Aug. 2, 1949. R. A. BECKWITH 2,477,568

MIXING MACHINE FOR CONCRETE OR THE LIKE

Filed Sept. 26, 1945 2 Sheets-Sheet 1

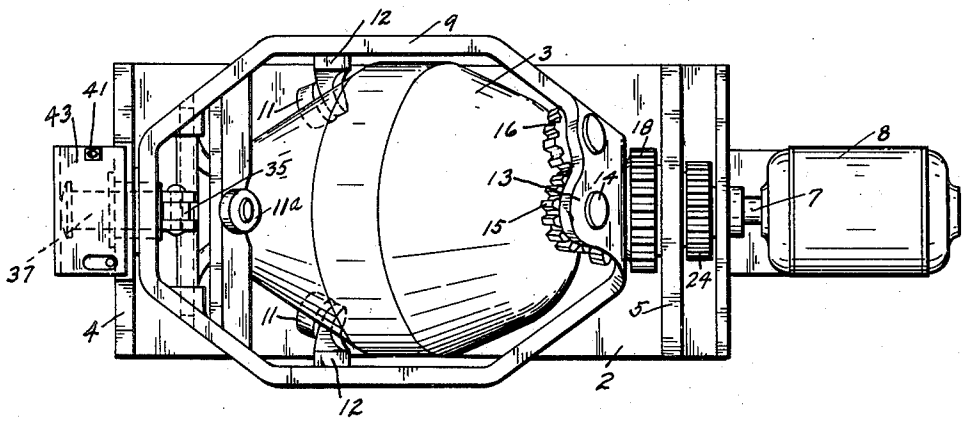



Fig. 1.

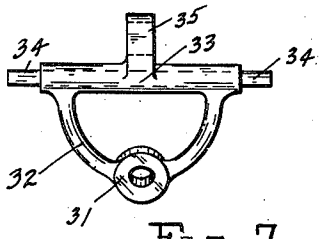



Fig. 7.

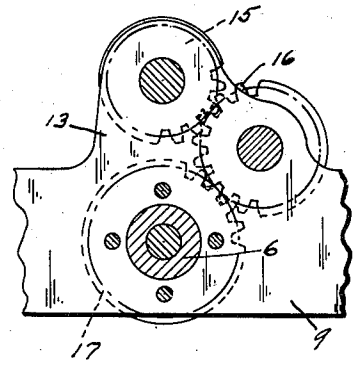



Fig. 5.

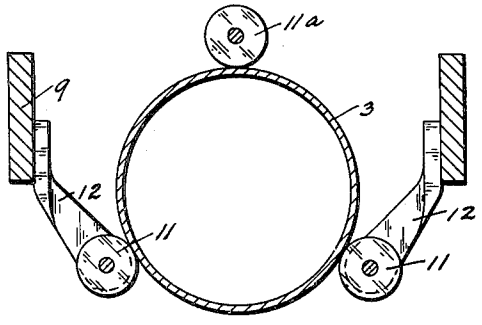



Fig. 6.

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2 Sheets-Sheet 2

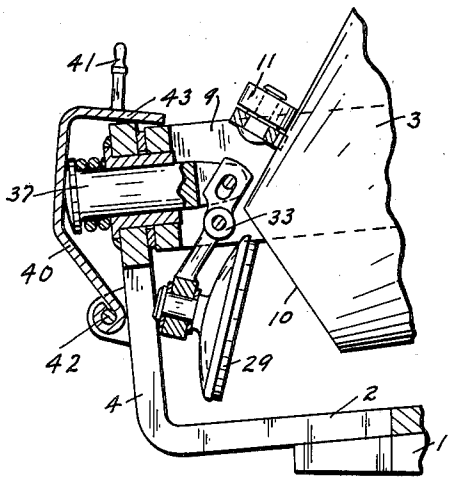



Fig. 3.

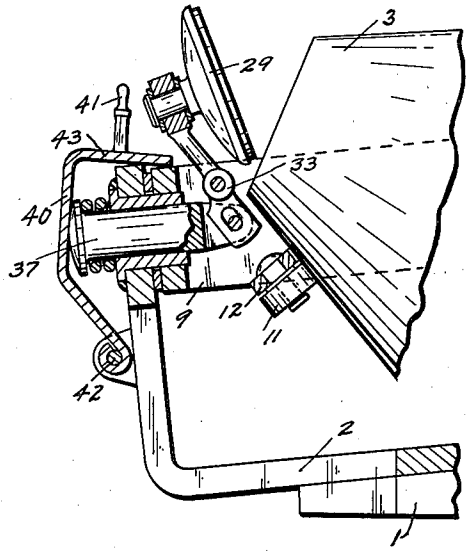



Fig. 4.

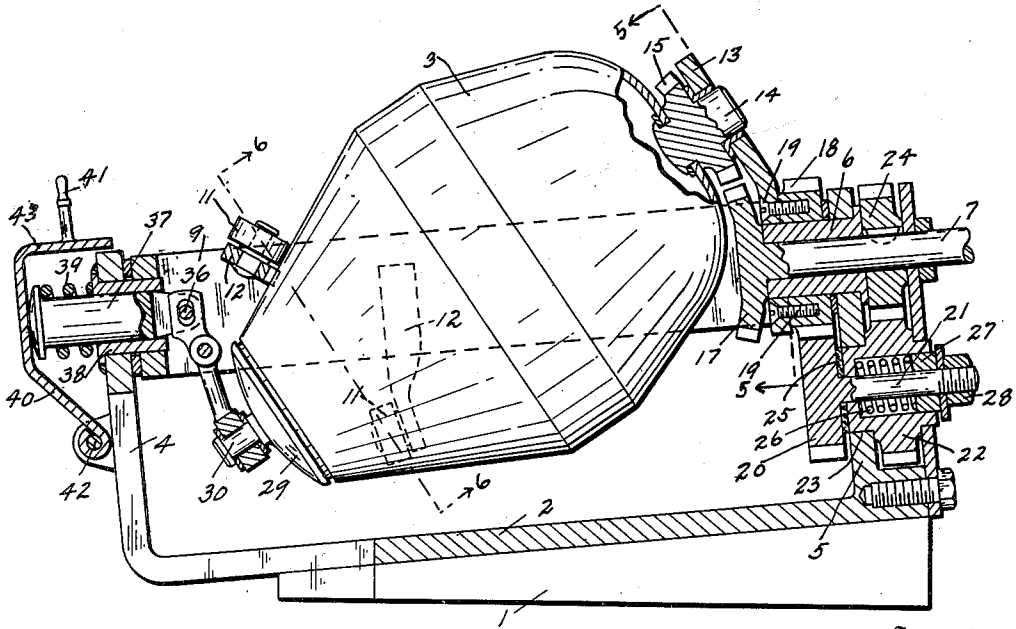



Fig. 2.

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# UNITED STATES PATENT OFFICE

2,477,568

## MIXING MACHINE FOR CONCRETE OR THE LIKE

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Application September 26, 1945, Serial No. 618,718

10 Claims. (Cl. 259—177)

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The object of my present invention has been to produce a novel construction of mixing machine particularly designed for the mixing of concrete aggregates, but also adapted for general mixing purposes for employment in glass, chemical, fertilizer, and other plants, where agitation of mass materials is required for manufacturing purposes.

In the carrying out of my invention, I utilize a novel construction of mounting means for the mixing drum or receptacle, whereby, upon actuation thereof, the materials in the drum are oscillated back and forth, so to speak, in the direction of the longitudinal axis of the drum, and at the same time the mass of materials being agitated or mixed is rotated, generally speaking, in a direction around the said longitudinal axis of the drum or mixing receptacle. In the above manner multi-directional movements are imparted to the materials being mixed in the mixing drum, and a high degree of efficiency of mixing action is produced.

Still another object of my invention has been to produce a machine in which the multitudinal direction mixing or agitating movements of the mass of materials in the mixing drum is produced by the operation of a single motor adapted to shift the drum back and forth, practically speaking, with an oscillatory movement shifting the materials therein from end to end of the drum in a reverse manner, and effecting simultaneously a rotation of the drum for causing the rotational movement previously referred to in respect to the materials being agitated.

Still another object of my invention has been to utilize the driving means for imparting the multi-directional movements to the drum, and which means is availed of for shifting the drum to a discharge position and to a charging position, without the necessity of using special provisions such as a motor or some other type of power operated means for causing the mixing drum to assume said discharge and charging positions.

Still another object of my invention has been to utilize as a feature of the driving means for operating the drum from a suitable motor or prime mover, which driving means includes an automatic clutch operable to enable discontinuance of bodily movement of the drum that imparts oscillating endwise shifting of the materials therein, and permitting continuing revolution of the drum as desired in order to obtain a maximum period of mixing even including the time when the charging operation is being performed,

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and to facilitate the quick discharging of the materials from the drum when the drum has reached a discharge position and is maintained therein for discharging purposes.

A further object of my invention has been to produce a machine of the general class above described and having the advantages above set forth in relation thereto, in which the mixing drum is mounted upon a cradle and disposed in said cradle at an angle to the axis of rotation to the latter, so that endwise mass movement or bodily movement of the materials being mixed will be produced as the cradle is rotated. My invention contemplates not only the foregoing mounting of a mixing drum in a cradle having the characteristic operation set forth, but, in addition thereto, the utilizing of suitable drive gearing by which the mixing drum is constantly rotated while being carried on the cradle and being turned with the cradle for the oscillating shifting movement of the materials therein, while simultaneously producing a revolving or rotational movement of said material, together with suitable control instrumentalities whereby to discontinue movement of the drum bodily incident to the rotation of the cradle, while the rotational movement of the drum as supported upon the cradle, and independently of the cradle is continued.

My invention involves other details of construction and operation of special advantage in the art of concrete mixing machines for obtaining a highly efficient machine for the purpose of concrete mixing, and which features of construction and advantages will appear more fully upon reference to the following description in conjunction with the accompanying drawings, in which:

Figure 1 is a top plan view of a preferred embodiment of a concrete mixing machine embodying my invention.

Figure 2 is a vertical longitudinal sectional view of the machine as illustrated in Figure 1, the mixing drum being largely shown in side elevation and broken away at the end thereof driven from the drive gearing.

Figure 3 is a fragmentary sectional view showing the cradle movement stopping instrumentalities and the drum door actuating means, the portion of the drum shown being illustrated as when in discharging position and the closing door for the discharge opening being arranged in its open position as when discharging of the drum is taking place.

Figure 4 is a view similar to Figure 3, but illustrating the drum in a reverse position, notable

for charging of the same, and again showing the drum opening closing door in open position enabling the charging operation to be performed.

Figure 5 is a fragmentary sectional view taken about on the line 5—5 of Figure 2, looking in the direction of the arrows.

Figure 6 is a sectional view taken about on the line 6—6 of Figure 2, looking in the direction of the arrows.

Figure 7 is a detail elevational view showing the yoke-like rocking lever for effecting the opening and closing of the door for the drum.

Specifically describing the preferred embodiment of my invention as shown in the accompanying drawings, 1 designates the base of the machine, upon which is carried the frame structure generally designated at 2. The base of the frame structure is inclined generally in the direction of the longitudinal axis of the drum 3. The frame structure 2 comprises an upwardly extending arm 4 at one end and an upwardly extending arm 5 at the opposite end. The arm 5 supports a sleeve bearing 6 in which is mounted a drive shaft 7 which is virtually the shaft of a suitable motor 8, which motor may be of the electric type, as illustrated, or the shaft 7 may be the engine shaft of an explosive or other type of engine such as may be suitable for the purposes of my machine.

By the use of suitable control switch, not shown, the speed of the motor 8 may be varied from slow to greater speed, as desired.

I provide a drum supporting cradle 9 for supporting the drum 3 which is of generally oppositely tapered shape, and closed at one end, while its other end has provided therein the charging and discharging openings 10. The cradle 9 is rotatable as will be more fully set forth, and the drum 3 is arranged at an angle to the longitudinal axis of the cradle, as seen best in Figures 1 and 2 of the drawings. At its more tapered end the drum 3 is supported by means of rollers 11 which are carried by brackets 12 attached to the inner sides of the cradle 9. At its larger end the drum 3 is supported by means of an upwardly and laterally inclined arm 13 constituting an extension of an end member of the cradle.

The arm 13 of the cradle supports the trunnion member 14 at the larger end of the drum 3, which trunnion member is shown as formed integrally with the driven gear 15, a suitable bearing being provided in the arm 13 for the said trunnion 14. The driven gear 15 meshes with an intermediate transmission gear 16 which in turn is in mesh with the driving gear 17 carried by the shaft 7 of the motor 8. The gear 17 is located just at the inner side of the end of the cradle 9 adjacent thereto. To this end of the cradle 9 is attached a cradle driving gear 18, and suitable fastening means 19, such as screw bolts, may be utilized for the said attachment purpose. The gear 18 is supported on the bearing members 16 of the arm 5, and said gear meshes with another driving gear 20 which may be characterized as an idler gear and which is supported upon an auxiliary shaft or counter-shaft 21. The shaft 21 is uniquely mounted in suitable bearing means provided in the transmitting gear 22 which has a bearing portion 23 mounted in the arm 5 of the frame structure 2. The gear 22 is driven directly from a gear 24 which is keyed to the motor shaft 7 previously described.

The gear 20, which drives the cradle 9, is operated from the gear 22 which is directly driven from the shaft 7, by means of a slip clutch arrangement including the clutch facing 25 intermediate the gears 20 and 22, and the coiled spring 26 received in the hollow portion shown as provided in the gear 22, said spring having a bearing at its left end, as seen in Figure 2, on the gear 22, and having a bearing at its right end on a collar 27, see Figure 2, which collar surrounds the countershaft 21 and is held in place in the hollow portion of the gear 22 as a bearing, by means of a set nut 28.

From the foregoing description of parts it will be seen that the drum 3 is driven by positive driving gear means for rotating the drum from the shaft 7, the gear means including the gears 17, 15, and 16. On the other hand, it will be seen that the cradle 9 is slip clutch driven through the provision of the drive from the shaft 7 through the gears 22, 20, and 18, the latter fastened to the cradle.

The door operating means for my mixing drum 3 will now be described in relation particularly to Figures 2, 3 and 4 of the drawings.

The door for closing the charging and discharging opening 10 of the drum is designated 29 and is equipped with a central trunnion 30 mounted in a bearing 31, which bearing 31 is carried by a yoke-like extension 32 of a door opening and closing lever 33, shown best in Figure 7 and in Figures 2, 3, and 4.

The lever 33 is provided with an axis shaft or member mounted at its ends in the bearings in the spaced end portions of the cradle 9 at the end of the latter opposite that at which the drive gearing previously described is located. The supporting bearing portions of the lever 33 are designated 34 and the lever includes an upper arm 35 having pivotal connection at 36 with a plunger member 37, see Figures 2, 3 and 4. The plunger member 37 is mounted in a sleeve-like trunnion member 38 which constitutes the trunnion support for the cradle 9 at its left end, as seen in Figures 2, 3, and 4, and the cradle 9 is adapted to rotate about the axis of the trunnion member 38 and about the axis supplied by the bearing member 6 and the shaft 7.

The trunnion member 38 permits of free inward and outward movements of the plunger member 37, and permits of the free movement of the member 37 which is normally pushed to the outer extreme of its movement as a normal working position by means of a coiled spring 39 bearing against an outer head on the member 37 at one end of the spring, the opposite end of the spring bearing against the member 38.

A stopping device for discontinuing the rotation of the cradle 9, and renewing such rotation by manual is provided at the door end of the machine, speaking with reference to the door of the drum 3. This stopping device consists of an angular shaped plate 40 equipped at its upper portion with an operating handle 41 and pivotally connected at its lower end as shown at 42 with the left arm 4 of the frame structure 2. The upper end of the plate 40 constitutes virtually a stop arm and normally lies in the position shown in Figure 2, being held in such position by the spring 39 acting upon the plunger 37.

For the purpose of stopping the drum 3 in a position such as illustrated in Figures 2 and 3, wherein the drum is at an inclination for facilitating discharge thereof, the stop device is operated by the handle 41 to cause the stop member 43 to engage over the end of the cradle 9 adjacent thereto, as seen in Figure 3. This will bring the

cradle 9 to a stop in substantially the position shown in Figures 2 and 3, and, simultaneously with the movement of the member 43 to the stopping position, the plunger 37 will be actuated for rocking the door opening lever 33 and bringing the door 29 to the open position shown in Figure 3.

Notwithstanding the discontinuance of the rotation of the cradle 9 in the above manner, the drive of the driving mechanism to the drum 3 to revolve the drum about its trunnions 30 and 14, in the cradle, will continue, and the drum will therefore be revolved in order to quickly empty the same when it is in its discharge position of Figure 3 with the door 29 open.

Now in like manner in regard to the matter of charging the drum, it will be seen that when the cradle 9 is in a position reverse, up and down, to that of the position of Figures 2 and 3, the stop member 43 may be pushed to overlie the adjacent end of the cradle, by means of handle 41, and in this way the cradle will be discontinued from rotation while the drum 3 is in an upwardly inclined position at its discharge end, and simultaneously the door 29 will be opened, as seen in Figure 4, and the charging of the drum may be effected while the parts are arranged as shown in the last mentioned figure. The charging of the drum may be effected by a suitable chute or any other charging means located above the opening 10 of the drum when the latter is in the position of Figure 4.

As to the operation of the member 43 in both of its positions of Figures 3 and 4, a release of the pressure on the said member 43 by the handle 41, in the direction of the drum, will enable the spring 39 to push the plunger 37 outwardly and simultaneously move the member 43 outwardly to disengage it from the cradle 9. Thereupon, the drive to the cradle 9 will be resumed and its rotation continued.

The manner in which the above operation of stopping the cradle while the drum 3 continues to rotate, as incident to the operation of the gearing previously set forth will now be described.

When the stop device 40 is in the position shown in Figure 2 it will be apparent that the drive to the drum 3 is twofold, in that the drum is driven from the shaft 7 positively under all conditions while the motor 8 is in operation, through the gear 17, the gear 16, and the gear 15, the last carried by the trunnion 14. The continuous rotation of the drum 3, of course, is the rotation thereof at an angle of the axis of the cradle, or, in other words, while the drum is disposed at an angle to such axis, and during such rotation the drive of the shaft 7 is taken off through the gears 24, 22, 20, and 18, through the cradle itself.

The last mentioned drive to the cradle 9 through the gears just referred to involves of course the drive of the slip clutch means previously described and referred to as including the clutch part 25, shaft 21, and the spring surrounding the shaft 21. Thus, at any time that the operator of the machine wants to stop the drum 3 from its rotation bodily with the cradle 9, the use of the stop device 40 will accomplish this because the cradle will be held positively against the driving action of the gears 18, 20, 22, and 24 through the provision of the slip clutch means heretofore set forth, the gears 24 and 22 continuing their rotative movement, but the gears 20 and 18 being stopped from movement and permitted so to do through the slip clutch provision set forth.



It is contemplated that the speed of the motor 8 may be slowed down if desired, at the time that the charging operation is to be performed for the drum 3, or at the time that the discharging operation is to be performed, but it is consequential that the rotation of the drum 3 in its cradle be continued incident to the stopped movement of the cradle or the continuous movement of the cradle for reasons which have been heretofore pointed out.

A roller 11*a* on a cross bar spanning one end of the cradle 9 coacts with rollers 11 to hold the drum 3 for rotation in the cradle.

Referring generally to the entire operation of my machine, it will be apparent that as the cradle 9 revolves in its position as supported upon the frame structure 2, the drum 3 is bodily shifted to opposite angles in its rotative movement, these angles, both in respect to the vertical and horizontal, and combinations of such positions. This movement is important in that it shifts the mass of aggregates or materials being mixed in the drum, backward and forward endwise of the drum, with a sort of oscillatory motion. Meanwhile, during the above shifting of the materials by reason of the cradle movement of the drum 3, the drum is imparted a revolving movement independently of its bodily movement with the cradle, and this revolving movement causes a rotation of the mass of materials in the drum circularly about the axis of the drum in the cradle, as will be obvious. For concrete mixing purposes, it is contemplated, of course, that the drum 3 shall be equipped interiorly with mixing blades or agitating paddles of any suitable type found efficient in practice and as commonly used today in drums of this character. Thus the agitated materials will not only be bodily shifted in an oscillating manner endwise of the drum, and rotated in a circular manner around the axis of the drum, but they will be broken up by intercepting blades during such movement of the mass of aggregate materials.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum, axis means connecting the drum and cradle, a motor common to and drivingly connected for rotating the cradle and drum about their respective axes, a door for closing and opening the drum, means for interrupting the driving of the cradle to stop the drum in a predetermined position, and means for opening the door incident to stopping of the cradle movement.

2. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum, axis means connecting the drum and cradle, a motor common to and drivingly connected for rotating the cradle and drum about their respective axes, a door for closing and opening the drum, means for interrupting the driving of the cradle to stop the drum in predetermined charging and discharging positions, the drum being disposed on the cradle to incline downwardly when in discharge position and inclined upwardly in charging position, and means to open the door simultaneously with stoppage of cradle movement.

3. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum, axis means connecting the drum and cradle, a motor common to and drivingly connected for continuously rotating the cradle and drum about their respective axes, a door for closing and opening the drum, and means for interrupting the driving of the cradle to stop the drum in predetermined charging and discharging positions, the drum being disposed on the cradle so that its longitudinal axis is diagonal to that of the cradle and so as to incline downwardly when in discharge position and incline upwardly in charging position.

4. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum having discharge means operable for discharging when the cradle is stationary, axis means connecting the drum and cradle and disposed on a line at an angle to the axis means for the cradle, power means for continuously rotating the cradle, means to stop the cradle rotation at will, and instrumentalities operated from the power means for rotating the drum in the cradle when the cradle rotates and when its rotation is stopped, the driving means for the cradle including a slip clutch between the cradle and drum driving members, and the stop means includes a device to stop the cradle movement by utilizing the action of the slip clutch.

5. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum, axis means connecting the drum and the cradle and disposed on a line diagonal to the axis means for the cradle, a single motor, and driving means comprising cradle and drum driving members drivingly connecting the motor to rotate the cradle and to rotate the drum in the cradle, in which the driving means for the cradle includes a slip clutch, between the cradle and drum driving members, and a device to stop the cradle movement by utilizing the action of the slip clutch.

6. A machine as claimed in claim 5, in which said cradle and drum driving means includes gearing connecting the motor and drum, gearing including a controllable clutch connecting the motor to the cradle, and the stop means includes means to simultaneously stop the cradle and control the said clutch for preventing the continuance of the drive from the motor to the cradle.

7. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum having discharge means operable for discharging when the cradle is stationary, axis means connecting the drum and cradle and disposed on a line at an angle to the axis means for the cradle, power means for continuously rotating the cradle, means to stop the cradle rotation at will, and instrumentalities operated from the power means for rotating the drum in the cradle when the cradle rotates and when its rotation is stopped, the drum discharge means including an opening in the end of the drum disposable in a downward direction on stopping of the drum from rotation, and a door for said opening.



8. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum having discharge means operable for discharging when the cradle is stationary, axis means connecting the drum and cradle and disposed on a line at an angle to the axis means for the cradle, power means for continuously rotating the cradle, means to stop the cradle rotation at will, and instrumentalities operated from the power means for rotating the drum in the cradle when the cradle rotates and when its rotation is stopped, the drum discharge means including an opening in the end of the drum disposable in a downward direction on stopping of the drum from rotation in a position of downward inclination with the opening at its lower end for discharging action, and a door for said opening, said opening being adapted to be used as a charging opening when the cradle is stopped while the drum is adjusted to a position of inclination with the opening at an upper end thereof.

9. A mixing machine comprising a supporting frame, a cradle rotatable thereon, a mixing drum on the cradle having axis means thereon inclined to the axis of rotation of the cradle, said drum having a charging opening, power means to rotate the cradle, means operated from the power means to rotate the drum in the cradle, and devices to stop the cradle rotation for holding the drum in a position inclined upwardly with its charging opening upward to receive materials charged therethrough into the drum while the drum rotation continues.

10. A mixing machine comprising, in combination, a supporting frame, a cradle, axis means supporting the cradle on the frame, a mixing drum having discharge means operable for discharging when the cradle is stationary, axis means connecting the drum and cradle and disposed on a line at an angle to the axis means for the cradle, power driving means for continuously rotating the cradle including a motor, means to stop the cradle rotation at will, and instrumentalities operated from the power means for rotating the drum in the cradle when the cradle rotates and when its rotation is stopped, said instrumentalities comprising gearing connecting the motor and the drum, other gears connecting the motor and cradle, and a controllable clutch connecting certain of the last mentioned gears.

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