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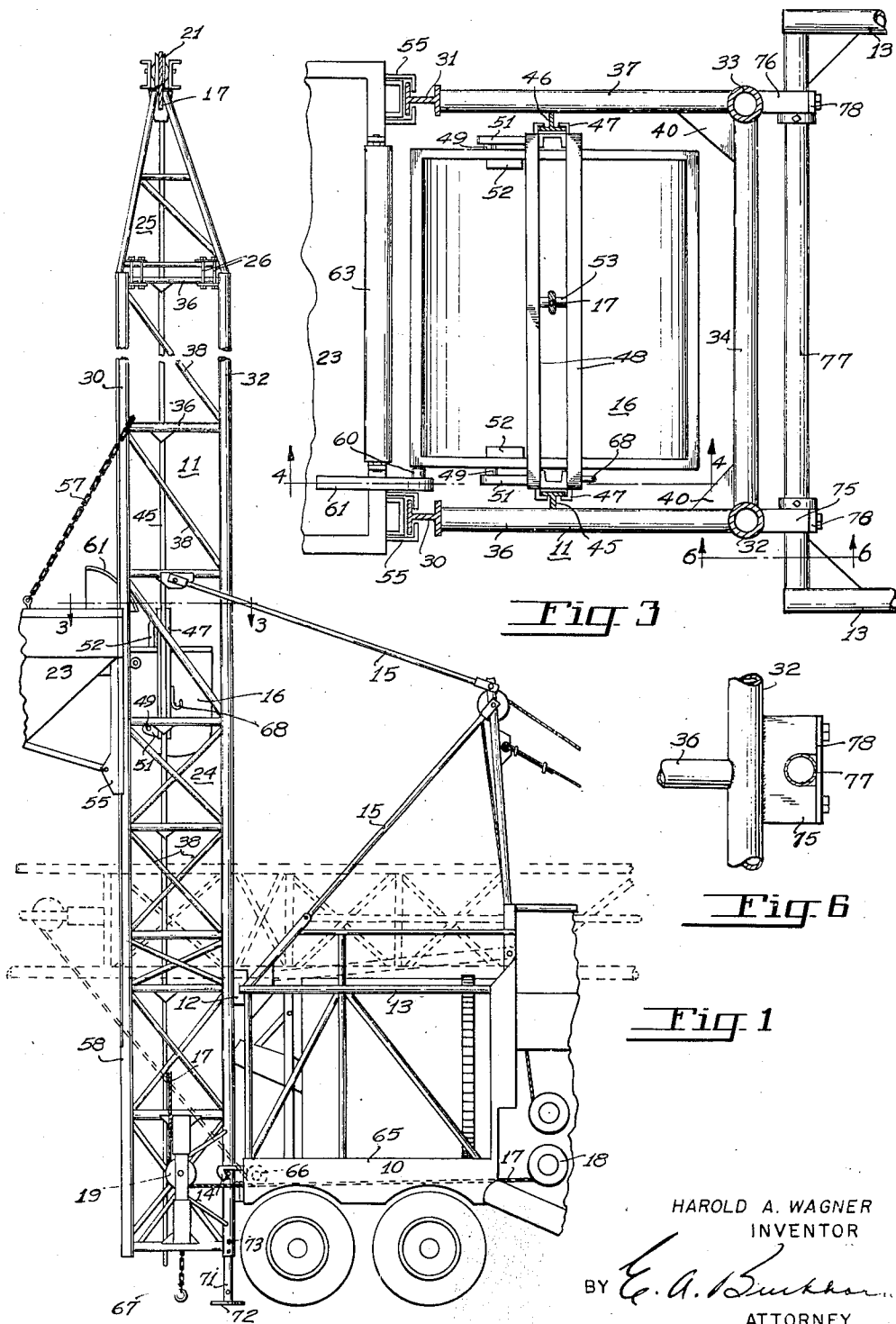
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CONCRETE MIXER TOWER

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2 Sheets-Sheet 1



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CONCRETE MIXER TOWER

2 Sheets-Sheet 2

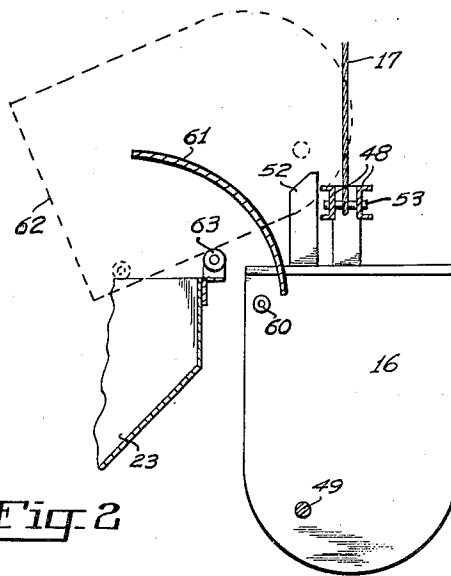
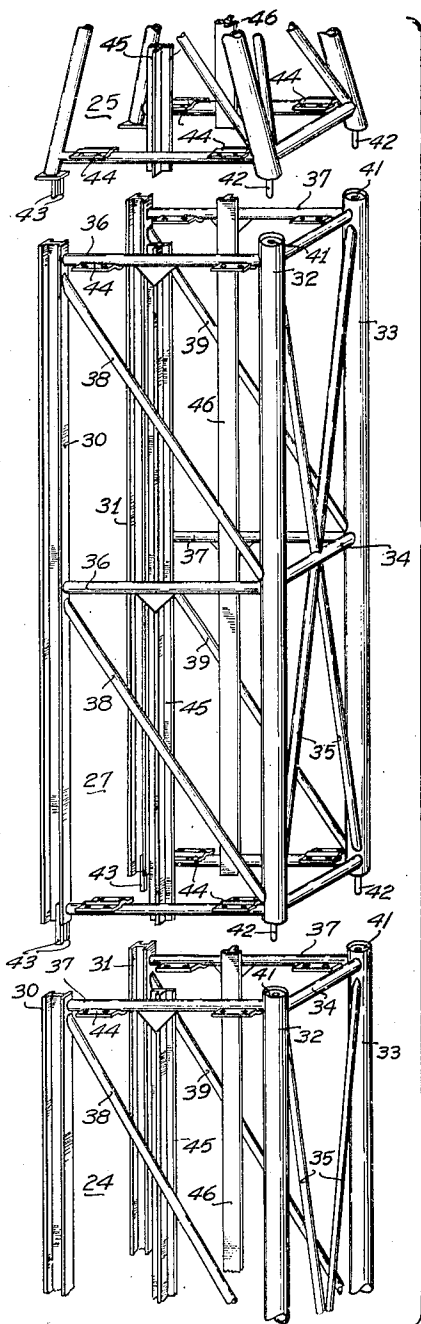


Fig 2

Fig 4

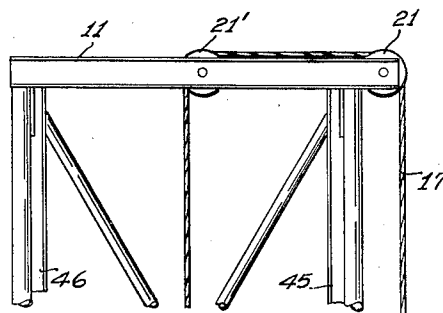


Fig 5

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CONCRETE MIXER TOWER

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10 Claims. (Cl. 214—120)

The present invention relates to hoisting towers, and more particularly to those of a portable type, such as may be used for elevating materials in building construction. While it is not necessarily so limited, the elevator tower arrangement is suitable for pivotal mounting on a mobile vehicle upon which it may readily be transported in a horizontal position and quickly elevated to a vertical operative position.

It is frequently desirable to provide a compact portable tower, particularly for use in construction work for elevating material from ground level to heights thereabove. To permit of maximum utilization of the tower structure it should be light in weight in order that it can readily be mounted upon a mobile vehicle for transportation over ordinary roads and in such a position as to have a reasonably low clearance height. Because of the varying nature of different construction projects, the structure should be capable of adjustment to meet with the requirements of each job, not only as to types of material which may be handled thereby, but also as to the height to which material is to be elevated. When the tower is to be used in conjunction with other apparatus, such as with a portable concrete mixing plant upon which it may be mounted, the tower should be readily removable so as to permit independent use of the concrete mixer when the concrete is not required to be raised. The problem of tower design is considerably complicated by virtue of the fact that the structure, in order to be practicable, should be so supported upon the vehicle when in the operative position that no guy cables will be required for stabilizing the tower.

It is, therefore, an object of the present invention to provide a new and improved elevator tower structure which is relatively light in weight yet rigid and stable in the operative position.

A more specific object of the invention is to provide a new and improved open faced tower structure having a relatively large capacity bucket slidably arranged therein and which bucket may quickly and smoothly be elevated within the tower shaft without binding.

A still further object of the invention is to provide a new and improved hoisting tower adapted to be pivotally mounted on a concrete mixer or the like apparatus and having a bucket elevating cable means which may also be used for raising and lowering the tower without requiring any rearrangement of the cable.

Another object of the invention is to provide a new and improved open faced tower structure

and load receiving hopper slidably mounted across the face of the tower for adjustment to selective positions thereon.

Another object of the invention is to provide a new and improved tower comprising a plurality of readily separable sections which may be assembled to produce a tower of a desired height.

In accordance with the illustrated embodiment of the invention, the tower structure comprises a plurality of parallel uprights defining a longitudinal elevator shaft, the uprights being braced together around three sides of the tower whereby the elevator shaft is open along the front side of the tower throughout the full length thereof. The rear uprights are preferably of a tubular configuration while the front uprights are formed by I-beams having their flat sides facing outwardly. An elevator bucket carriage slidably mounted within the tower shaft upon guide rails secured to the opposite inner sides of the tower is provided with a bucket pivotally supported therein adjacent its lower end. A hopper is adjustably mounted upon the front side of the tower so as to extend across the open face thereof and is so constructed as to engage with a portion of the bucket as the carriage is moved therepast to cause forward tilting movement of the bucket through the open tower face and dumping of the bucket contents into the hopper. The hopper unit includes channel slides which cooperatively engage around the flanges of the I-beams forming the front tower uprights so as substantially to preclude spreading of the tower sides during the use thereof.

Further objects and advantages of the invention will become apparent as the description proceeds, 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 tower structure shown mounted upon the rear end of a portable concrete mixer plant; Fig. 2 is a fragmentary exploded view in perspective illustrating more clearly structural details of the tower; Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 1; Fig. 4 is a diagrammatic sectional view taken along the line 4—4 of Fig. 3 and illustrating functional features of certain elements of the structure; Fig. 5 is a front elevation of the uppermost end of the top unit of the tower; and Fig. 6 is a fragmentary cross sectional view taken along the line 6—6 of Fig. 3.

Referring particularly to Figs. 1 and 2 of the drawings, the elevator tower structure of the in-

vention will be described as it may be applied to a mobile concrete mixer apparatus indicated generally at 10. It will readily be appreciated, however, upon a perusal of this specification, that the invention is not necessarily so limited, in that the tower structure may be applied equally well to other apparatus and for purposes other than for handling merely concrete. Thus, for example, the concrete mixer 10, insofar as the present disclosure is concerned, may be taken to represent any mobile vehicle upon which it is desired to mount a portable elevator structure. Furthermore, it is not essential that the tower structure disclosed be mounted upon a mobile vehicle, since, obviously it can be stationarily mounted in an upright position upon any suitable foundation. As illustrated, the longitudinal tower structure, indicated generally at 11, is suitably pivoted intermediate its ends at some point, such as 12, upon an upper portion of the mixer framework 13. When in the vertical position the lower end of the tower may be secured to the vehicle framework by suitable means, such as hooks 14, pivotally attached to the mixer frame and extending rearwardly therefrom for cooperatively hooking over studs secured to the tower uprights. Braces 15 may be connected between the tower above the pivot 12 and other parts of the mixer structure for steadying the tower in the elevated position.

A bucket 16 is mounted for longitudinal movement within the shaft of tower 11 by means of a cable 17 extending from the power driven winch drum 18 provided on the mixer and trained over pulley 19 in the base of the tower and over pulleys 21 mounted in the top of the tower from which latter pulleys the cable extends downwardly centrally of the tower shaft to the carriage supporting the bucket 16. In order to illustrate more clearly the tower details, the cable extending lengthwise of the tower has been omitted from the drawings. Adjustably mounted upon the front side of the tower 11 is a hopper 23 which is adapted to receive the contents from the bucket 16 and from which the contents may be distributed to suitable points as by chutes (not shown).

The tower structure will now be described in greater detail. Referring to the view of Fig. 1, it will be observed that the tower is formed by a lower unit 24, which is hinged to the mixer framework, and an upper unit 25 which is secured as by clamping bolts 26 to the top of the lower unit. The upper unit may readily be removed and one or more intermediate extension units assembled between the lower and upper units in order to adjust the height of the tower to the job requirements. An extension unit 27 is included in the exploded view of Fig. 2. The structure of the lower and intermediate units is essentially similar with regard to the uprights and bracing in order that when assembled the combined units will effectively form a unitary structure of the combined length.

Referring now to Fig. 2, it will be observed that the tower structure is formed of a plurality of parallel uprights which are braced together around the rear and the two opposite sides of the tower only so that the front side of the tower is open substantially throughout the full length thereof, or, at least, throughout the full length of travel of the bucket 16 mounted therein. The front uprights 30 and 31 and the rear uprights 32 and 33 are spaced at right angles with respect to each other so as to define a substantially

rectangular elevator shaft therebetween for the bucket 16. It is preferred that the rear uprights 32 and 33 be formed by relatively large diameter tubular members and which are secured together by suitable means such as horizontal cross braces 34 and diagonal members 35. The front uprights 30 and 31 are preferably formed by I-beams arranged so that their flat sides extend in a common plane and whereby their outer sides define the front of the tower. The I-beams 30 and 31 are rigidly secured to corresponding ones of the rear uprights by suitable means such as horizontal braces 36 and 37, respectively, and diagonally extending members 38 and 39. The various cross braces and diagonal members are preferably tubular in shape, or pipes, welded at their opposite ends to the uprights whereby a structure of relatively light weight, yet possessing a high degree of rigidity, is provided. Corner gusset plates 40 (see Fig. 3) are preferably welded between adjacent right angularly extending horizontal braces in order to add to the strength of the structure. It is pointed out that no cross bracing is provided between the front uprights 30 and 31, the space therebetween being open the full length of the tower structure for reasons that will be pointed out more fully hereinafter.

While the tower may be made as a unitary structure of a predetermined length, it is preferred, for reasons of greater flexibility and adaptability to the requirements of varying needs, to construct the tower of a plurality of separable sections and which may be united together in an end to end relation to form a tower of any reasonable desired length. Such sections can readily be combined when the tower is in a lowered or horizontal position. To facilitate the alignment and assembly of the various sections, telescopic interfitting means are provided on the adjacent ends of the tower units. The upper ends of the rear uprights 32 and 33 are provided with cylindrical plugs 41 having central openings therethrough for cooperatively receiving dowel pins 42 centrally secured to and depending from the lower ends of the rear uprights of the above section. Depending from the lower ends of the front uprights of the above sections are pairs of fingers 43 welded to opposite sides of the web portion and which are adapted to straddle the web of the front uprights of the lower section. The lower end of the top unit 25 is equipped in the same manner as the corresponding ends of the intermediate units for facilitating the assembly of this unit upon the upper end of the lower unit. Clamping plates 44 are provided upon the parallel cross braces at the adjacent ends of the tower sections and top unit for receiving bolts, such as 26 (Fig. 1), therethrough.

For guiding the movement of the bucket 16 within the elevator shaft of the tower, a pair of rails 45, 46 are secured to the inner sides of the tower in a parallel relation with respect to the various uprights. The guide rails may be formed of any suitable metal members such as T irons, the edge of the webs of which may be welded to the transverse brace members of the tower. The flat sides of the T-shaped members thus face each other and define bearing surfaces for the bucket carriage within which the bucket 16 is supported. The bucket carriage comprises a rectangular framework including a pair of double flanged slides 47, shown more clearly in Fig. 3, which fit over the oppositely extending flanges of the guide rails, the upper ends of the slides 47 being connected together by transversely ex-

tending channel beams 48. The bucket 16 is pivotally mounted within the carriage as at 49 on the ends of bracket arms 51 secured to the lower ends of the vertical frame members of the bucket carriage and extending outwardly therefrom toward the front of the tower. It will be observed that the pivotal support for the bucket is thus somewhat forwardly 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, however, by means of a stop 52 extending upwardly from the top of the bucket and which engages with the front side of the cross beams 43 of the bucket carriage. The end of the cable 17 is fastened to a cross pin 53 extending between the carriage beam members 43 centrally thereof. By virtue of the fact that the slides 47 of the bucket carriage fit cooperatively around the flanges of the guide rails 45, 46, disengagement of the bucket carriage from the guide rails during longitudinal movements thereof within the elevator shaft is positively precluded and free sliding movement is assured.

The hopper 23 mounted upon the front side of the tower is of a width substantially equal to that of the tower, or at least, somewhat wider than the bucket 16. The hopper is supported upon the tower by means including a pair of oppositely disposed parallel slides 55 which are cooperatively arranged upon the sliding surfaces provided by the front uprights or I-beams 30 and 31. The slides 55 include angle iron edge strips which extend around the opposite edges of the face sides of the uprights 30 and 31 and, since the slides 55 are rigidly secured together in a predetermined spaced relation through the structure of the hopper proper, there will be no tendency on the part of the hopper, however loaded, to exert any lateral stresses upon the tower structure which might cause spreading of the tower sides. In this respect, the supporting structure for the hopper 11 adds to the rigidity of the tower acting as a brace between the front uprights and holding them in a predetermined spaced relation.

The hopper may be raised to any predetermined position upon the face of the tower by means of the cable 17 which may temporarily be disconnected from the bucket supporting carriage and suitably connected to the hopper for effecting the positioning thereof by means of the power driven winch drum 12. For holding the hopper in the adjusted position suitable means such as a pair of chains 57 may be provided, one end of each being suitably connected to the hopper, while the other end may be hooked around the front uprights as shown in Fig. 1. For facilitating the removal of the hopper from the front side of the tower, the oppositely extending flanges of the front side of the I-beams 30 and 31 forming the front uprights are cut away as indicated at 58 (Fig. 1) at the lower end of the tower. Thus, when the hopper is dropped to the lowermost position, the in-turned angles of the hopper slides move free of the I-beam flanges and the hopper may readily be removed as for transportation of the mixer with the tower lowered.

Means are provided for effecting automatically the dumping of the contents from the bucket 16 into the hopper 23 as the bucket carriage is moved upwardly in the tower past the hopper. Attached to one side wall of the bucket adja-

cent the upper end and near the forward edge portion thereof is a suitably mounted roller 60. An arcuate track 61 is mounted on the upper side of the hopper on the same side relative to the tower as the roller 60 on the bucket 16 and extends into the path of travel of the roller so that upon upward movement of the bucket the roller will ride upon the lower surface of the track 61 thereby causing the bucket to tilt outwardly through the open face of the tower upon its supporting pivot 49 in the bucket carriage. Continued upward movement of the bucket carriage will cause the bucket to swing outwardly for dumping its contents into the hopper 11 in a manner as shown more clearly in the dotted lines 62 of the diagrammatic view, Fig. 4. Mounted upon the upper rear edge of the hopper is a longitudinal roller 63 which is engaged by the underside of the bucket in the forward tilted position thereof and across which the bucket can freely roll throughout the dumping operation. After the contents have been dumped from the bucket 16 and the carriage is lowered, the bucket will again assume its normal upright position within the bucket carriage.

The hoisting cable 17 extends from the winch drum 13 to the rear of the mixer behind the frame side plate 65 and under an idler roller indicated at 66 suitably mounted in the rear end of the mixer framework. The cable 17 is trained around the pulley 19 in the lower end of the tower from which it extends upwardly along the outside of the tower to the top thereof where it is trained over pulleys 21 and 21' mounted in the upper unit of the tower structure in a manner as indicated more clearly in the fragmentary view of Fig. 5. From the centrally arranged pulley 21' the cable 17 extends downwardly within the elevator shaft to the bucket supporting carriage.

In the normal operative position of the tower structure as shown in Fig. 1, the cable 17 is utilized for raising and lowering of the bucket 16. The cable 17 and winch drum 13 may also be utilized for effecting raising and lowering of the tower structure between the vertical and horizontal positions. To do this the bucket 16 is first lowered to the bottom of the tower and then secured relative to the tower by any suitable means, such as a short length of chain 67 which is secured at one end to the lower end of the tower and the other end of which may be hooked over a hook 68 rigidly secured to the bucket carriage slide 47. The hooks 14 and the braces 15 may then be removed and the tower lowered to the horizontal position, shown in dotted lines, by paying out the cable 17 from the winch drum 13. By virtue of the fact that the bucket 16 is anchored, the cable will not move over the pulley 19 and the lowering of the tower will be determined by the length of the cable extending between the idler roller 66 in the rear end of the mixer framework and pulley 19. For raising the tower from the horizontal to the vertical position the above procedure may be reversed. After the tower has been raised, it may be locked in place and braced as shown, after which the chains 57 may be unhooked from the bucket carriage.

In order to provide a firm foundation for the rear end of the mixer, as during the operation thereof, jacks are provided comprising posts 71 telescopically arranged within the lower ends of the rear uprights 32 and 33. Feet 72 are fixedly attached to the lower ends of the posts 71 for ef-

fecting a suitable weight distribution. The jacks may be lowered into engagement with the ground surface before the operation of the mixer is started and secured in place, as by pins 73 placed through cooperative openings provided in the ends of the rear uprights and the posts 74. As the weight of the mixer is increased upon the loading thereof with sand, cement and water, the jacks will effectively stabilize the mixer structure. The pivotal mounting for the elevator tower upon the rear end of the concrete mixer will be more clearly understood by reference to Figs. 2 and 3, taken in conjunction with Fig. 1. Secured to the rear sides of the rear uprights 32 and 33 are a pair of bearing blocks 75 and 76, respectively, which are provided with aligned U-shaped recesses in the outer side for cooperatively extending around the cylindrical transverse frame member 77 extending across the mixer framework adjacent the upper end thereof. Plates 78 retain the bearing blocks 75, 76 in place upon the mixer frame member 77. When it is desired to detach the tower structure from the mixer it is merely necessary to guy the tower with a suitable arrangement of cables (not shown), after which the braces 15 may be removed, the hooks 14 detached, and the retaining plates 78 unbolted from the bearing blocks 75, 76. For guying purposes, the cable 17, which is detached from the winch drum 12, may be used. The mixer may then simply be driven away from the tower structure for use on jobs in which it may not be necessary to elevate the mixed concrete. By backing the mixer up to the tower again, it may be attached thereto and lowered to the horizontal position and carried off.

Having described the principle of the invention in what is considered to be a preferred structural embodiment thereof, it is desired that it be understood that the various specific details are merely illustrative and that the invention may be carried out by other means.

The invention is hereby claimed as follows:

1. In a portable concrete mixing apparatus, the combination comprising a vehicle having a framework, an elevator tower structure pivotally mounted intermediate its ends upon an upper portion of said framework for movement between a vertical operative position and a horizontal inoperative position, a hoist bucket slidably mounted within said tower for longitudinal movement therewithin, said tower including a pair of tubular rear uprights, means for securing the lower ends of said uprights in engagement with a lower portion of said framework in the operative position of said tower, means telescopically arranged within the lower ends of each of said rear uprights and movable into engagement with the ground to provide a firm foundation for said tower in the operative position thereof, a winch drum on said vehicle, a pulley on the lower end of said tower, a cable extending from said drum over said pulley and connected at its opposite end to said bucket for effecting relative longitudinal movement thereof within said tower in the operative position of said tower, and means for securing said bucket relative to said tower whereby movement of said tower between said operative and inoperative positions may be effected by said cable without requiring rearrangement thereof.

2. In a portable concrete mixing apparatus, the combination comprising a mobile vehicle having a framework including an upper horizontal transverse member at one end thereof, an elevator tower structure pivotally mounted intermedi-

ate its ends upon said frame member for movement between a vertical operative position and a horizontal inoperative position, said tower comprising a pair of tubular rear uprights and a pair of front uprights defining a substantially rectangular shaft therebetween, a bucket mounted within said shaft for longitudinal movement therewithin, means for securing the lower ends of said uprights in engagement with the lower portion of said framework in the operative position of said tower, and members telescopically movable within the lower ends of said rear uprights adapted to depend into engagement with the ground providing a firm support for said tower in the operative position thereof.

3. In a portable concrete mixing apparatus, the combination comprising a vehicle having a framework, an elevator tower mounted on said framework, said elevator tower comprising lower, intermediate, and upper units removably secured together in an end to end relation, said lower unit being pivotally mounted intermediate its ends upon said vehicle framework, said lower and intermediate tower units having tubular rear uprights and I-beam front uprights defining a substantially rectangular shaft therebetween, said uprights being braced across the rear and across opposite sides, said lower and intermediate units being open along the front side substantially the full length thereof, cooperating telescopic means provided in adjacent ends of said tubular uprights of said lower and intermediate tower units, and telescopic means provided in the lower ends of said tubular uprights for engaging the ground and supporting said tower.

4. An elevator tower comprising a pair of tubular uprights and a pair of I-beam front uprights defining a substantially rectangular shaft therebetween, the flat sides of said I-beams extending in substantially common planes, rear cross braces welded to and securing said rear uprights together, side cross braces welded to said rear uprights and to the rear flat sides of the corresponding one of said front uprights, said shaft being open along the front side of said tower substantially throughout the full length thereof, elevating bucket means longitudinally movable within said shaft, hopper means for receiving the contents from said bucket, means slidably mounting said hopper across the front side of said tower, said mounting means including a pair of longitudinal slides engaging with the outer flat sides of said front uprights, said slides having inturned side portions extending around the opposite edges of said flat sides of said front uprights.

5. An elevator tower comprising a pair of tubular rear uprights and a pair of I-beam front uprights defining a substantially rectangular shaft therebetween, the flat sides of said I-beams extending in substantially common planes, rear cross braces welded to and securing said rear uprights together, side cross braces welded to said rear uprights and to the rear flat sides of the corresponding one of said front uprights, there being no braces rigidly and directly interconnecting said front uprights whereby said shaft is open substantially throughout the full length thereof, elevating bucket means longitudinally movable within said shaft, hopper means including a support slidably mounted upon the front flat sides of said front uprights, said support including portions extending around each of the opposite edges of the flat sides of said front uprights.

6. An elevator tower of the type comprising uprights defining a substantially rectangular elevator shaft therebetween, said shaft being open along the front side of said tower for substantially the full length thereof, an elevator bucket slidably mounted within said shaft for movement longitudinally thereof, and a hopper for receiving contents from said bucket slidably mounted across the open side of said tower, said tower comprising a pair of tubular rear uprights and a pair of I-beam front uprights, the flat sides of said I-beams extending in substantially common planes, rear cross braces welded to and securing said rear uprights together, side cross braces welded to said rear uprights and to the rear flat sides of the corresponding one of said I-beams, the front flat sides of said I-beams defining slide surfaces for said hopper.

7. An elevator tower comprising a plurality of parallel uprights defining a substantially rectangular elevator shaft therebetween, means fastening said uprights together around three sides of said shaft, said shaft being open along the front side of said tower for substantially the full length thereof, an elevator bucket slidably mounted within said shaft for movement longitudinally thereof, a hopper for receiving contents from said bucket slidably mounted across the open side of said tower, two of said uprights on opposite sides of said shaft and defining the front side of said tower having T-shaped forward sections, the flat side of the T-shape of said sections extending in a common plane, supports for said hopper slidably engaging said flat sides and having inturned flanges extending around each of the opposite edges of said flat sides of said T-shaped sections.

8. An elevator tower comprising a plurality of parallel uprights defining a substantially rectangular elevator shaft therebetween, said shaft being open along the front side of said tower for substantially the full length thereof, an elevator bucket slidably mounted within said shaft for movement longitudinally thereof, a hopper for receiving contents from said bucket slidably mounted across the open front side of said tower, two of said uprights on opposite sides of said shaft and defining the front side of said tower having T-shaped forward sections, the flat side of the T-shape of said sections extending in a common plane, supports for said hopper slidably engaging said flat sides and having flanges extending around each of the opposite edges of said flat sides of said T-shaped sections, said sides

being cut away from the web of said sections at the lower end of said uprights to permit removal of said hopper supports from said tower in the lowered position of said hopper.

9. An elevator arrangement comprising a tower structure including pairs of front and rear parallel uprights, cross braces securing said uprights together along opposite sides and across the rear, said tower being open along the front side, a bucket carriage slidably arranged for movement longitudinally of said tower between said uprights, a longitudinal bucket mounted within said carriage and having a cross section corresponding substantially to the cross section of free longitudinal space within said tower, said bucket being pivotally mounted upon said carriage adjacent the lower end thereof and forwardly of the center of gravity of said bucket, a hopper adjustably mounted upon the front pair of said uprights, means on said hopper for engaging with said bucket as said carriage is elevated therepast and causing outward tilting of said bucket, the upper end of said bucket upon forward tilting thereof projecting outwardly between said front tower uprights and movable to a substantially inverted position over said hopper, and roller means mounted along the rear edge of said hopper for supporting the underside of said bucket during dumping operation.

10. An elevator tower structure comprising a rectangular arrangement of parallel uprights, interconnecting means bracing said uprights along one pair of opposite sides and across the rear side, said tower being open along the front side, a bucket longitudinally movable within said tower between said uprights, a pair of guides secured to the opposite inner sides of said tower, a supporting carriage for said bucket slidably mounted upon said guides, said bucket being pivotally mounted upon said carriage adjacent the lower end thereof and forwardly of the center of gravity of said bucket, a stop extending upwardly from said bucket and engaging said carriage to normally retain said bucket in an upright position, a hopper adjustably secured to the front pair of said uprights, means on said hopper for engaging said bucket and causing forward tilting of said bucket to an over center position within said carriage upon movement of said carriage past said hopper, and a roller mounted upon the edge of said hopper for supporting the underside of said bucket during dumping operation.

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