No. 836,191. PATENTED NOV. 20, 1906.

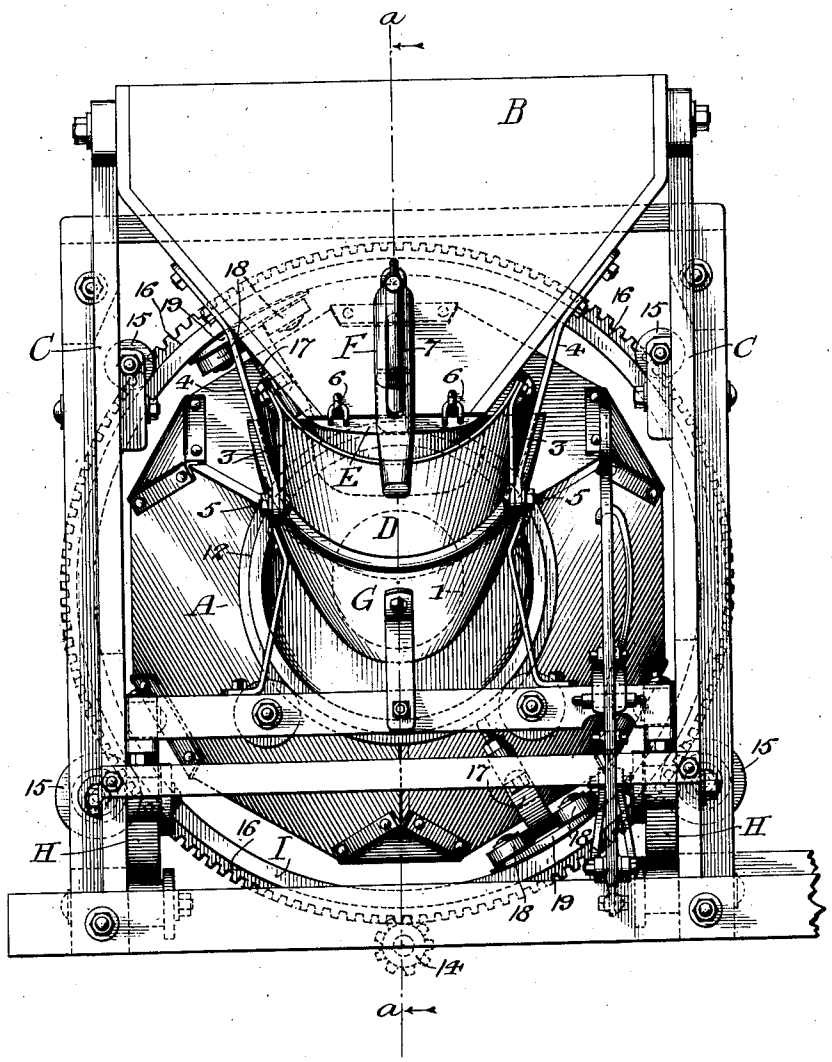
W. J. JUDD.

MIXING MACHINE.

APPLICATION FILED OCT. 20, 1903.

5 SHEETS—SHEET 1.

Fig. 1.

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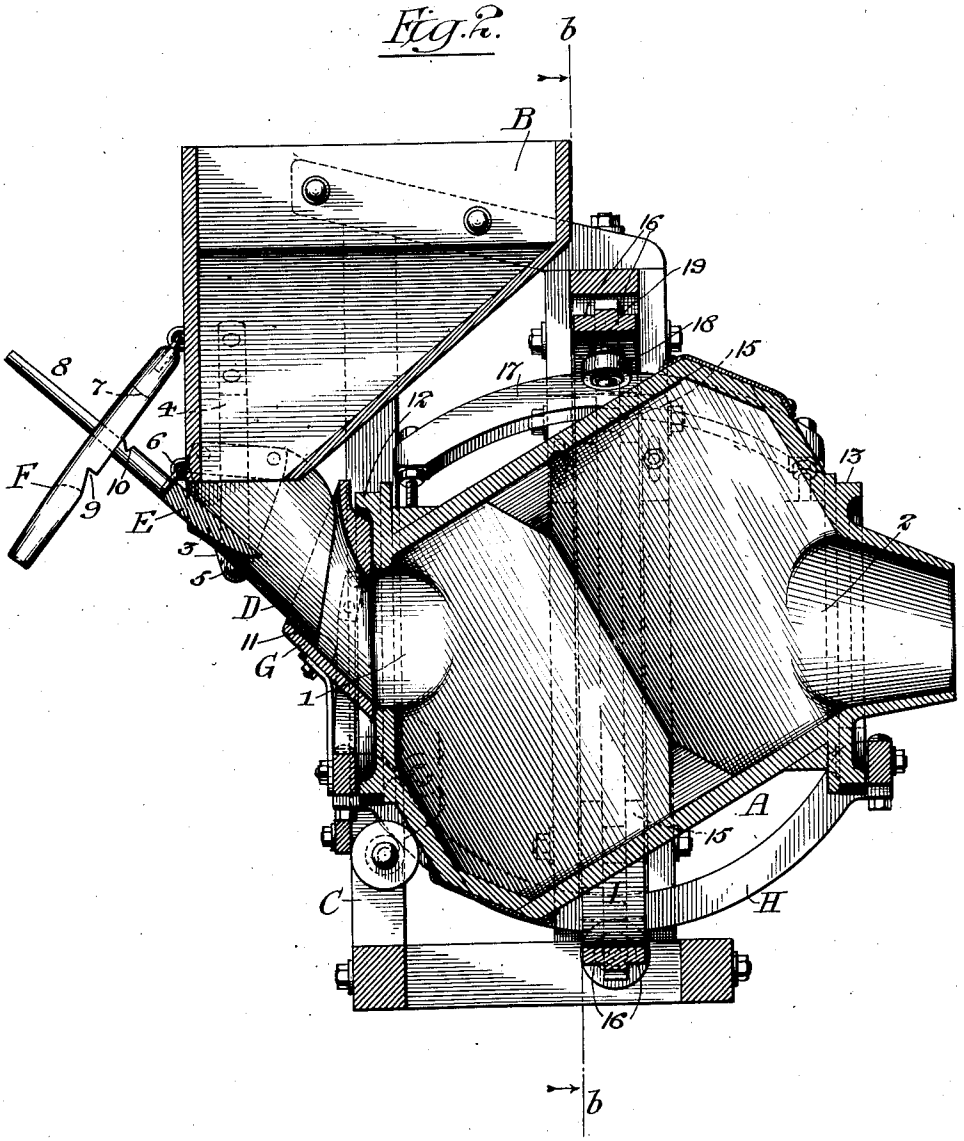
5 SHEETS—SHEET 2.

Fig. 2.

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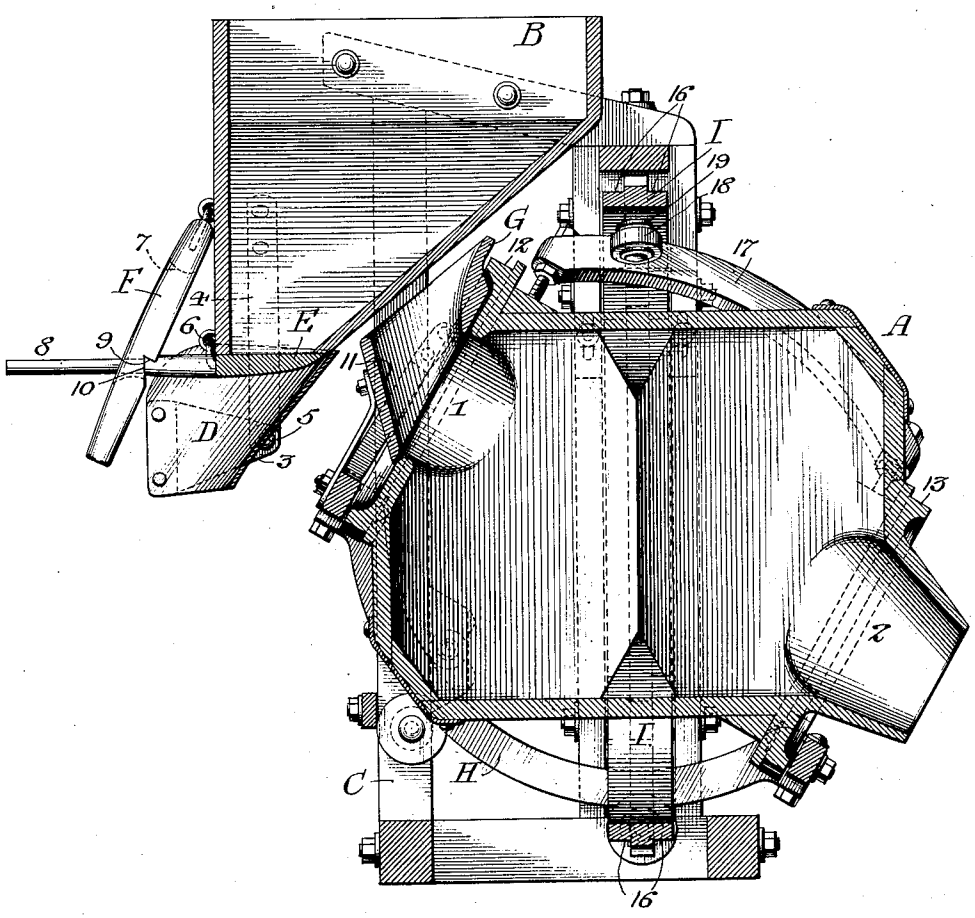
5 SHEETS—SHEET 3.

Fig. 3.

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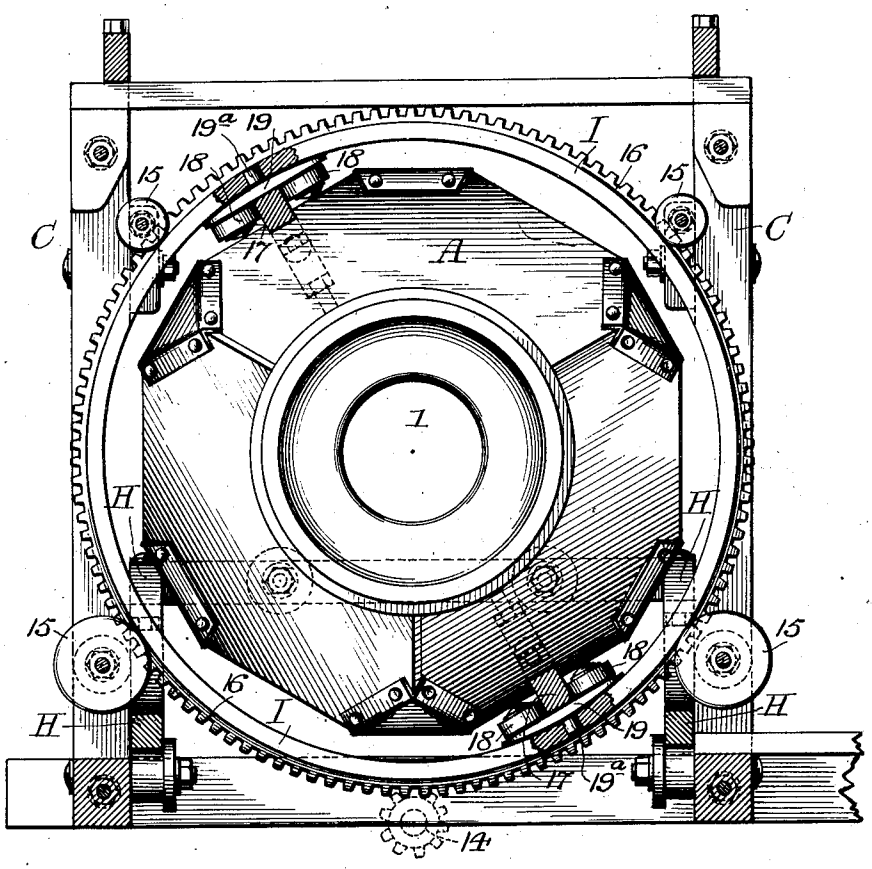
5 SHEETS—SHEET 4.

Fig. 4.

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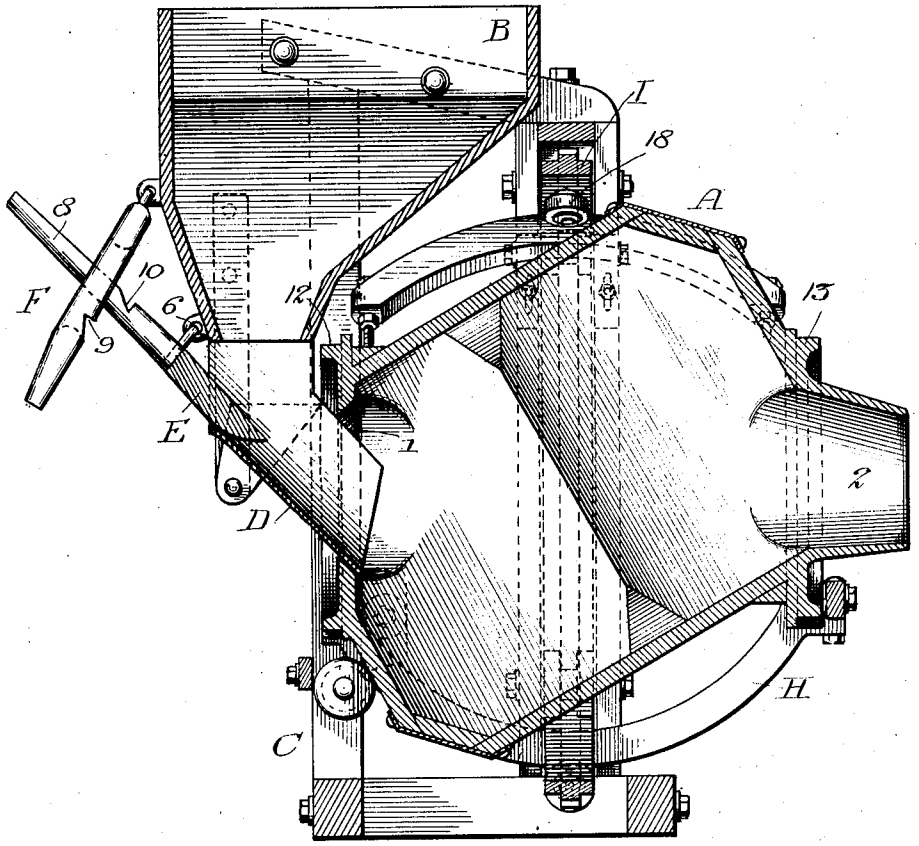
5 SHEETS—SHEET 5.

FIG. 5.

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# UNITED STATES PATENT OFFICE.

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## MIXING-MACHINE.

No. 836,191. Specification of Letters Patent. Patented Nov. 20, 1906.

Application filed October 20, 1903. Serial No. 177,751.

*To all whom it may concern:*

Be it known that I, WILLIAM J. JUDD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Mixing-Machines, of which the following is a specification.

My invention relates to machines for mixing concrete and other similar material of the class in which the mixing-receptacle is supported for rotation upon a tilting support which can be tilted so as to bring the mixing-receptacle into position for receiving and mixing and into position for discharging or dumping the mixed-up materials in alternation.

Objects of my invention are to provide an improved device for charging the mixing-receptacle and to provide improved means for operating the latter.

In the accompanying drawings, Figure 1 represents an end elevation of a mixing-machine embodying the principles of my invention. Fig. 2 is a section through Fig. 1 on line *a a* with the mixing-receptacle in position for receiving material from the hopper. Fig. 3 is a like section showing the mixing-receptacle in position for discharging its contents. Fig. 4 is a section on line *b b* in Fig. 2. Fig. 5 is a view like Fig. 2, with the exception that the mouthpiece G for the mixing-receptacle is omitted, the lower discharge end portion of the chute being extended into opening 1 of the mixing-receptacle.

The mixing-receptacle A is constructed with oppositely-arranged openings or passages 1 and 2, respectively, for charging and discharge. Said mixing-receptacle is also supported to revolve about an axis passing through these inlet and outlet openings and to tilt while thus revolving about a transverse horizontal axis between such inlet and outlet openings, this tilting action serving to bring the mixing-receptacle into position for charging and mixing and in alternation therewith to bring it into position for discharging the mixed-up batch.

B indicates a hopper arranged upon a frame or support C, and D denotes a tilting chute arranged between the mixing-receptacle and hopper as a means for directing materials from the hopper to the inlet-opening or passage of the mixing-receptacle. The tilting chute D can be pivotally supported in any way consistent with the purpose for which it is intended. As shown, it is provided with pendent side arms 3, each rigidly secured at one of its ends thereto and at its other end pivoted to swing about a transverse horizontal axis, said arms being, for example, pivoted to arms or bearings 4, arranged to depend from the hopper. By this arrangement the axis about which the chute tilts can be positioned at any desired point below the middle of the chute, so as to increase the radius of the arc in which the chute tilts or swings, it being desirable with certain forms of mixing-receptacle to thus increase said radius. This tilting chute D is automatically tilted in a direction to cause it to leave the inlet-opening or passage of the mixing-receptacle at a time when the latter is tilted from its charging toward its discharging position, and it is automatically tilted into position to enter or direct material from the hopper to such inlet-opening or passage of the mixing-receptacle at a time when the mixing-receptacle has been tilted back into position to receive materials from the hopper. The tilting chute is thus tilted toward and away from the mixing-receptacle in alternation, its movement away from the mixing-receptacle being effected from or by the tilting action of the latter, while its movement toward the mixing-receptacle is preferably caused by the weight of a tilting hopper-bottom, although it can be thus tilted by the depression of the hopper-bottom as a result of the weight of materials upon the latter.

In order to prevent the hopper from discharging its contents until a moment proper for such discharge, it is provided with a tilting bottom E, which is pivotally supported upon the hopper, as at 6, so that it can be brought into position to close the hopper-outlet, as in Fig. 3, and also tilted into position to open such outlet, as in Fig. 2. When this tilting bottom is in position to close the hopper-outlet, it is temporarily locked or held by a catch device, which can be operated so as to release or unlock the hopper-bottom E and permit it to tilt from the horizontal position shown in Fig. 3 to the inclined position shown in Fig. 2. When, therefore, the tilting chute D is in position to direct materials into the mixing-receptacle, as in Fig. 2, and the hopper-bottom has tilted

down, as also shown in such figure, materials from the hopper will pass into the mixing-receptacle, which at such juncture is in position for both charging and mixing. When, however, the mixing-receptacle is tilting from its charging and mixing position into position for dumping or discharging the mixed-up batch, as illustrated in Fig. 3, the initial portion of such movement on the part of the mixing-receptacle will tilt the chute D in a direction to cause the discharge end of the chute to rise and swing in a direction to permit it to leave the inlet-opening of the mixing-receptacle and also clear the latter. The result of this action is that the chute D will tilt from the position shown in Fig. 2 to the position shown in Fig. 3, and in so doing the chute will engage and tilt the hopper-bottom E from its depressed condition shown in Fig. 2 to its elevated position shown in Fig. 3, and thereby cause the hopper-bottom to again close the outlet of the hopper. When the hopper-bottom is thus automatically brought into position to again close the hopper-outlet, it will be automatically locked and held by the catch device.

The automatic catch device illustrated comprises a notched swinging latch or catch F, provided with a longitudinal slot 7, Fig. 1, and hung at its upper end upon the rear side of the hopper, and an arm or extension 8 of the hopper-bottom projecting rearwardly therefrom and extending through slot 7 in the catch F. When the mixing-receptacle is in position for charging, as in Fig. 2, the inclination of the tilting hopper-bottom will place its arm 8 at the upper end portion of slot 7 in the swinging catch and the latter will stand out from the hopper, substantially as illustrated in said figure. When, however, the mixing-receptacle is tilted toward its discharging position, so as to tilt the chute D and bring it into the position shown in Fig. 3, and thereby cause it to tilt upwardly to an extent to close the hopper, the arm 8 of the tilting hopper-bottom will swing downwardly to a horizontal position and permit the catch to engage and lock the hopper-arm—as, for example, by allowing a notch 9 on the catch to engage a shoulder 10 on the arm 8. In this way the chute D will be tilted away from the mixing-receptacle by the action of the latter, and this action on the part of the mixing-receptacle will also serve as a primary means for closing the hopper-bottom, which when thus closed is automatically locked, as illustrated in Fig. 3, in which the chute D is at the extreme of its outward tilt. When the hopper is thus closed and the mixing-receptacle has been tilted back from its discharging position (shown in Fig. 3) to its charging position, (shown in Fig. 2,) the chute D can be caused to swing into position to direct material into the mixing-receptacle by swinging the catch F outwardly from the hopper to an extent to unlock the hopper-bottom, whereupon the weight of the hopper-bottom E when in excess of its outwardly-extending arm will cause such bottom to swing or tilt downwardly, and thereby engage the discharge-end portion of the chute D and tilt the latter from its position shown in Fig. 3 to its position shown in Fig. 2. In this way when the hopper-bottom is unlocked it will automatically swing downwardly into position to direct the materials toward the opening in the mixing-receptacle, and the chute D will be tilted into position for the same purpose by reason of this action on the part of the hopper-bottom. After the hopper-bottom has been thus released, so as to permit it to tilt the chute into charging position, the attendant can again raise and lock the hopper-bottom by swinging down its outwardly-extending arm to an extent to permit the catch to engage and lock it. The hopper can then be suitably filled, and at a desired moment its contents can be discharged into the chute by simply unlocking the hopper-bottom. On the other hand, however, the attendant may, if he desires, leave the chute in the position shown in Fig. 3 and commence filling the hopper before the mixing-receptacle has been tilted back to its charging position, and at any desired time after the chute has been brought back to its charging position the unlocking of the hopper-bottom will permit the weight of the materials thereon to automatically depress it and cause it to tilt the chute into charging position. In this way the hopper-bottom can automatically open by its own weight while the hopper is empty, or it can be opened by the weight of material when the hopper is partially or suitably filled.

The mixing-receptacle shown in the drawings is a cubiform box having openings at diagonally-opposite corners, and with a mixing box or receptacle of such form I prefer as a matter of further improvement to extend its inlet-opening 1 by means of a non-rotary mouthpiece G, arranged upon a tilting support H for the rotary mixing-receptacle. This mouthpiece or chute G is adapted and arranged to form an inclined guideway 11, which slopes downwardly to opening 1 in the mixing-receptacle when the latter is in the position shown in Fig. 2, whereby materials from the chute D, temporarily positioned as in said figure, will readily slide down the incline 11 and pass into the mixing-receptacle. This arrangement also permits the opening 1 to be formed by practically cutting away a corner portion of the cube box on a plane at right angles to the axis about which such box revolves, and hence when said axis is horizontal, as in Fig. 2, the box or mixing-receptacle can be readily charged. The mouthpiece G is also placed upwardly, so as to permit the tilting chute or deflector D to readily

enter and leave it. The opening or passage through this mouthpiece G is arranged to register with opening 1 in the mixing-receptacle, and hence such opening or passage through the mouthpiece is practically an outward extension of the opening 1. In the specific arrangement shown the mouthpiece engages and tilts back the chute D when the mixing-receptacle is tilted from its charging toward its discharging position; but as the mouthpiece is an adjunct to the mixing-receptacle and tilts therewith the result, broadly considered, is the same as though the chute D projected directly into an opening in the mixing-receptacle, so as to permit the latter to directly engage and tilt back the chute, and this arrangement can be adopted particularly where other forms of mixing-receptacle are employed, it being, however, more desirable to provide the mouthpiece when the mixing-receptacle is of cubiform or equivalent polyhedric shape.

The mouthpiece can be supported upon the tilting support for the mixing-receptacle in any suitable way, and as to this portion of my invention, the tilting support can be of any other known or suitable form or construction.

The tilting support illustrated may be generally described as an oscillatory segmental base-support suitably guided and bearing upon antifriction-rolls or the like, the mixing-receptacle being provided with annular bearings 12 and 13, arranged upon antifriction-rolls on the tilting support, which oscillates so as to tilt the axis about which the mixing-receptacle revolves and which is therefore, broadly considered, a tilting support.

As an improved means for revolving the mixing-receptacle it is arranged within the space of a ring-gear I, which can be operated by a pinion, as indicated in dotted lines at 14 in Fig. 4. This ring-gear is arranged in a vertical plane and suitably guided—as, for example, portions of the frame are provided with antifriction guide-rolls 15, arranged to engage annular bearing-face portions 16, with which the ring-gear is provided at opposite sides of its line of teeth. The tilting support and the mixing-receptacle thereon tilt independently of the driving ring-gear I, and the mixing-receptacle has a shifting connection with the ring-gear to permit it to be driven therefrom and at the same time permit it to tilt independently thereof.

As illustrated, the mixing-receptacle is provided with two oppositely-arranged curved or segmental bearings 17, each embraced by a pair of antifriction-rolls 18, supported on the ring-gear, and in order to permit these rolls to automatically adjust themselves to the relative difference in movement between the non-tilting ring-gear and the tilting mixing-receptacle each pair of rolls 18 is carried by a vibratory bearing 19, common to the two rolls and pivoted at a point between them to the inner face of the ring-gear, pivots $19^a$ $19^a$ for such purpose being shown in Fig. 4, in which portions of the ring-gear are broken away, so as to expose the said pivots. When, therefore, the mixing-receptacle is tilted, the bearings 17 will shift between the rolls 18, and at the same time the rotation of the ring-gear will cause the mixing-receptacle to revolve.

The ring-gear is arranged in a vertical plane transverse to the axis of rotation of the tilting mixing-receptacle and between the open ends of the latter, whereby the mixing-receptacle can tilt to any desired extent, it being observed that by such arrangement the transverse axis about which the mixing-receptacle tilts is in or substantially in the plane of the ring-gear and that the bearings 17 on the mixing-receptacle extend in planes parallel with the plane in which the axis of rotation of the mixing-receptacle is arranged to tilt.

Broadly considered, the tilting chute and the automatic latching device therefor can be employed in connection with a mixing-receptacle of other suitable forms. The ring-gear and shifting connections between the mixing-receptacle and such ring-gear can also be employed in connection with other forms of mixing-receptacles, it being observed, however, that they constitute matters of further improvement in combination with a polyhedric or cubiform mixing-receptacle, and also that where a cubiform or polyhedric mixing-receptacle has an opening for the passage of material arranged in line with an axis passing through diagonally opposite corners or vertices and is formed by cutting away one of such corners the feature of the mouthpiece G, fixed upon a tilting support for the mixing-receptacle, is of particular advantage. This mouthpiece can, however, be used in connection with other forms of mixing-receptacles. It is obvious that in like manner the mouthpiece in this application can be dispensed with and the discharge end of the chute can be projected directly into the opening 1, as shown in Fig. 5; but as hereinbefore stated I regard the use of the stationary mouthpiece as a further and important feature of improvement. In either case, however, the chute is tilted away from its charging position by the tilting action of the mixing-receptacle.

Broadly considered, the removable chute is supported to move into position for charging the mixing-receptacle and in alternation therewith to recede from such position, the forward movement of the chute from its back position (shown in Fig. 3) being automatically effected by action on the part of the valve or hopper-bottom E, it being seen that when the hopper-bottom E is unlocked it will tilt down by its own weight or by reason of its own weight with the weight of materials thereon

and in so doing move forward the chute by connection provided between the two, a simple form of such power-transmitting connection being contact between the hopper-bottom and the bottom of the chute. Also contact between the mouthpiece G for the mixing-receptacle and the under side of the chute during the initial portion of a tilting movement of the mixing-receptacle and its tilting support in a direction to tilt the mixing-receptacle from its charging position to a position for discharge practically provides connection between the tilting support and the chute and serves to cause the chute to be tilted back by the tilting action of the support whereon the mixing-receptacle is mounted.

It will also be seen that the tilting hopper-bottom, more broadly considered, is a tilting valve or gate for controlling the discharge from the hopper and that as to this movable gate and the tilting chute each actuates the other in alternation, the gate being tilted by the chute in a direction for closing the discharge-opening of the hopper and the chute being tilted by the gate in direction toward the mixing-receptacle during the opening movement of the gate, also that means are provided for tilting the chute away from the mixing-receptacle synchronously with and incident or complementary to the tilt of the mixing-receptacle in direction from its charging to its discharging position.

What I claim as my invention is—

1. In a mixing-machine, a mixing-receptacle supported for tilt from a charging to a discharging position; means for tilting the mixing-receptacle; a hopper; a tilting chute for the delivery of material from the hopper to the mixing-receptacle when the latter is in charging position; a movable gate for controlling the discharge from the hopper and for tilting the chute toward the mixing-receptacle during the opening movement of said gate; and means located on the machine for tilting the chute in a reverse direction synchronously with and incident to the tilt of the mixing-receptacle in direction from its charging toward its discharging position.

2. In a mixing-machine, a mixing-receptacle supported for tilt from a charging to a discharging position; means for tilting the mixing-receptacle; a hopper; a tilting chute for the delivery of material from the hopper to the mixing-receptacle; a tilting gate for controlling the discharge from the hopper and for tilting the chute toward the mixing-receptacle; and means located on the machine for tilting the chute in a reverse direction synchronously with and incident to the tilt of the mixing-receptacle in direction from its charging toward its discharging position.

3. In a mixing-machine, a mixing-receptacle supported for tilt from a charging to a discharging position; means for tilting the mixing-receptacle; a hopper; a tilting hopper-gate and a tilting chute each for actuating the other in alternation, the gate being tilted by the chute in a direction for closing the discharge-opening of the hopper, and the chute being tilted by the gate in direction toward the mixing-receptacle; and means located on the machine for tilting the chute away from the mixing-receptacle synchronously with and incident to the tilt of the latter in direction from its charging toward its discharging position.

4. In a mixing-machine, a mixing-receptacle supported to revolve about a tilting axis and having an opening for the reception of material coincident with such axis; a hopper having a tilting bottom; a tilting chute for charging the mixing-receptacle arranged to receive material from the hopper; and a catch device for locking the hopper-bottom in a closed position, the hopper-bottom being arranged between the chute and the hopper, and to deliver material to the tilting chute when the chute is in position for charging the mixing-receptacle and the hopper-bottom is tilted downwardly.

5. In a mixing-machine, a rotary mixing-receptacle; a tilting support upon which the mixing-receptacle is arranged to revolve; a ring-gear surrounding and independent of the mixing-receptacle and supported to revolve in a plane transverse to the axis about which the mixing-receptacle revolves; suitable means for operating the ring-gear, and power-transmitting connection interposed between the ring-gear and the mixing-receptacle and permitting the latter to tilt independently of the ring-gear.

6. In a mixing-machine, a mixing-receptacle supported to revolve about a tilting axis and having an opening for the reception of material coincident with such axis, a tilting support upon which the mixing-receptacle is arranged to revolve, a mouthpiece for said opening in the mixing-receptacle secured upon the tilting support, and a tilting chute arranged to enter and leave the mouthpiece in alternation, the mixing-receptacle being revoluble independently of the mouthpiece.

7. In a mixing-machine, a mixing-receptacle supported to revolve about a tilting axis and having an opening for the reception of material; a tilting support upon which the mixing-receptacle is arranged to revolve; a mouthpiece for said opening in the mixing-receptacle secured upon the tilting support; and a chute for discharging material into said mouthpiece when the mixing-receptacle is in receiving position the mixing-receptacle being revoluble independently of the mouthpiece.

8. In a mixing-machine, a mixing-receptacle supported to revolve about a tilting axis and having an opening for the reception of material coincident with such axis; a tilt-

ing support upon which the mixing-receptacle is arranged to revolve; a mouthpiece for said opening in the mixing-receptacle arranged upon the tilting support; and a tilting chute which is supported to tilt into position to discharge into the mouthpiece when the mixing-receptacle is in receiving position, and which is tilted away from said mouthpiece when the mixing-receptacle is tilted from its receiving toward its discharging position the mixing-receptacle being revoluble independently of said mouthpiece.

9. In a mixing-machine, a rotary mixing-receptacle having an opening for the reception of materials coincident with its axis of rotation; a tilting support for tilting the rotary mixing-receptacle from a charging position to a position for discharging, and conversely for tilting such mixing-receptacle from a discharging to a charging position; and a mouthpiece for the charging-opening of the mixing-receptacle mounted upon the tilting support, the mixing-receptacle being revoluble independently of the said mouthpiece.

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