Aug. 6, 1963 J. KACENA 3,100,064

MORTAR-PLASTER MIXER

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Fig. 1.

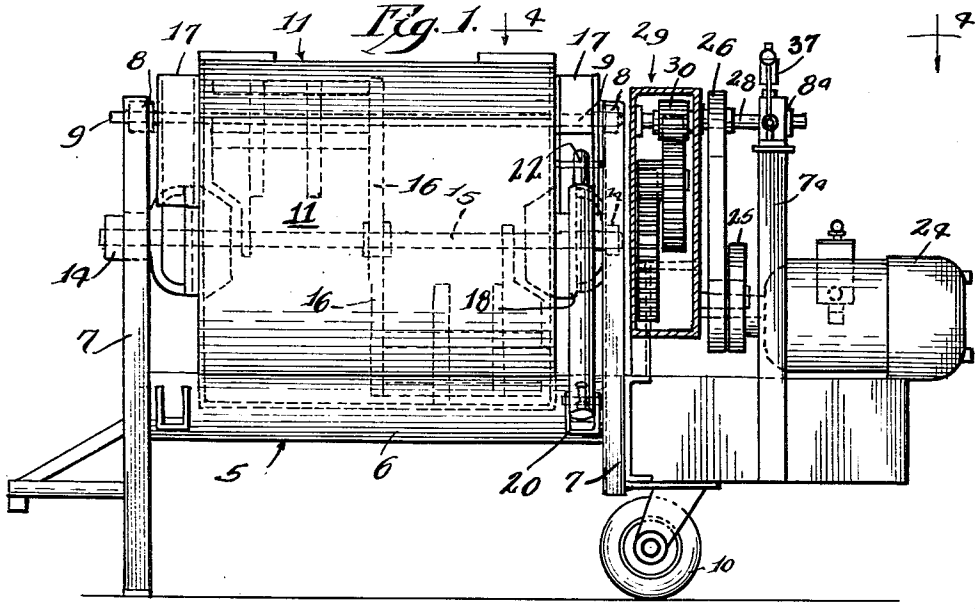
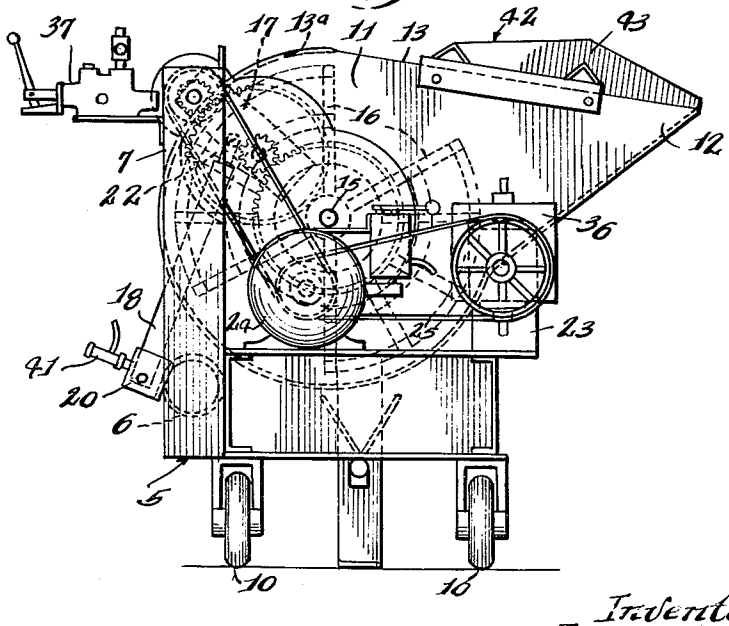


Fig. 2.



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Fig. 3

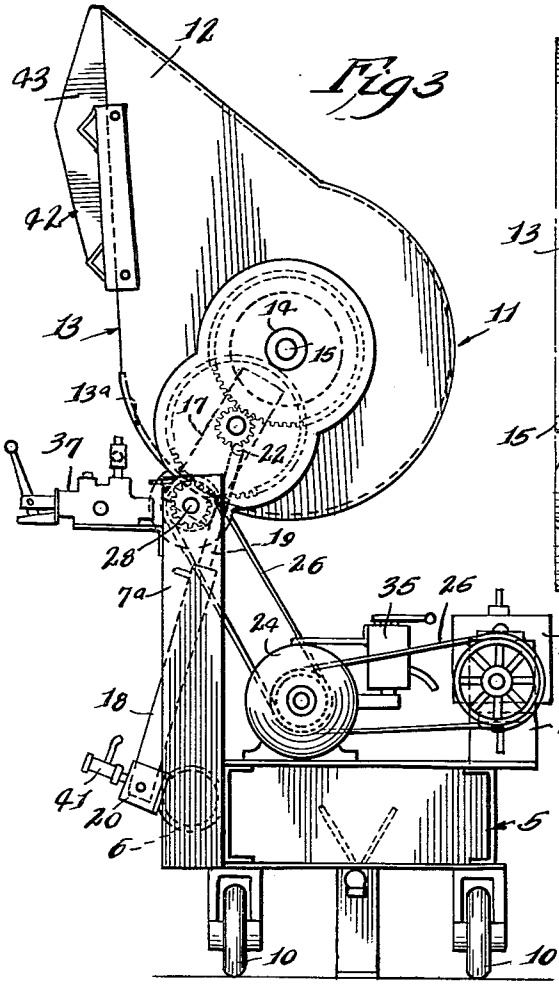


Fig. 4

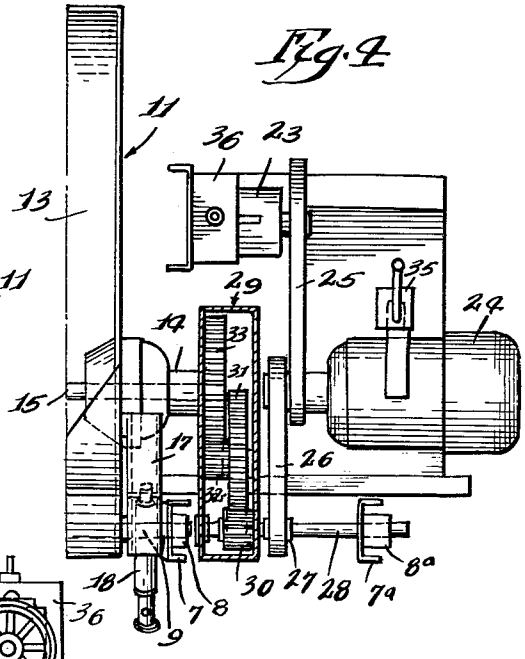
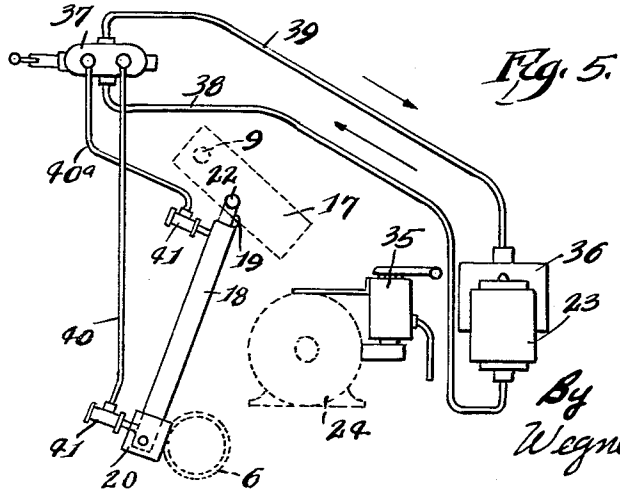


Fig. 5.



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Fig. 6

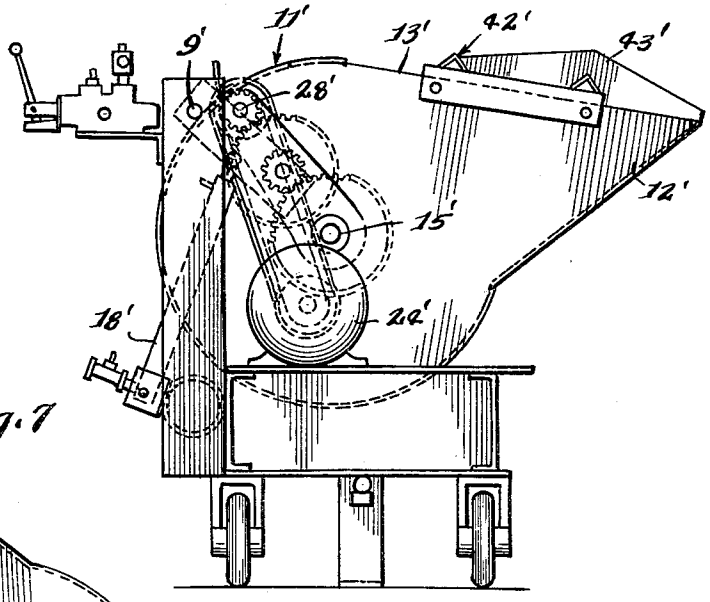


Fig. 7

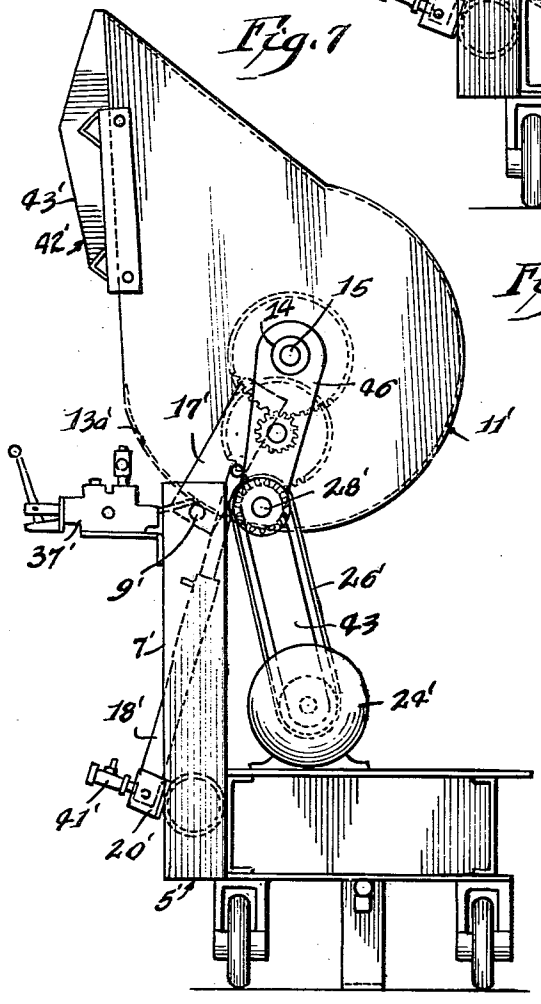


Fig. 8

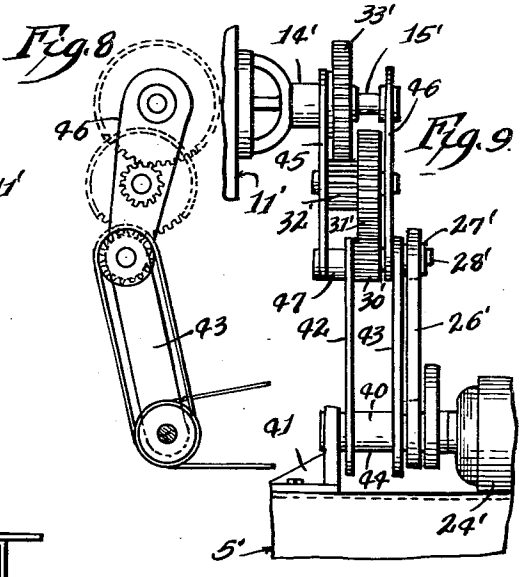


Fig. 9

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MORTAR-PLASTER MIXER

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3 Claims. (Cl. 222—166)

This invention relates to an apparatus for mixing materials, and more particularly to an apparatus for mixing plaster or mortar for use in the building trade.

Mixing apparatus of the type disclosed in this application generally consists of a horizontal cylindrical mixing drum having an opening in its cylindrical wall which is normally at the top and serves as a material charging opening. The drum is supported on a frame for oscillatory movement about its central axis to lower the opening when the operator wishes to discharge material from the drum. It is generally necessary to block up such apparatus in order to provide sufficient height to discharge the material from the opening into a wheelbarrow or other suitable container. Raising the height of the opening for discharging purposes also raises the height of the opening for charging purposes, making it inconvenient to shovel or dump bags of material into the mixing drum. Therefore, taking advantage of a low charging level to facilitate the loading of material into the drum must be done at a sacrifice of the discharge height, and blocking up the apparatus to provide a suitable discharge height results in the disadvantage of a high charging level.

One object of this invention is to provide a new and improved plaster or mortar mixing apparatus which may be simply and easily loaded and unloaded.

Another object of this invention is to provide a mixing apparatus having a drum containing rotating mixing blades and means for swingably supporting the drum on an axis substantially outward of the center of the drum so as to provide a lower level charge position and a high level discharge position, thereby facilitating loading of the mixing ingredients into the drum and providing sufficient height to discharge the material from the drum into a wheelbarrow or other convenient container.

Another object of this invention is to provide such an apparatus with a power operated means for swinging the mixing drum on the supporting means so that the operator may move the drum from a "low" charge position to a "high" discharge position by the mere operation of a control valve.

A further object of this invention is to provide for continuous rotation of the mixing blades during the raising and lowering of the drums from a "low" charge position to a "high" discharge position.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the mixing apparatus.

FIGURE 2 is an end elevational view of the mixing apparatus with the mixing drum in a charge position.

FIGURE 3 is similar to FIGURE 2 but showing the mixing drum in a discharge position.

FIGURE 4 is a plan view of the driving section of the mixing apparatus, taken substantially along line 4—4 of FIG. 1.

FIGURE 5 is an elevational view of a hydraulic lifting system used in the mixing apparatus.

FIGURE 6 is an end elevational view of a modified mixing apparatus showing the mixing drum in a charge position.

FIGURE 7 is similar to FIGURE 6, but showing the mixing drum in its discharge position.

FIGURE 8 is an end elevational view of a drive mechanism for the modified mixing apparatus.

FIGURE 9 is a side elevational view of a driving mechanism for the modified mixing apparatus.

While this invention is susceptible of embodiments in many different forms, there is shown in the drawings, and will herein be described in detail, an embodiment of the invention and a modification thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention, and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring to FIGS. 1 and 2, a supporting means is provided in the form of a frame **5** comprising a horizontal base member **6**, supported on wheels **10**, and a pair of laterally spaced support members **7**, extending upwardly from the base and provided with bearings **8** on their top portions to receive and rotatably support an elongated pivot shaft **9**. A third upwardly extending support member **7***a*, similar to support members **7**, is provided with a bearing **8***a* on its top portion in axial alignment with bearings **8**.

The mixing means is shown as comprising an elongated cylindrical mixing drum **11** having a hopper **12** formed on a portion of its periphery and provided with an opening **13**, and with a discharge lip **13***a*, for charging and discharging mortar or plaster ingredients and mixtures. Bearings **14** are mounted on the end of drum **11** at the central axis of the drum and receive rotatable shaft **15**, extending the entire length of the drum. Fixed to shaft **15** within the cavity of the mixing drum is a set of spiral mixing blades **16** having their outer edges in near contact with the inside surface of the drum and operable to mix the ingredients that comprise the mortar or plaster.

To facilitate charging of the drum with the opening in a "low" position and discharging the mixture with the opening in a "high" position, means are provided for swingably supporting the drum on shaft **9**. In its preferred form such means is shown as comprising pivot arms **17** mounted at the ends of drum **11** and extending substantially radially outwardly beyond the periphery of the drum where they are affixed to shaft **9** at points adjacent the outer periphery of the drum. Thus the drum **11** may be swung on frame **5** about shaft **9**.

FIGURE 2 shows the drum **11** in its charging position with the hopper opening **13** in a generally horizontal plane and at a "low" level to facilitate the loading of material by shovel or bag, and is generally about waist high. In FIGURE 3 the drum is shown in its upper or "high" discharge position with the opening **13** in a somewhat vertical plane to facilitate discharging the mix. To swing the drum between these positions and around the axis of shaft **9** a hydraulic cylinder **18**, having a cylinder rod **19**, has its base end pivotally connected to a bracket **20** which is mounted on base member **6**, and has its rod end pivotally connected to one of the pivot

arms 17 at a point 22 which is spaced from shaft 9 and provides a lever arm portion of pivot arm 17 between shaft 9 and point 22.

To drive the mixing blades 16 and a hydraulic pump 23 mounted on frame 5, as shown in FIGURE 4, a motor 24 is mounted on frame 5. A belt 25 connects the motor to the pump. The motor 24 is also connected through a belt 26 to a pulley 27 which is fixed to a shaft 28 which is directly in line with the shaft 9 and is rotatably supported at one end by the bearings 8*a*, and at the other end by a gear train housing 29. A pinion gear 30, within gear housing 29, is fixed to the shaft 28 to rotate therewith. Thus power is transmitted from the motor 24 to shaft 28 and through gearing in the gear train housing 29 (which contains gears 30, 31, 32 and 33) to the shaft 15 which carries the mixing blades 16. The gear train housing 29 is secured to the outer surface of the bearing 14 and will pivot with the drum 11.

A control 35 is provided for starting and stopping the motor 23.

A hydraulic circuit (see FIG. 5) provides a means for swinging the mixing drum around the axis of shaft 9. The suction port of the pump 23 is directly connected to a sump 36 and the discharge port is connected, through tubing 38 to one port opening of a four way control valve 37. A second port opening of the valve is connected through tubing 39 to the sump 36, a third port opening, through tubing 40 to the piston end of the hydraulic cylinder 18 and a fourth port opening, through tubing 40*a* to the rod end of the cylinder. Speed control valves 41 are inserted in lines 40 and 40*a* adjacent the cylinder.

A safety guard 42 is provided over opening 13 in hopper 12 and extends the length of the mixing drum, and a bag breaker 43 is mounted in the center of the guard to aid the operator when dispensing bagged materials into the drum.

The operation of what may be termed a "low"-"high" mixing apparatus will now be described. In FIGS. 1 and 2 the drum is shown in its normal or "low" charging position with the drum opening 13 in a generally horizontal plane to receive the ingredients required for mixing the mortar or plaster. This "low" charging position facilitates loading of the drum by shovel or with bagged material. The motor 24 may be started by operating the starter 35 and power is transmitted to the pump 23, and through belt 26 and the gear train in housing 29 to the mixing blades 16, thereby mixing the ingredients as they are dumped into the drum. When the material is thoroughly mixed, the hydraulic valve 37 is manually operated to direct hydraulic oil under pressure from the discharge of pump 25 through tubing lines 38 and 40 into the hydraulic cylinder 20, thereby extending the cylinder rod 19 to its full length. Since the rod end of the cylinder is pivotally connected at point 22 to pivot arm 17, the force exerted by the cylinder rod will swing pivot arm 17 about the center axis of shaft 9 and since the pivot arms are connected to the ends of drum 11, the drum will also swing about the shaft and reach an upper or discharge position with opening 13 in a substantially vertical plane, as shown in FIGURE 3. As mentioned heretofore, the shaft 28 is in line with the shaft 9 and as the mixing drum 11 swings about the center axis of shaft 9, the gear housing 29, being connected to the drum through the housing of bearing 14, will also rotate about the center line of shaft 28. The distances between the center axes of gears 30, 31, 32 and 33 within gear housing 29 are not change as the housing is rotated with the mixing drum and the driving relationship between the motor 24 and the mixing blade 16 is maintained and the blades continue to turn in a clockwise direction (FIGS. 2 and 3) during the swinging of the drum from the lower charge position to the upper discharge position. The rotating blades will move the plaster or mortar material toward the opening 13 and out over discharge lip 13*a* into a wheelbarrow or other suitable container (not shown).

After the mixing drum has been emptied the control valve 37 is moved to its normal position; connecting lines 38 and 40*a*, which directs oil into the rod end of cylinder 18, and also connecting lines 39 and 40 allowing the oil in the piston end of the cylinder to return to the sump 36, causing the cylinder rod 19 to collapse and the drum to swing back to its charge position.

It can be seen in FIGURE 3 that the high level discharge position of drum 11 eliminates the necessity of elevating the entire apparatus to gain sufficient height to properly discharge the material into a wheelbarrow, for exmaple, the hydraulic cylinder and the revolving mixing blades provide an entirely automatic discharge of mixed material from the drum by elevating the drum to a high position and by continually moving the material toward the opening 13 and out over the discharge lip 13*a*.

Maximum power is required to turn the mixing blades when the mortar or plaster ingredients are in a relatively dry form, and when the necessary liquid has been added to the mixture, a relatively low power is required to turn the blades. At this point more power is available for the hydraulic pump 23 to develop a high oil pressure in a hydraulic system where control valve 37 is operated to raise the mixing drum. If the apparatus is operated in the above manner, a relatively small capacity prime mover may be utilized and still have sufficient power to mix the material as the drum is raised.

FIGURES 6, 7, 8 and 9 show a modified design of the plaster mixer. Descriptive parts designated by prime numbers correspond to the numbers used in the aforementioned mixing apparatus and the parts serve a similar purpose. The object of this modified design is to allow the mixing drum pivot point to be located in any desired location, and also allow the mixing drum to be of any desired diameter while maintaining the use of a common size gear train for driving the apparatus. The operation of the mixer is essentially the same as the one previously described except for the gear train arrangement driving the mixing blades which is essentially a floating unit and will now be described in detail.

The motor 24′ is provided with an extended shaft 40 that is rotatably supported at its end in a bracket 41 affixed to frame 5′. Belts 24′ and 26′ are used to transmit power from the motor shaft to a hydraulic pump and to a pulley 27′ respectively. A pair of lower support links 42 and 43 are spaced apart at one end by a spacer 44 and are rotatably supported by the motor shaft 40 at a point between the bracket 41 and the motor drive pulleys. A pulley 27′ is fixed to a shaft 28′ which extends through and rotatably supports the other end of the lower support links 42 and 43. A gear 30′ is fixed to the shaft 28′ and located between support links 42 and 43, maintaining their spaced relationship. A pair of upper support links 45 and 46 are rotatably supported at one end by the shaft 28′ and spaced apart by the gear 30′, the lower support arm 42 and a spacer 47. The other end of the upper support links 45 and 46 are rotatably connected to a mixer blade shaft 15′ and a gear 33′ is affixed to the shaft 15′ at a point between the upper support links 45 and 46. Integral gears 31′ and 32′ are rotatably supported between the upper support links 45 and 46 at their mid point and provide intermediate gearing to transmit power from the gear 30′ to the gear 33′.

With the described arrangement the center lines of all the driving gears mounted on the upper support links 45 and 46 have a fixed relationship with one another, but the entire gear train is rotatable about the shaft 15′ and about the shaft 28′ and indirectly, through the links 42 and 43 may revolve about the motor shaft 40. Power is transmitted from the motor 24′ to shaft 28′ and through the gear train 30′, 31′, 32′ and 33′ to the shaft 15′ and

will continue to be transmitted through this gear train as the mixer drum **11'** is swung about its pivot point as previously described. The drum pivot point at shaft **9'** can be changed to any desired location by lengthening or shortening the drum pivot arm **17'**, the drive belt **26'**, and the lower support links **42** and **43**. In the same manner the diameter of drum **11'** may be increased or decreased by lengthening or shortening the same elements, and this can be done without changing the gear train unit. By the utilization of the described floating drive arrangement the manufacturer need only stock one size of gear train and still be able to manufacture mixing apparatus of the type described having numerous diameter mixing drums rotated from any desired pivot point.

I claim:

1. An apparatus for mixing mortar or plaster having, in combination, a frame including a base member and a pair of laterally spaced support members extending upwardly from said base member and carrying trunnion means, a cylindrical mixing drum having a hopper formed on a portion of its periphery and provided with an opening for loading and discharging the drum and a discharge lip, means affixed to the ends of said drum at the periphery of the drum and engaging said trunnion means to provide a swingable mounting for the drum, permitting it to be swung from a lower position wherein the hopper opening is in a generally horizontal plane to facilitate receiving material, to an upper position wherein the hopper opening is in substantially a vertical plane to facilitate discharging material wtih material discharging therefrom over the discharge lip in moving from the lower position to the upper position with the lip moving over a small arc of movement, a hydraulic piston and cylinder device connected between said frame and said drum for swinging the drum for the lower charge position to the upper discharge position, a control for operating said hydraulic piston and cylinder, a rotary mixing device including mixing blades within said drum and means for continually driving the mixing device in all positions of said drum including a set of meshing gears with a gear movable with the drum revolving about a gear not movable with the drum.

2. A mixing apparatus having, in combination, a frame including a pair of laterally spaced support members, carrying trunnion means defining an axis of rotation, a cylindrical mixing drum having a hopper formed on a portion of its periphery with an opening therein for loading and discharging the drum, said opening having a discharge lip, a mixing device, including mixing blades, mounted in said drum and rotatable therein, means for swingably mounting said drum on said trunnion means at the periphery of the drum permitting the drum to be swung about said axis of rotation from a lower charge position wherein the hopper opening lies to a side of said axis of rotation and extends substantially horizontal to facilitate receiving material, to an upper position wherein the hopper opening is above said axis and substantially vertical and the mass of material in the drum has been substantially discharged over said lip, means for swinging the drum between the lower charge position and the upper discharge position with the discharge lip moving over a small arc of movement during discharge of material, and means for continually driving the mixing device in all positions of the drum.

3. A mixing apparatus having, in combination, a frame including a pair of laterally spaced support members, carrying trunnion means, a cylindrical mixing drum, a hopper formed on a portion of the drum periphery with an opening therein for loading and discharging the drum and a discharge lip, mixing blades within said drum rotatable about a mixing axis of rotation, means for swingably mounting said drum on said trunnion means at a point beneath said discharge lip and located at a distance from said mixing axis of rotation approximately equal to the radius of said drum and a lesser distance from said discharge lip permitting the drum to be swung from a lower charge position wherein the hopper opening is to one side of said trunnion means and in a substantially horizontal position to facilitate loading of material, to an upper position wherein the hopper opening is above said trunnion means and substantially vertical and the rotatable mixing blades when rotating act to push the material towards said opening and out over the edge thereof.

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