers such as may be used for elevating materials in building construction. It is more particularly concerned with an elevator tower arrangement suitable for pivotal mounting on a vehicle upon which it may readily be transported in a horizontal inoperative position and quickly elevated to a vertical operating position.

Hoisting tower apparatus of the type to which this invention relates includes a hopper mounted on the front of the tower and which is required to be removed therefrom as the tower is lowered to the horizontal position for transportation in order to reduce the overall height of the apparatus to a minimum to satisfy highway clearance limitations. The hopper when removed from the tower is separately supported upon the vehicle, usually by chains underneath the overhanging tower end. Since the hopper is relatively heavy and cumbersome it is rather difficult to handle and much time and effort is ordinarily required for removing it from the tower preparatory to transportation and for remounting it on the tower preparatory to usage. In accordance with the present invention physical removal of the hopper from the tower is not required and it can be shifted to an inoperative position upon lowering of the tower simply by removal of a pair of retaining pins. The taking down and setting up procedures for the tower is thus very greatly simplified and expedited.

A general object of the invention is to provide a new and improved hoisting tower structure which is simple and compact in design, and readily adjustable to meet the various requirements for such apparatus.

A more specific object is to provide a new and improved elevator tower structure including improved means for raising and lowering the tower structure.

A still further object of the invention is to provide a hoisting tower arrangement including a material elevating bucket and a material receiving hopper mounted on one side of the tower and having a new and improved means for automatically dumping the bucket as it is moved upwardly past the hopper.

A further object of the invention is to provide a new and improved hoisting tower including a hopper adjustably mounted upon the face of the tower and adapted to be swung to an inoperative position within the tower when the latter is moved to the horizontal condition.

A still further object of the invention is to

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provide a new and improved open faced hoisting tower arrangement mounted on a vehicle for movement between a vertical operative and a horizontal transporting position and including a hopper pivotally mounted across the face of the tower and adapted to be pivoted into the lower end of the tower structure on lowering the tower to a horizontal position.

Further objects and advantages of the invention will become apparent from the following description of the invention, 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 front elevational view of the tower structure in accordance with one form of the invention shown mounted upon a portable concrete mixer; Fig. 2 is a side elevation of the structure shown in Fig. 1; Fig. 3 is a side elevation of the structure of Fig. 1 but with the tower shown in a horizontal transporting position; Fig. 4 is a cross sectional view taken along line 4—4 of Fig. 2; Fig. 5 is a view taken along line 5—5 of Fig. 4; Fig. 6 is a view taken along line 6—6 of Fig. 4; Fig. 7 is a view taken along line 7—7 of Fig. 6; Fig. 8 is a view taken along line 8—8 of Fig. 2; Fig. 9 is a view taken along line 9—9 of Fig. 8.

In accordance with the illustrated embodiment of the invention the tower structure comprises a plurality of parallel uprights defining an open faced longitudinal elevator shaft having a hoist bucket mounted for movement therewithin. The tower is adapted to be pivotally mounted intermediate its ends upon a supporting vehicle and is adjustable between a horizontal inoperative position and a vertical operative position. A hopper is adjustably mounted upon the front side of the tower so as to extend across the open face and is provided with a novel means for engaging the bucket as it moves upwardly within the tower to cause dumping of the bucket contents into the hopper. The hopper is so designed and so mounted upon the tower that upon movement of the tower to the horizontal position, the hopper may be swung to an inoperative position within the lower end of the tower, thus reducing the overall height of the apparatus to a minimum for traveling and with a minimum of effort on the part of the operator. A novel arrangement is also provided whereby the tower can be quickly raised and lowered with a minimum of preparatory steps required to be taken.

The elevator structure will be specifically de-

scribed as it may be applied to a mobile concrete mixer although it is to be understood that the mixer is merely representative of any vehicle upon which it is desired to mount a portable material elevator structure.

With reference to the drawings, and particularly to Figs. 1, 2 and 3, the rear portion of a mobile concrete mixer is indicated generally at 1. The longitudinal tower structure is suitably pivoted intermediate its ends at some point such as 4 upon an upper rear portion of the mixer. When in the vertical position the lower end of the tower may be attached by removable pins to a pair of brackets 5 secured to the opposite sides of the vehicle adjacent the lower end thereof. For lowering the tower, the pins are removed after which the tower may be pivoted about the bearing 4 to the horizontal position shown in Fig. 3.

The tower structure is formed of parallel front uprights 12 and 13 and rear uprights 14 and 15 spaced at right angles with respect to each other so as to define a substantially rectangular elevator shaft therebetween. The rear uprights are rigidly secured together by means of suitably spaced transverse members 16 while the front uprights 12 and 13 are rigidly secured to the rear uprights 14 and 15, respectively, by a plurality of suitably spaced cross members 19 and 20 extending therebetween. Diagonal braces may be provided as desired between the uprights around the three sides such as is shown. The front side of the tower, or the space between the uprights 12 and 13 is open substantially throughout the full length thereof, or at least, throughout the full length of travel of the bucket mounted within the tower.

Referring to Figs. 4 to 7 a bucket 22 is mounted within a carriage comprising a framework including a pair of slides 23, the slides being connected together at their upper ends by transversely extending channel beams 24. The bucket 22 is pivotally mounted within the carriage as at 26 on the ends of bracket arms 27 secured to the lower end of the carriage slides 23. It will be observed that the pivotal support 26 for the bucket is thus somewhat forward of the center of gravity thereof so that the upper end of the bucket is normally biased toward the rear side of the tower. The bucket is maintained in the upright position within the supporting carriage, by means of stops 28 secured to and extending upwardly from the top of the bucket and engaging with the front side of the cross beams 24 of the bucket carriage.

The movement of the bucket within the tower is guided by a pair of rails 30 and 31 secured to the inner sides of the tower in parallel relation with respect to the uprights. The guide rails are shown in the form of T irons, the flat sides being welded to the transverse brace members 19 and 20 of the tower with the webs of the T irons extending towards each other and defining bearing surfaces for the bucket carriage slides 23.

The bucket is adapted to be raised and lowered within the tower by means of a cable 32 attached to the bucket carriage as at 33, the cable extending to the top of the tower and trained over pulleys 34 and 35. From pulley 35, the cable extends down outside the tower to the pulley 36 adjacent the lower end thereof, from whence it travels beneath the idler 37 on the vehicle to the winch drum (not shown).

A hopper 40 for receiving the contents of the bucket is mounted upon the front side of the tower and is supported by means of a pair of slides 41 which are cooperatively arranged upon the front uprights 12 and 13, which in this instance are I-beams. Slides 41 include channel edge portions which extend around the edges of the forward face sides of the uprights 12 and 13 as shown more clearly in Fig. 4. The hopper is pivotally secured at its upper end to the upper end of slides 41, the hopper being provided with trunnions 42 removably mounted in brackets 43 secured to the front sides of slides 41. Means for supporting the hopper in an upright or operative position comprises bracket members 45 secured to the sloping rear wall of the hopper and a transverse member 46 to the ends of which are pivotally secured a pair of arm extensions 47 adapted when in a horizontal position to be secured by pins 48 between cooperating lugs welded to the lower ends of slides 41 as illustrated more clearly in detail views, Figs. 8 and 9.

The hopper may be adjusted to any predetermined position upon the face of the tower by connecting in any suitable manner to the bucket carriage. Chains 52 are then employed to hold the hopper in the adjusted position by hooking the free ends thereof around the front uprights as shown in Fig. 2. The hopper itself may be of any suitable construction, being preferably of a construction where the bottom wall slopes downwardly and outwardly from the tower, and having a discharge chute 54 at the lowermost end thereof with a suitable closure gate 55, for controlling the flow of material therefrom. The width of the hopper is greater than the width of the bucket 22 but of less width than the distance between the front uprights 12 and 13.

Means are provided for effecting automatically the dumping of the contents from the bucket 22 into the hopper 40 as the bucket carriage is moved upwardly in the tower past the hopper. Attached to the outer surface of one side wall of the bucket adjacent the forward edge portion thereof is a curved guide flange 56. Pivotally mounted upon the same relative side of the hopper adjacent the top thereof is an arm 57 having a roller 58 at the end thereof. Arm 57 is adapted to be fastened to the top of the hopper by means including a removable pin 60 and held thereby in such a position that the roller 58 lies in the path of travel of the guide flange 56. Upon upward movement of the bucket, roller 58 will engage and ride upon guide rail 56 so that the bucket will be caused to tilt forwardly through the open face of the tower to a dumping position above the hopper in the manner shown more clearly by dotted lines in Fig. 5. Mounted upon the upper rear edge of the hopper are a pair of rollers 61 on which the side of the bucket will ride while the bucket is in a dumping position and across which the bucket will freely roll throughout the dumping operation and during the time the bucket is being returned to its normal upright position within the carriage as the latter is lowered after the contents of the bucket have been discharged. When the operator desires to elevate the bucket past the hopper as for the purpose of positioning the bucket for lowering the hopper from the adjusted elevated position, pin 60 is removed and the arm 57 is swung away from the tower to a position as shown in Fig. 3. The bucket is then raised to a point above the hopper, hopper 40 suitably fastened to the carriage and lowered to a point where slides 41 engage stops 64 attached to the lower ends of the uprights 12 and 13.

In Fig. 3, the tower is shown in the lowered or

horizontal inoperative position as for traveling. In order to maintain the overall height of the structure in this position at a minimum, the hopper 40 is first lowered to the bottom of the tower structure while the latter is in a vertical position until slides 41 engage stops 64 as described above. Pins 48 are then removed so that the arms 47 on the hopper supporting frame can be dropped to a vertical position shown by dotted lines in Fig. 9. As the tower is pivoted to a horizontal position, the hopper 40 will swing upon its trunnions 42 and between uprights 12 and 13 into the tower structure until as the tower approaches the horizontal position the rear wall of the hopper will contact stop 70 in the form of a tubular member extending between rear uprights 14 and 15.

Means for elevating the tower to the vertical operative position comprises a pair of cables 80, one end of each being secured to the lower end of the tower structure as at 81 and trained from there over idler pulleys 82, mounted on the lower portion of the vehicle 1, and another pair of idler pulleys 83 mounted on the inner sides of the tower structure between the uprights on opposite sides of the tower. The other ends of the cables are provided with loops for fastening onto hooks 85 provided on corresponding sides of bucket carriage. As the bucket is then pulled toward the top of the structure by cable 32 connected to the winch drum, cable 80 travels about idler pulleys 82 and 83 so that the lower end of the tower is pulled downwardly, pivoting the tower about point 4 to an upright position. The tower may then be anchored to the brackets 5.

As the tower is raised, hopper 40 will swing outwardly to a point from which it can be easily moved into a position where arms 47 can be connected to slides 41.

For lowering the tower the procedure is substantially the reverse of that indicated. Thus with the arrangement just described, either raising or the lowering of the tower may be expediently effected merely by the movement of bucket within the tower. When the tower is moved to the upright position and anchored, the loops on the ends of cables 80 are disconnected from the hooks 85 on the bucket carriage and hung over hooks 87 attached to the guide rails 31 at a convenient point as shown in Fig. 2.

Having described the invention in what are considered to be certain 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. An elevator arrangement comprising a tower adapted to be pivotally secured adjacent one end thereof to a vehicle and being further adapted to be transported horizontally upon said vehicle and shifted to a vertical operative position, said tower comprising a rectangular arrangement of parallel uprights, said tower being open along the front side thereof, a pair of slides mounted upon the uprights on the opposite sides of said front side of said tower, a hopper pivotally mounted adjacent its upper end on said slides, means detachably fastening said hopper adjacent its lower end on said slides, said hopper having a width slightly less than the distance between the uprights defining the front side of said tower whereby upon disconnection of the lower end of said hopper from said slides said hopper may be pivotally swung between said front uprights.

2. An elevator comprising a plurality of parallel uprights defining a tower structure having a longitudinal elevator shaft therein, said shaft being open along the front side of said tower, a hopper, means for mounting said hopper for vertical movement along the open front side of said tower structure, said mounting means including a pair of slides mounted upon the uprights on the opposite sides of said open side of said tower structure, said hopper being pivotally secured to said slides adjacent the upper ends thereof, a framework secured to said hopper means including a pair of arms pivotally secured to said framework for detachably fastening said framework to the lower portion of said slides, said hopper having a width slightly less than the distance between said slides whereby, upon detachment of said framework from said slides, said hopper may be pivotally swung between said slides into said shaft.

3. In a device of the class described, the combination comprising a tower formed of a plurality of parallel uprights defining a structure having a longitudinal elevator shaft therein, means for pivotally mounting said tower on one end of a vehicle for movement between a horizontal transporting position and vertical operative position, said elevator shaft being open along the front side of said tower, a hopper, means for mounting said hopper upon the front side of said tower, said mounting means comprising a pair of slides engaging a pair of the tower uprights on the opposite sides of said front side, means pivotally mounting said hopper adjacent its upper end on said slides, means releasably securing the lower end of said hopper to said slides, said hopper having a width less than the width of the open face of said tower, and being adapted to swing through the open face of said tower and into said shaft on movement of said tower structure to said horizontal position.

4. In a device of the class described, the combination comprising an open faced tower adapted to be pivotally mounted on one end of a transporting vehicle for movement between a horizontal transporting position and a vertical operative position, a hopper pivotally mounted across the open face of said tower, said hopper having a width less than the width of the open face of said tower and being adapted to swing into the tower through the open face thereof on movement of said tower to said horizontal position.

5. The combination comprising a tower movable between a horizontal inoperative position and a vertical operative position, said tower including a pair of spaced apart front uprights, a hoist bucket mounted within said tower, a hopper for receiving bucket contents, adjustable means for supporting said hopper in an operative position across the front side of said tower, said hopper having a width less than the distance between said uprights, said hopper being movable to an inoperative position within said tower when in said horizontal position.

6. An elevator comprising a plurality of parallel uprights defining a tower structure having a longitudinal elevator shaft therein, said shaft being open along the front side, a pair of slides mounted upon a pair of said uprights on the opposite sides of said front side, a hopper, means pivotally securing said hopper adjacent its upper end to said slides, means for detachably securing the lower portion of said hopper to said slides for

supporting said hopper in an operative position in front of said tower structure, said hopper having a width less than the width of the open front side of said shaft.

7. An elevator comprising a plurality of parallel uprights defining a tower structure having a longitudinal elevator shaft therein, said shaft being open along the front side of said tower, an elevator bucket carriage slidably mounted within said shaft for movement longitudinally thereof, a bucket pivotally mounted adjacent its lower end in said bucket carriage, a receiver for contents from said bucket mounted across the open face of said tower, means on said receiver for engaging said bucket as said bucket carriage is moved upwardly within said tower for effecting tilting of said bucket and the unloading of the contents thereof into said receiver, said engaging means comprising an arm pivotally secured to said receiver for movement between a bucket engaging position and position wherein the bucket can be moved upwardly past said receiver without engagement therewith.

8. In a device of the class described, the combination comprising a tower including a plurality of parallel uprights, a pair of front uprights defining an open side for said tower, a bucket carriage slidably mounted within said tower, a bucket pivotally mounted within said carriage so as normally to assume an upright position, said bucket being tiltable through said open side of said tower, a hopper arranged wholly on the outside of said tower adjacent the front side thereof, a roller arm pivotally secured to said hopper, means for securing said roller arm in a position for engaging said bucket as said carriage is moved upwardly for effecting tilting of said bucket to a dumping position, said roller arm being also adapted to be pivotally moved to a bucket non-engaging position.

9. In a device of the class described, the combination comprising a vehicle, a tower adapted to be transported in a horizontal inoperative position upon said vehicle, a hinged connection between a point intermediate the ends of said tower

and an upper portion of said vehicle to allow the tower to be raised to a vertical operative position, a bucket carriage slidably mounted within said tower, means for effecting movement of said bucket carriage longitudinally of said tower, means for effecting pivotal movement of said tower to said operative position comprising a cable having one end secured to the lower end of said tower and threaded about idler pulleys on said vehicle and on said tower, and means for securing the other end of said cable to said bucket carriage whereby movement of said carriage within said tower will effect pivotal movement of said tower about said hinged connection.

10. In a device of the class described the combination comprising a tower pivotally mounted intermediate its ends to an upper portion of a supporting vehicle, said tower being adapted to be transported horizontally upon said vehicle and shifted to a vertical operative position, a bucket carriage longitudinally movable within said tower, means for raising said bucket carriage within said tower, and means for raising said tower to a vertical operative position comprising a cable extending between the lower end of said tower and a lower portion of said vehicle, and means for fastening one end of said cable to said bucket carriage whereby movement of said bucket carriage toward the upper end of said tower will cause said tower to be raised to said vertical operative position.

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