

[54] **PORTABLE AND DISMANTLEABLE CONCRETE MIXER**

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- Dec. 4, 1970 Germany..... P 20 59 701.7

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- [58] **Field of Search**..... 259/171, 177, 175, 259/176, 81, 89, 30

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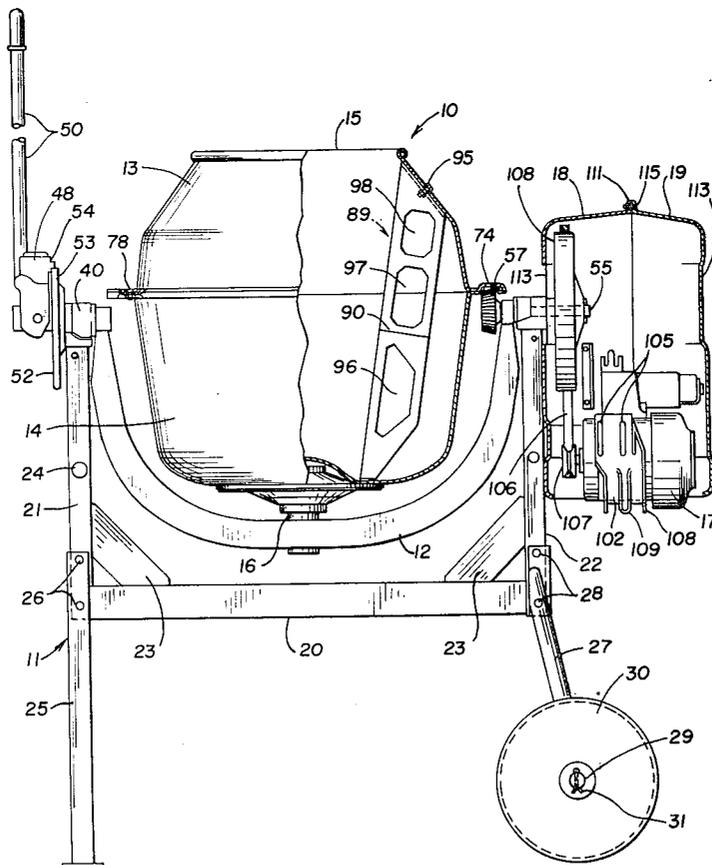
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Attorney—Blythe D. Watts et al.

[57] **ABSTRACT**

Dismantleable mixer for concrete and the like. The mixer has a drum of two nestable sections. For storage and shipment all parts other than the frame fit within the nested drums.

16 Claims, 14 Drawing Figures



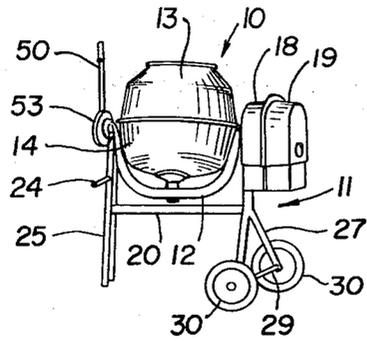


Fig. 1

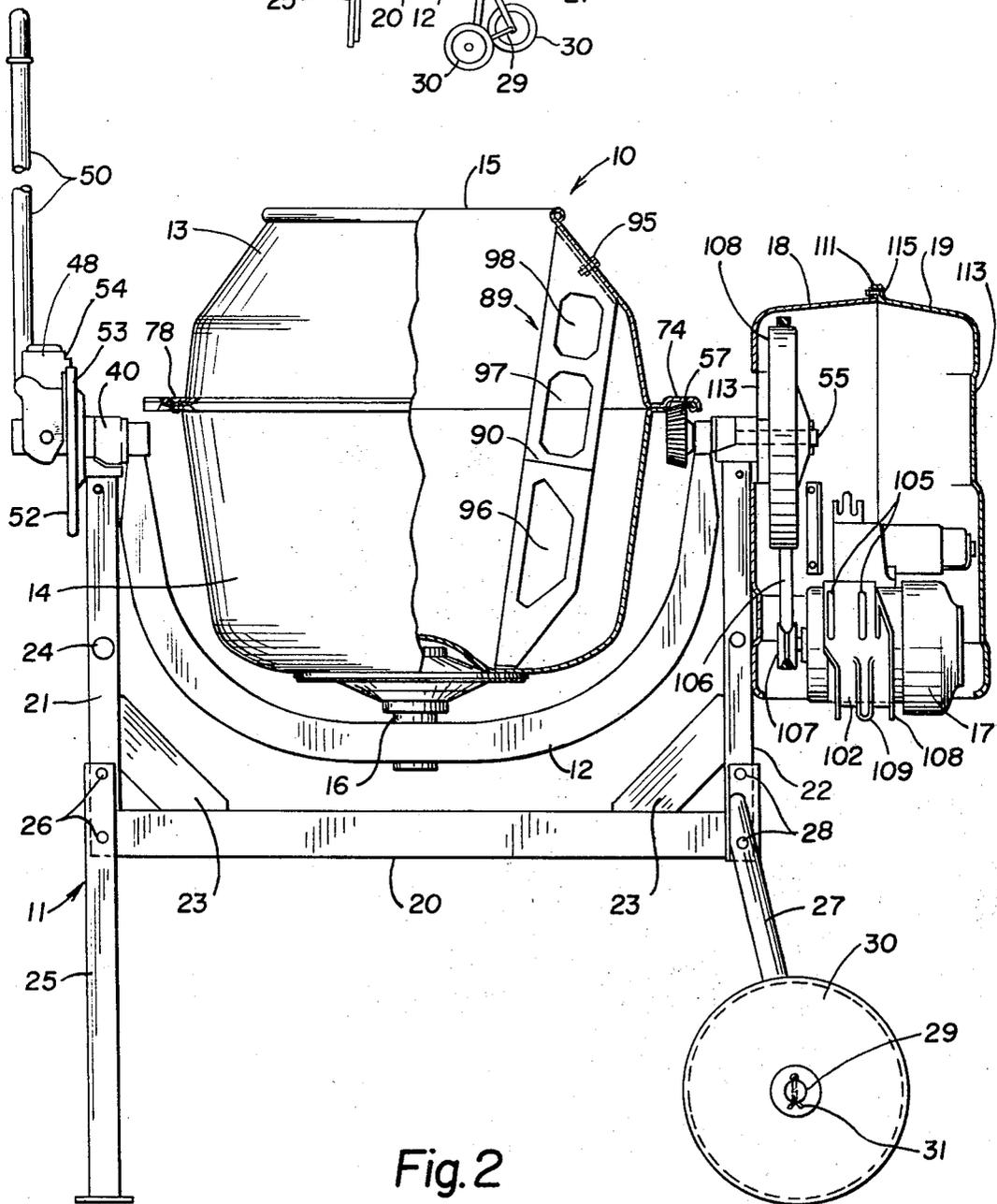


Fig. 2

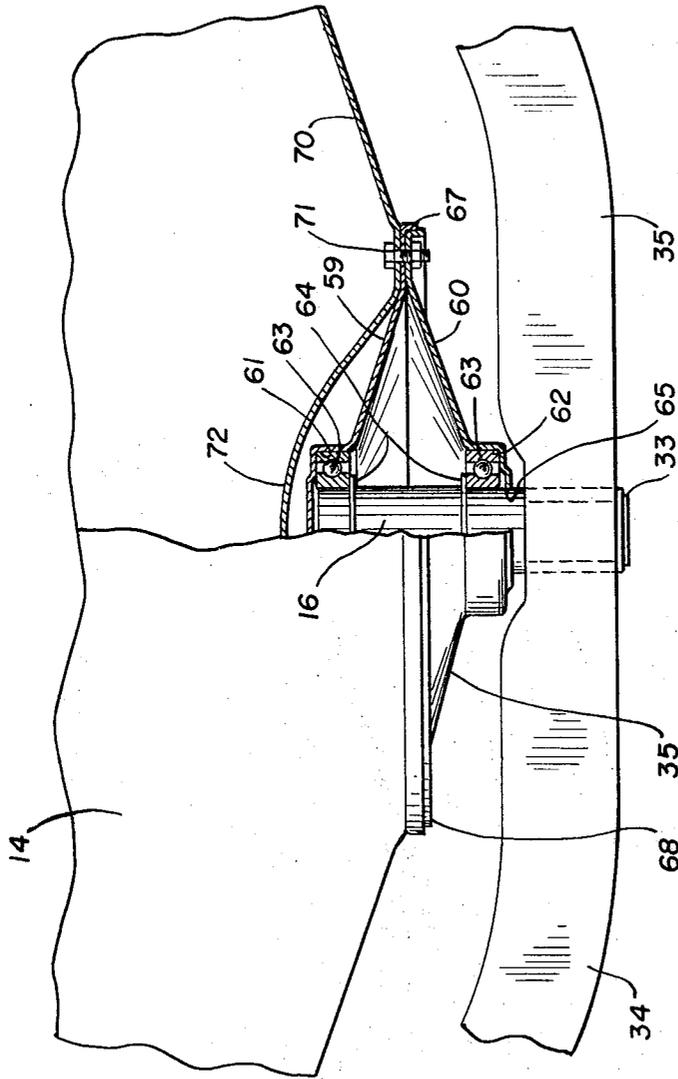


Fig. 3

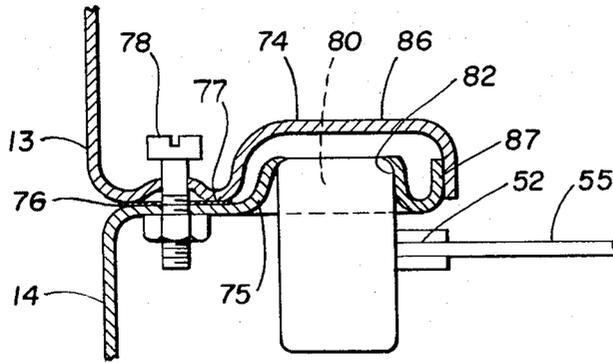


Fig. 4

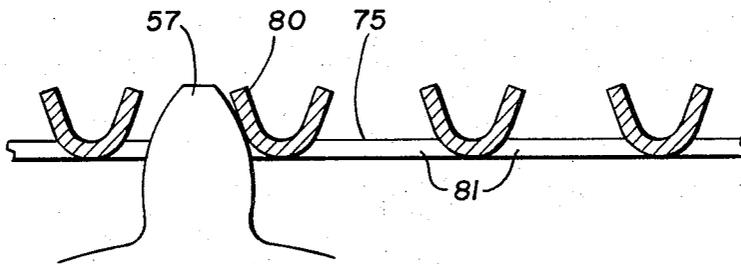


Fig. 5

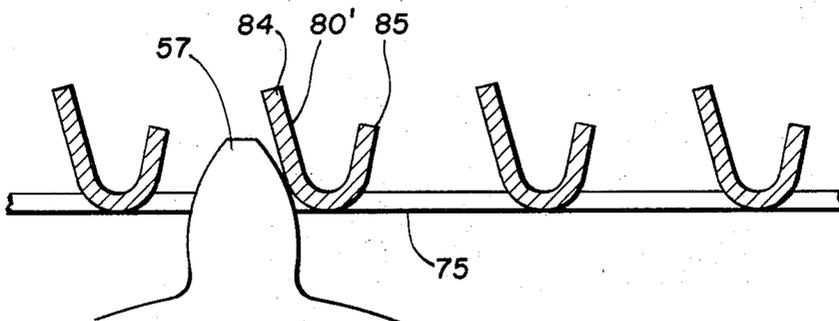


Fig. 5a

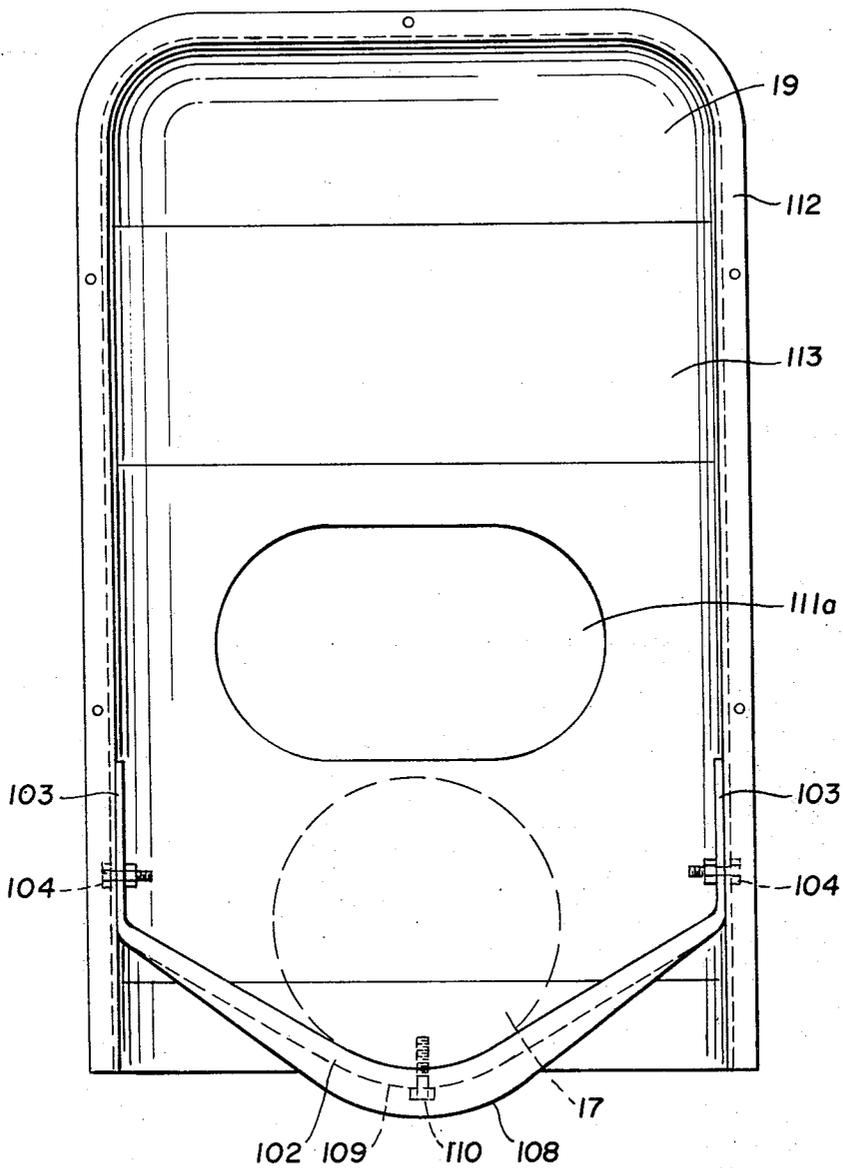


Fig. 6

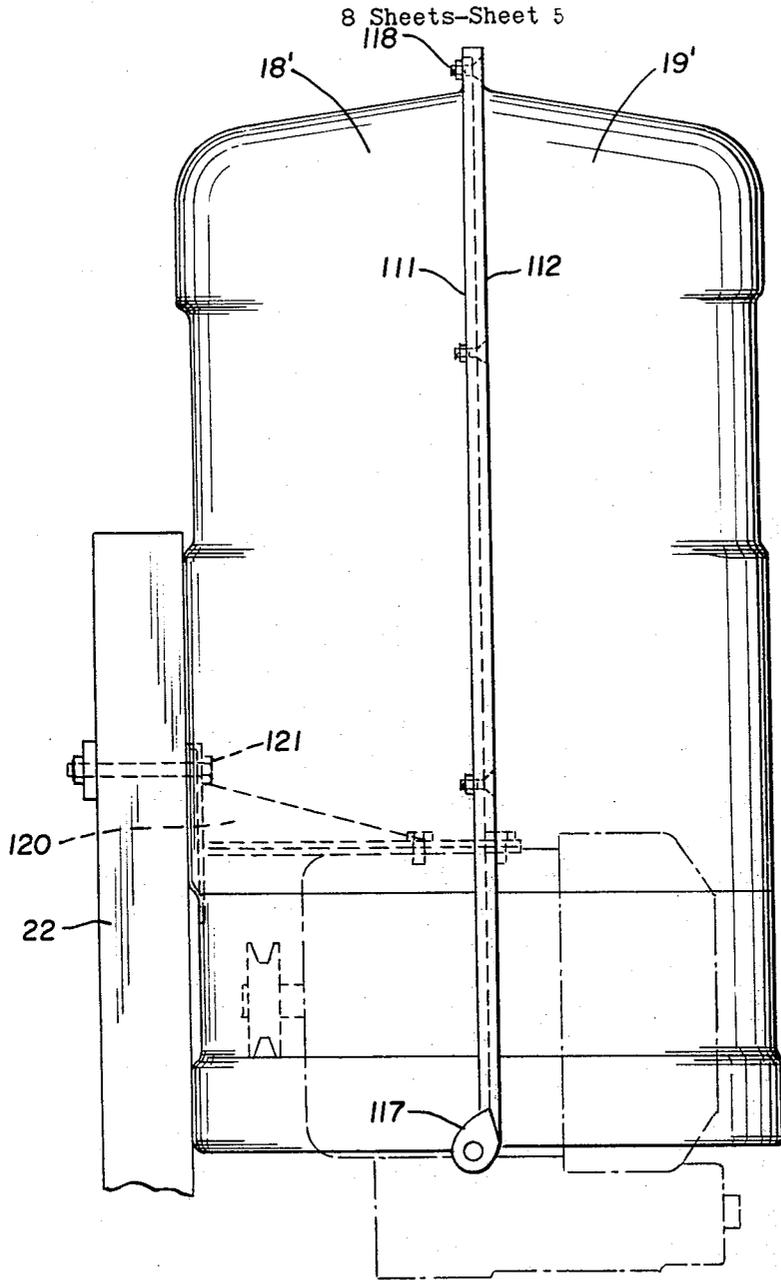


Fig. 7

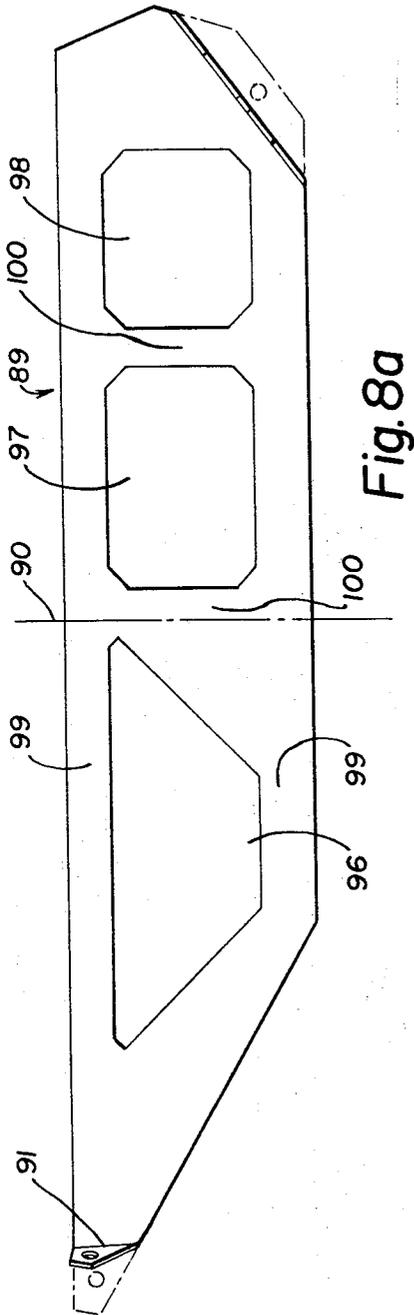


Fig. 8a

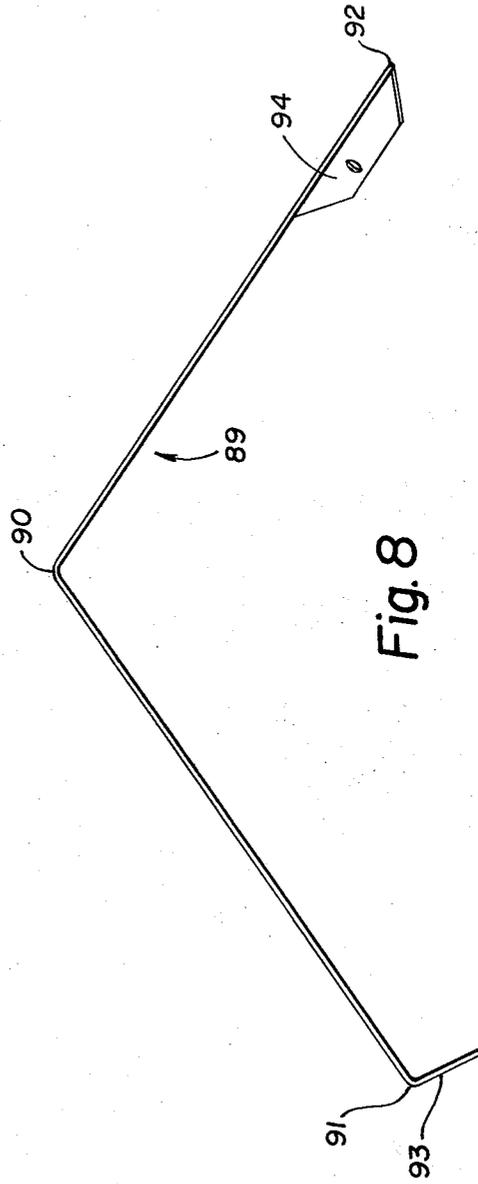


Fig. 8

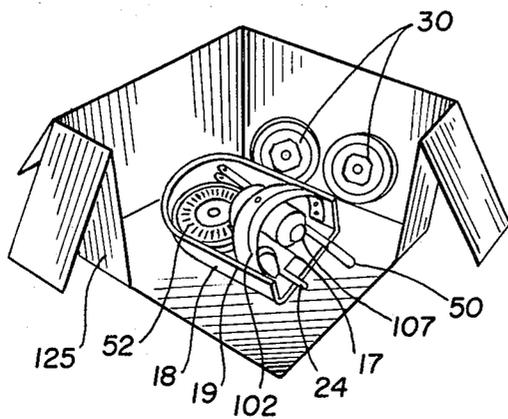


Fig. 9

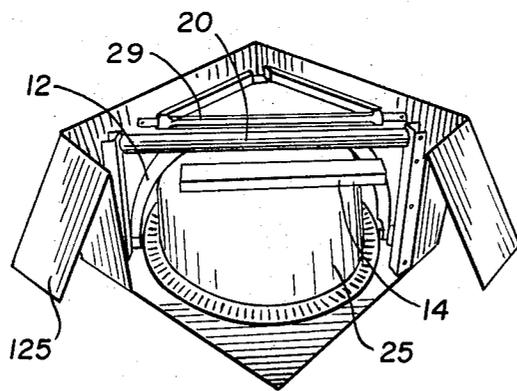


Fig. 10

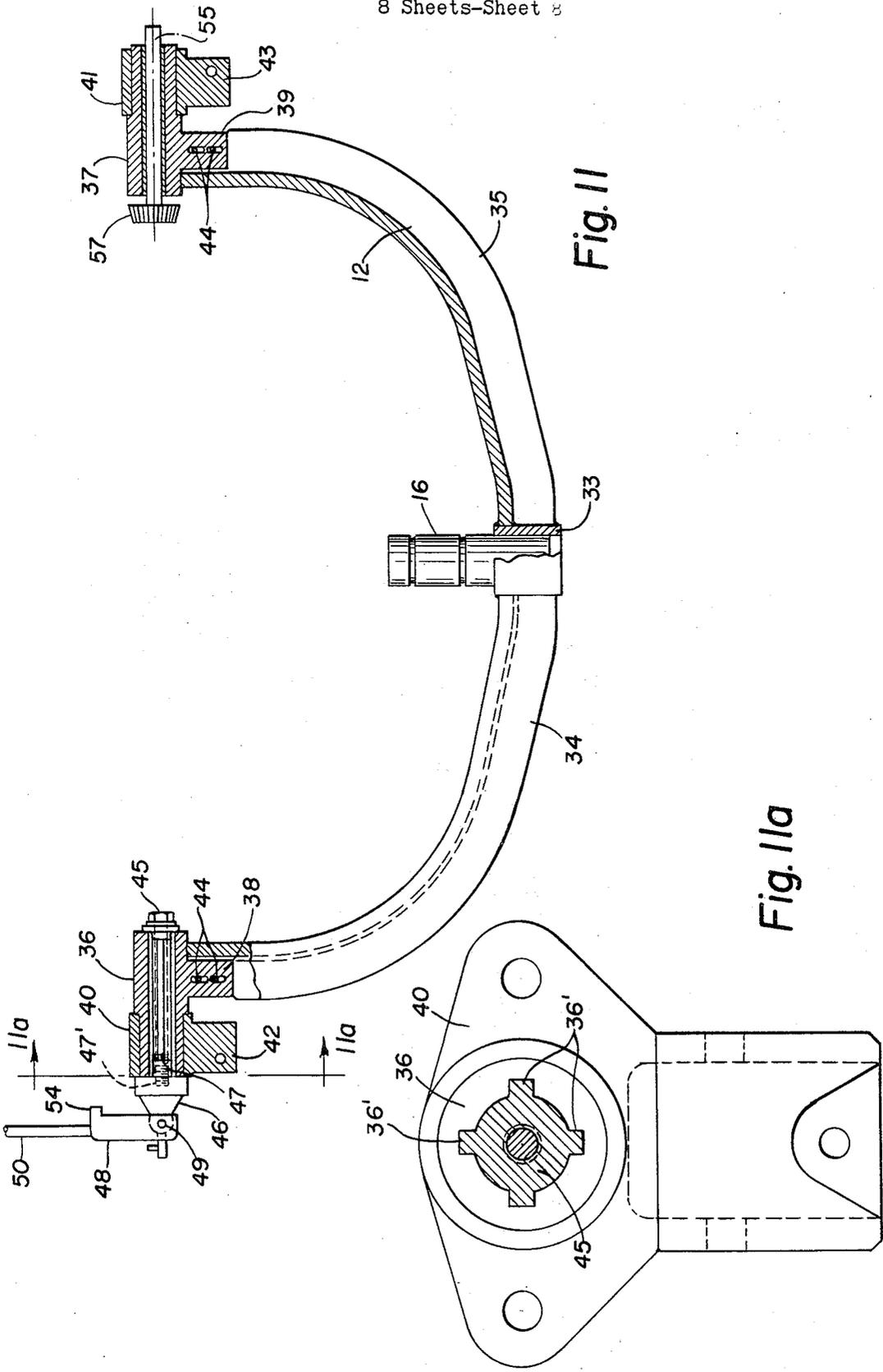


Fig. II

Fig. Ila

PORTABLE AND DISMANTLEABLE CONCRETE MIXER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to mixers for concrete and the like and more particularly to a mixer which is designed for facile dismantling and storage in a dismantled condition when not in use.

2. Prior Art

Portable mixers, as such, are known. The known designs, however, are relatively expensive and complex. They are especially too expensive and complex for purchase by do-it-yourself type customers and assembly by such customers. Further, the components of known mixers do not fold, readily dismantle, or otherwise collapse in a manner which effectively minimizes the space required for storage and shipment. Accordingly, they are unduly expensive and wasteful insofar as costs of shipment and storage space required are concerned.

SUMMARY OF THE INVENTION

While portable mixers have the drawbacks summarized above and others, they nonetheless are gaining in popularity and importance as an ever increasing number of home owners construct their own homes and improvements to them. Accordingly, the possibility of constructing a small, inexpensive, dismantleable mixer which can be stored and shipped in a small package is most interesting. This is especially so since compactness provides for low shipping costs and makes the construction especially attractive for export business since low transportation costs allow the possibility of successful competition abroad.

The present invention provides a simple, inexpensive and yet reliable mixer which is readily assembled and disassembled. The mixer, when disassembled, packs neatly and compactly in a small carton or the like such as a corrugated paper board carton of rectangular configuration. The mixer can easily be assembled, even by novices, according to simple schematic directions without impairing complete operation for a variety of purposes and without sacrificing robustness.

The mixer of this invention has the following features, all of which contribute to the described advantages of it:

- a. The mixer has a mixing drum composed of two parts which can be boxed one within the other.
- b. A toothed crown is stamped into the rim of one drum part for driving the drum when assembled.
- c. A motor is provided which has a protective housing. The motor housing is also composed of two parts which can be boxed one within the other.
- d. The mixer frame is readily dismantled and is composed of the following parts:
 - i. A central section the shape of a square U. The central section has upstanding arms which are somewhat longer than the height of the larger part of the drum. The central section also has a base of a width which is somewhat greater than the largest diameter of the drum.
 - ii. A triangular leg and axle section is provided. This section can be fastened, detachably, to one lower corner of the central section. One leg of the triangular section is an axle on which two wheels can be rotatably mounted.

iii. A rod-like leg is provided. This leg is removably connectable to the other lower corner of the central section.

- e. Flexible, removable thin mixing blades are provided. The blades have a break crosswise centrally thereof so when under load from the agitating pressure of mixing a quantity of mortar or concrete, they assume a curvature which provides an enhanced agitation action.
- f. The drum parts are designed so that the smaller can be nested within the larger and placed within a carton. When positioned in the carton, the drum parts are sized and positioned such that the motor and other components other than the frame can be disposed within the drum parts.
- g. The frame parts can be placed beside the drum parts and boxed together within a carrying case.
- h. The drum and motor housing parts as well as the agitation blades are all stamped or drawn from thin sheet metal. The frame parts are formed from commercially available tubular stock or channels. The central section of the frame, for example, is formed from channels of U-shaped cross section. Thus, the entire assembly is fabricated from inexpensive, readily available and light weight materials but the finished product is one which is strong and robust.
- i. In the preferred configuration the drum and motor housing parts are tapered at an angle of about 8° so that they each are nestable in like parts for convenience in manufacture and in the mated parts for convenience in shipment and storage.
- j. The mixing blades are detachably fastened to the two mixer drum sections. Removable fasteners are used so that the mixing blades assist in rigidifying the drum. Each blade is, in turn, reinforced by the drum itself when in use, but readily removable for storage and shipment. Because the mixer drum reinforces the agitator in use, sheet metal may be used but the mixer blades are nonetheless of more than adequate strength for the forces encountered during mixing.
- k. The mixer blades or agitators are apertured. The apertures are sized and contoured such that the metal pieces removed to form the apertures form other parts of the mixer as will be described in greater detail presently.
- l. The provision of a novel shaft and bearing assembly for supporting the mixing drum. A pair of dish-shaped members are provided. These dish-shaped members are formed of sheet metal by stamping or drawing and each includes a bearing supporting recess. Shaft bearings are disposed in these recesses and the mixer support shaft is journaled in the bearings. Snap rings are provided to maintain the bearings in spaced relationship and within the supporting dishes. The dishes are secured together at perimetral flanges, when flanges in turn are removably fastened to the base of the mixer by removable fasteners. Thus, the removable and inexpensive bearing and shaft assembly is provided that both exhibits good strength properties and shields the bearings from contamination by dirt or other foreign matter.
- m. A simple, highly reliable and dependable drive is provided. As indicated in b), above, a toothed crown is provided. To accomplish this, one of the

mixer drum parts is equipped with a notched perimetral flange. The flange forms an annular rack for receiving the teeth of a drive pinion. The flange, when stamped to form the rack, is formed in such a way that the teeth of a drive pinion will not be abraded or cut by metal defining the rack openings. A plastic pinion is then used to good advantage to provide quietness of operating characteristics.

- n. One manner in which the possibility of abrasion and cutting of the pinion teeth is obviated is by providing upturned rack portions on the side of each pinion-tooth-receiving aperture that is engaged by a pinion tooth which extend further than the upturned portions on the opposite side of each such aperture. Thus, the metal deformed outwardly to form each aperture is in two portions on either side of the aperture. The tooth engaging one of the portions is larger than the opposite portion so as to obviate any possibility of the top of the tooth engaging portion abrading a tooth.
- o. Preferably, this rack is formed on the flange on a lower one of the two drum parts. The upper drum part has an annular perimetral flange which overlies the rack and shields it from material which may be dropped when the mixer is loaded or unloaded and thus keeps the pinion and the rack clean.
- p. Annular pads or gaskets are secured to the upper drum flange. These gaskets provide fluid-tight drum walls when the drum sections are fixed together.
- q. As has been indicated, the motor housing is comprised of two flanged drawings or stampings which nest together for storage. When the flanges are connected together, a very rigid motor housing is provided although made of sheet steel. Alternately, especially where a gasoline engine may be used, the two parts may be hinged together to permit access for service. Slots are formed in the walls of the housing for receiving motor mounting bolts so that the motor may be adjusted for example to tension a drive V belt, while the housing is maintained in assembled and closed condition.
- r. A novel bearing construction which is simple and readily dismantlable but adequately and properly supports the mixer support yoke is provided as are facilely removable wheels which further contributes to a readily dismantlable construction.

The cooperation of all of these features makes it possible to pack the mixer in an ideally small package. The size of the package is determined primarily only by the dimensions of the larger part of the drum which is preferably the lower drum part. Except for the frame parts, all of the mixer components are placed within the nested drum parts for packaging and shipment or storage. The frame parts are made so that they pack neatly and compactly around the drum parts to provide a very simple and compact overall construction.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a perspective view of the assembled mixer;
- FIG. 2 is a side elevational view, with parts broken away and removed, of the assembled mixer;
- FIG. 3 is an enlarged fragmentary view, partly in section, of the drum support and shaft and bearing assembly;
- FIGS. 4, 5 and 5a are enlarged fragmentary sectional views of the rack and pinion arrangement used to rotate the mixing drum;
- FIG. 6 is an enlarged sectional view of the motor housing as seen from the plane indicated by the line 6-6 of FIG. 2;
- FIG. 7 is an enlarged side elevational view, with parts broken away and removed, of an alternate form of motor housing;
- FIGS. 8 and 8a are enlarged views of the agitator;
- FIG. 9 is a perspective view of a partially packed case, with a portion of the case broken away and removed for clarity of illustration;
- FIG. 10 is a perspective view of the packed case, with a portion of the case broken away and removed for clarity of illustration; and,
- FIG. 11 is an enlarged elevational view of the mixer yoke support assembly.
- FIG. 11a is an enlarged sectional view taken along the lines A-B of FIG. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and to FIGS. 1 and 2 in particular, the portable, dismantlable mixer is shown generally at 10. The mixer has a sectionalized frame shown generally at 11. The frame 11 supports a generally U-shaped mixer yoke 12. The mixer 10 has a mixing drum supported by the yoke 12 and composed of upper and lower drum sections 13, 14. The upper section 13 has a load and discharge opening 15 through which material passes to and from a mixing chamber within the drum. The drum is journaled on a shaft 16 for rotation about an axis which, in the orientation shown in the drawings, is vertical.

A motor 17 is provided. The motor is housed within a motor housing composed of sections 18, 19. The housing is mounted on the frame 11 by connection of the section 18 to it. The motor drives the mixing drum in a manner which will be described in greater detail.

The frame 11 has a central section composed of a horizontally extending base 20 and a pair of upwardly extending, vertically disposed arms 21, 22. The base and arms 20-22 are formed of channel members. The connections of the upstanding arms to the central section base are reinforced by fillets 23. A handle 24 is connected to the arm 21 to facilitate movement of the mixer.

The frame 11 includes a single front leg 25 which is connected to the central section by removable fasteners such as screws 26. The frame also includes a removable triangular section 27. The triangular section is fastened to the central section by removable fasteners such as screws 28.

The lower leg of the triangular section 27 includes an axle 29. A pair of wheels 30 are removably attached to the axle 29 by snap clips 31, one of which is visible in FIG. 2.

Referring now to FIG. 11, the construction of the yoke 12 is shown in detail. The yoke 12 includes a central shaft support sleeve 33. The shaft 16 is mounted in the sleeve 33. A pair of identical arms 34, 35 of channels having U-shaped cross section extend diametrically opposite from and are connected to the shaft sleeve 33 as by welding. The arms curve upwardly, when in the orientation of FIGS. 1 and 2, such that the sleeve 33 and the connected arms 34, 35 together form the generally U-shaped yoke.

A pair of shaft and journaling sleeves 36, 37 are provided. The shaft and journaling sleeves have extensions 38, 39, respectively, which are fixed to the yoke arms 34, 35, respectively. The shaft and journaling sleeves 36, 37 are journaled in collars 40, 41, respectively. The collars 40, 41 have depending extensions 42, 43 which are removably connected to the central frame section arms 21, 22 respectively. This removable connection is by removable fasteners such as screws 44.

A handle shaft 45 is provided. The handle shaft projects through shaft and journaling sleeve 36. A handle collar 46 is in telescopic relationship with the shaft and journaling sleeve and the handle shaft 45. A stop 47 engages the shaft so that, the sleeve 36 and the collar 46 are fixed together in non-rotatable relationship. A handle connecting and tilt control element 48 is pivotally connected by a pivot pin 49 to the handle collar 46. A handle 50 is secured to the tilt control element 48.

A tilt control plate 52 is provided, FIG. 2. The tilt control plate 52 is secured to the collar 40 to maintain it in a fixed position. The tilt control plate 52 has perimetral notches 53 which are selectively engageable at least one at a time, by at least a notch projection 54 on tilt control element 48. Thus, the handle may be rotated counterclockwise as viewed in FIG. 2 about the axis of the pivot 49 until the tilt plate is disengaged. The handle is then rotated about the axis of the journaling sleeves 36, 37 to adjust the mixing drum axis to a desired angular relationship with respect to the vertical. The handle is then rotated clockwise about the pivot 49 to bring the at least one notched projection 54 into appropriate and selected one or ones of the notches 53 and lock the mixing drum in its adjusted position.

It will be appreciated that, in connection with the packaging of the entire mixer when dismantled as described presently, the handle may be pivoted until it is parallel to and juxtaposed near the central section leg 21. Alternatively, the handle may, if desired, be removed for storage by removal of the pivot pin 49.

A drive shaft 55 is provided. The drive shaft 55 is journaled in the shaft and journaling sleeve 37. The drive shaft 55 carries a pinion 57 at its inner end. As will be explained in greater detail presently, the pinion 57 rotatively drives the mixing drum.

The journaling support for the mixing drum is best shown in FIG. 3. Upper and lower dish-shaped drum support members 59, 60 are provided. The drum support members 59, 60 have bearing support recesses 61, 62. The recesses receive shaft bearings 63. The drum shaft 16 projects through an aperture 65 in the lower member 60 and into the shaft bearings 63. The shaft bearings 63 are maintained in spaced relationship by a pair of snap rings 64 that are mounted in grooves on the drum shaft.

The drum support members have perimetral flange portions 67, 68 which nest together. The flange portions are removably fixed together and to bottom 70 of

the lower drum section 14 by fasteners identified schematically at 71. The bearing support members 59, 60 are formed such that a slight axial loading is applied to the bearing 63 when the entire assembly is connected together and secured to the lower drum section 14.

As an examination of FIG. 3 will further show, the bottom 70 of the lower drum section 14 has a central portion 72 which is convex as viewed from the interior of the drum. This convex portion 72 provides clearance for the shaft and bearing assembly and in addition tends to rigidify the bottom 70 of the drum section 14.

Referring now to FIGS. 4-5a, the upper and lower drum sections 13, 14 have mating perimetral flanges 74, 75. Annular seals or gaskets 76, 77 are carried by the upper flange 74 and interposed between the flanges 74, 75 to provide a perimetral seal when the drum sections are fixed together. The drum sections are removably fixed together by nuts and bolts 78.

The lower drum section flange 75 has a plurality of rack teeth 80 formed in it. These rack teeth are formed by deforming the flange 75 to define pinion-tooth-receiving apertures 81 and tooth surfaces surrounding the apertures. Preferably, the deformed metal defining end walls of each tooth aperture provides rounded headings or tooth sides 82. The preferred construction of the end walls is shown in FIG. 5a. There tooth 80' has a tooth-engaging portion 84 which is of greater vertical dimension, as viewed in FIG. 5a, than the opposite portion 85 and than the engaged tooth of the pinion. This assures the avoidance of the edges of the tooth-engaging portion 84 being kept out of contact with teeth of the pinion 47. Further, the tooth-engaging portions 84 are curved to minimize pinion tooth slip. Accordingly, pinion tooth abrasion and cutting are minimized and avoided and outstanding and quiet performance can be achieved with a pinion formed of nylon or other suitable plastic material.

The upper flange 74 is contoured to provide a covering portion 86 to protect the rack and pinion from the egress of dirt. In addition, perimetral portions of the flanges 74, 75 are oppositely bent to provide nesting perimetral reinforcement portions 87.

Referring now to FIGS. 2, 8 and 8a, at least one and preferably a plurality of mixing agitators 89 are provided. As is best seen by reference to FIGS. 8 and 8a, an agitator or mixing blade 89 is formed of sheet metal with a break at 90 centrally located longitudinally speaking. The blade 89 also has breaks at 91, 92 to provide end mounting flanges 93, 94.

The mounting flange 93 is secured to the lower drum section by the fasteners 71 which mount the bearing and shaft assembly. The mounting flange 94 is an upper mounting flange fixed to the upper drum section by removable fasteners at a location indicated schematically at 95. When in place, the agitators serve to reinforce the drum sections and maintain them in position and vice versa.

The agitators have agitation apertures 96, 97, 98 through which the concrete or other material being mixed can pass during the agitation. Thus, the agitator 89 when apertured has elongated strips 99 and transverse strips 100 which serve to stir the material being mixed.

Under the load of mixing, the agitators tend to assume a generally curved configuration thoroughly mixing the material and causing the material to work upwardly providing a thorough agitation. While the agita-

tors in the drum sections are formed of sheet metal, the unique construction which has been described provides a great rigidity which is more than ample for the forces imposed during the mixing.

As a further example of the efficiency and novelty of the design of this mixer, the metal portions removed from the mixer 89 to provide the agitation apertures are used for other purposes in the mixer. Thus, the piece removed to form the aperture 96 is used to form one of the central section fillets 23. Similarly, the pieces removed to form apertures 97, 98 are used in connection with the motor mounting bracket which will be described presently.

Referring now to FIGS. 2 and 6, the motor 20 is supported on a motor bracket 102. The motor bracket 102 has upstanding mounting flanges 103 which are slotted at 105 to receive motor bracket mounting bolts 104, FIG. 2. The motor bracket mounting bolts are accessible from the outside of the motor housing so that tension on a V-belt 106 can readily be adjusted. The V-belt 106 is reeved around a motor pulley 107 mounted on the shaft of the motor and a drive pulley 108 mounted on the drive shaft 55. The pulleys and belt are disposed within the motor housing.

Motor mounting bracket 102 has edge flanges 108 and a central rib 109 for providing bracket stiffness and reinforcement. As is best seen in FIG. 6, the bracket is curved so that a segment of it is of the contour of the motor 17 and the motor is bolted to the bracket as by bolt 110. An aperture 111a is provided in the motor housing section 19 so that electrical leads are readily connected to the motor.

The motor housing, like the mixer section, is made of two sheet metal formed elements 18, 19. The housing, like the mixer drum, has perimetral walls which taper at about 8° or more so that, when dismantled, the motor housing and the drum have sections which nest one within the other. In addition, like sections can, for inventory control and production, be stored in a nested arrangement.

The motor housing stiffening is provided by perimetral flanges 111, 112 and by depressions 113 formed in the walls thereof. The flanges 111, 112 are removably secured together by removable fasteners indicated schematically at 115.

Referring now to FIG. 7, an alternate form of housing construction is shown. Here, the housing sections 18', 19' are hingedly connected together near their base by a hinge 117. A catch is indicated schematically at 118 which serves to fix the flanges 111, 112 of the housing sections together. This construction is used advantageously when, for example, a gasoline motor is used to power the mixer. Then, of course, ready access to the engine for service is desirable.

Where the housing of FIG. 7 is employed, it is desirable to mount the motor directly on the frame arm 22. Accordingly, a motor bracket 120 is provided which is removably secured to the frame arm 22 by bolts 121. As will be recognized by an examination of the drawing, portions of the motor bracket 120 are formed from the metal removed to form the apertures 97, 98 in the agitator 89.

Referring now to FIGS. 9 and 10, a packing case is indicated at 125. For clarity of illustration, portions of the packing case 125 are broken away and removed.

After the mixer is dismantled, the housing sections 18, 19 are nested together and positioned at the base

near the center of the packing case as shown in FIG. 9. Various components of the mixer are then positioned in the motor housing. Thus, in FIG. 9, the tilt plate 52, the motor bracket 102, the motor 17, and its pulley 107, and the handle 50 are all shown in the nested motor housing sections. The wheels 30 are also shown in the case 125 and these may also be positioned in the motor housing if desired. After these elements have been positioned in the case, the upper drum section is placed over them. The lower drum section, with mixer yoke 12 still attached if desired, is then inverted and nested over the upper drum section. The frame sections, after the frame has been dismantled, are then positioned in the case and the entire mixer has been dismantled and conveniently packaged within the case 125 as shown in FIG. 10.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A dismantlable mixer for concrete or the like which can be packed in a shipping container when dismantled comprising:

- a. a frame;
- b. said mixer frame being comprised of dismantlable sections;
- c. a drum yoke supported on the frame;
- d. a sectioned drum journaled on the yoke for rotation about its longitudinal axis by two bearings disposed within a pair of bearing supports one of which lies in a recess provided for it in the drum, said drum including a rack for receiving driving forces to rotate the drum;
- e. said drum sections having flange means joined detachably to form said drum such that the drum defines a mixing chamber; and,
- f. drive means drivingly connected to the rack for rotating the drum.

2. The mixer according to claim 1 wherein both bearing supports are substantially alike and are made of thin sheet metal.

3. A dismantlable mixer for concrete or the like which can be packed in a shipping container when dismantled comprising:

- a. a frame;
- b. said mixer frame being comprised of dismantlable sections;
- c. a drum yoke supported on the frame;
- d. a sectioned drum journaled on the yoke for rotation about its longitudinal axis, said drum including a rack for receiving driving forces to rotate the drum;
- e. said drum sections having flange means joined detachably to form said drum such that the drum defines a mixing chamber;
- f. drive means drivingly connected to the rack for rotating the drum, said drive means including a motor; and,
- g. a protective housing for the motor, said housing comprising a housing section mounted on the mixer frame and another housing section similar in form but differing in size by about the thickness of

the sheet metal used, said housing sections having flange means joined detachably together.

4. The mixer according to claim 3 wherein stiffening profiles are provided in the motor protection housing sections.

5. The mixer according to claim 3 wherein the motor is mounted on a motor bracket height-adjustably fastened to the motor housing.

6. The mixer according to claim 3 wherein the motor is on a bracket fastened detachably to only one housing part and to the mixer frame.

7. A dismantlable mixer for concrete or the like which can be packed in a shipping container when dismantled comprising:

- a. a frame;
- b. said mixer frame being comprised of dismantlable sections;
- c. a drum yoke supported on the frame;
- d. a drum comprised of two sections detachably connected together with removable fasteners, one of said sections being nestable within the other when detached,
- e. a rack on said drum for receiving driving forces to rotate the drum;
- f. said drum sections having flange means joined detachably to form said drum such that the drum defines a mixing chamber; and,
- g. drive means drivingly connected to the rack for rotating the drum.

8. The mixer of claim 7 wherein both of the sections taper from a comparable large diameter at a juncture between the sections and each section is of generally comparable size to the other.

9. The mixer of claim 8 including journal means establishing an axis transverse to said longitudinal axis about which the drum can be tilted and wherein the juncture from which both sections taper essentially intersects the tilting axis of the drum.

10. The mixer of claim 8 wherein both sections taper at an angle of at least 8°.

11. The mixer according to claim 7 wherein a mixing blade is in said chamber and secured to the drum.

12. The mixer of claim 11 wherein the mixer blade is one piece and stamped from thin sheet metal and is fastened between drum sections by means of end flanges.

13. A dismantlable mixer for concrete or the like

which can be packed in a shipping container when dismantled comprising:

- a. a frame;
- b. said mixer frame being comprised of dismantlable sections;
- c. a drum yoke supported on the frame;
- d. a sectioned drum journaled on the yoke for rotation about its longitudinal axis, said drum including a rack for receiving driving forces to rotate the drum;
- e. said drum sections having flange means joined detachably to form said drum such that the drum defines a mixing chamber; and,
- f. pinion drive means drivingly connected to the rack for rotating the drum;
- g. said rack being formed in the flange means of one of said drum sections by oblong holes with side surfaces formed from bent flange material, one side surface extending from the said flange means a greater distance than the other and beyond teeth of the engaging pinion drive means.

14. The mixer of claim 13 wherein there are upper and lower drum sections and said one drum section is the lower and wherein the upper drum section flange means is a perimetral flange overlying the rack to shield it.

15. The mixer according to claim 14 wherein perimetral portions of the flange means are bent in a stiffening manner.

16. In combination:

- a. a packing case having a base; and,
- b. an assembleable cement mixer within the packing case comprising:
 - i. two mixing drum sections of substantially similar size one nested within the other in an opposite orientation from that in which it is assembled to form the drum, said sections supported on the base of the case,
 - ii. a plurality of cement mixer parts, including a motor and drive assembly, a housing and support means for the motor and drive assembly, and a mixer drum journaling assembly, all within one of the nested sections, and
 - iii. a dismantled frame within said packing case, the components of said disassembled frame being external of the mixing drum sections.

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