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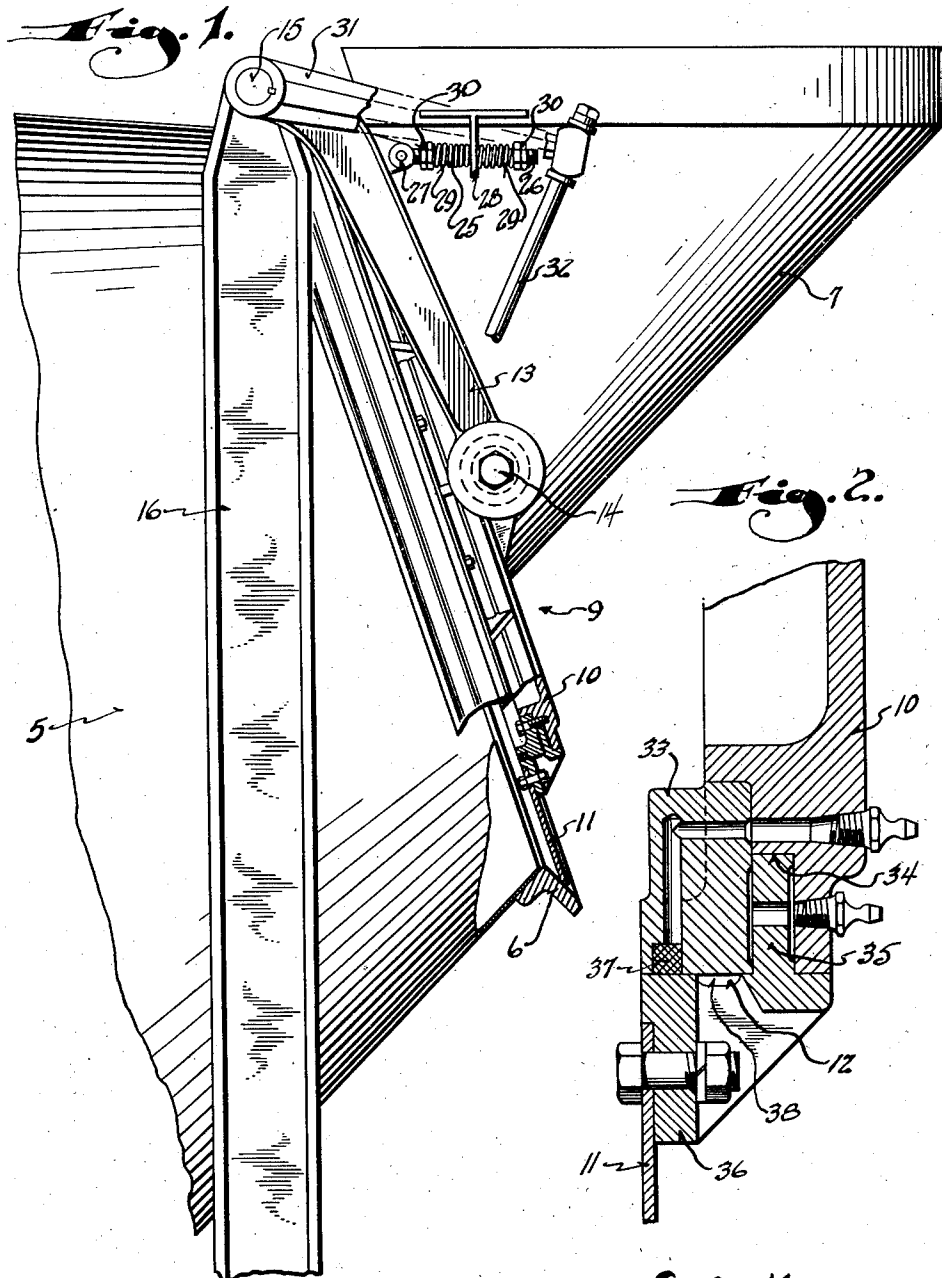
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CHARGING HOPPER MOUNTING FOR TRUCK TYPE CONCRETE MIXERS

Filed Oct. 29, 1942

3 Sheets-Sheet 1



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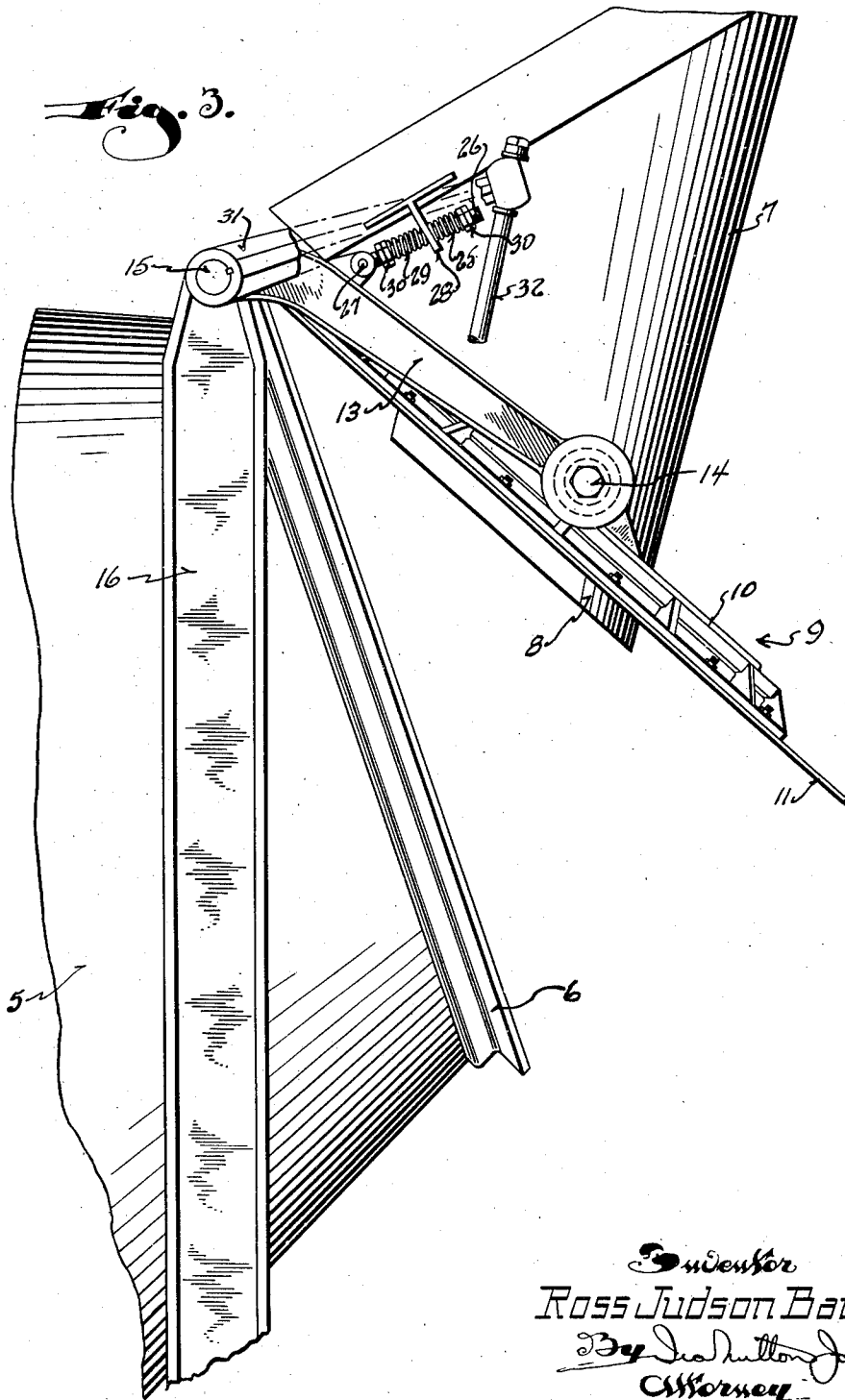
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UNITED STATES PATENT OFFICE

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CHARGING HOPPER MOUNTING FOR TRUCK TYPE CONCRETE MIXERS

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11 Claims. (Cl. 259—161)

This invention relates to concrete mixers and refers particularly to the charging hopper of truck mixers.

In truck mixers, particularly of the high discharge type, the drum is loaded and discharged through its elevated open end at the rear of the truck. To enable rapid charging of the drum a charging hopper or feed chute is provided which is substantially funnel-like and has its discharge end arranged to direct the aggregates through the mouth of the drum provided by its open rear end.

Discharging of the drum contents is effected by reversing the direction of rotation of the drum, whereupon the spirally arranged mixing blades in the drum convey the concrete rearwardly to discharge across the lower edge of the opening into an appropriate discharge chute.

To enable the spiral blading to effect the discharge of the drum contents it is, of course, necessary that the blading extend to the open end of the drum. Consequently, the charging hopper must be so designed that it directs the aggregates into the center of the drum to avoid the blading and as a result, an annular space is left between the discharge end of the hopper and the mouth of the drum.

Inasmuch as it is preferable to have the drum closed as completely as possible during transit, the hopper is provided with a closure which spans the space between its discharge end and the mouth of the drum, the outer portion of the closure being rotatable about the hopper so as to revolve freely with the drum in the closed charging position of the hopper.

In truck mixers of the past, which employed combined charging hoppers and drum closures of this type, two different schemes were employed for mounting and actuating the charging hopper. In one case, as represented in the patent to H. C. Peters, et al., No. 2,267,801, issued December 30, 1941, the combined charging hopper and closure was pivotally mounted to swing about a transverse axis near the top of the mouth of the drum; and in the other case, as represented by the patent to C. F. Ball, No. 2,265,752, issued December 9, 1941, the combined charging hopper and drum closure is slidably supported on a fixed shaft carried by the drum blading in axial alignment with the drum.

Both of these past forms of hopper mounting have proven objectionable in use, and it is, therefore, the primary object of this invention to provide an improved manner of mounting the combined charging hopper and closure by which

the objections inherent in past constructions are overcome.

Where the hopper was directly hinged to the supporting structure to swing about a fixed transverse axis, tight closure obviously depended upon the maintenance of a predetermined accurate relationship between the hinged mounting and the drum. It was found, however, that the inevitable shifting of the drum and the warping of the hopper supporting structure occasioned by the weaving and twisting of the truck chassis soon destroyed the initial accurate alignment between the hopper mounting and the drum. Thereafter it was impossible to have the closure seat firmly against the drum all around the edge of its open end.

The same difficulty was experienced with the other type of drum mounting, for while the fixed shaft upon which the hopper was slidably mounted was intended to maintain exact coaxiality between the hopper carried closure and the drum, it was found that in use this shaft became bent and took a downward deflection so that thereafter the closure would not engage the upper portion of the mouth of the drum.

This downward deflection or bending of the supporting shaft came about as a result of driving the truck across uneven, bumpy terrain while the charging hopper was in its outer discharging position applying the full weight thereof onto the outer end of the supporting shaft.

The present invention overcomes the difficulties of these past constructions through a relatively simple change from the construction illustrated in the aforesaid Peters et al. patent.

Specifically, therefore, it is an object of this invention to carry the combined charging hopper and closure between a pair of pivotally mounted arms adapted to be swung on their pivotal supports to carry the charging hopper to and from a closed charging position and, further, to so connect the hopper with these supporting arms that the hopper and closure carried thereby are free to adjust themselves to the mouth of the drum.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims. The accompanying drawings illustrate two

complete examples of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view in side elevation with parts broken away and in section illustrating the rear end portion of a truck type concrete mixer embodying this invention;

Figure 2 is a detail sectional view through the seal and bearing between the rotatable and non-rotatable parts of the closure;

Figure 3 is a view similar to Figure 1 but illustrating the combined charging hopper and closure partially swung to its open discharging position;

Figure 4 is an end view of the device showing the hopper in its closed charging position and having parts thereof broken away and in section;

Figure 5 is a fragmentary detail view illustrating specifically the yieldable connection between the charging hopper and its supporting arms; and

Figure 6 is a detail view illustrating a slightly modified form of connection between the supporting arms and the combined charging hopper and closure.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts, the numeral 5 designates the rotatable mixing drum of a truck type concrete mixer which, as is customary in the high discharge mixers now in general use, revolves about an inclined axis. The rear elevated end of the drum is open to provide a charging and discharging mouth for the drum and preferably has a drip ring 6 fixed thereto to provide a solid edge for the mouth of the drum.

The manner in which the drum is mounted and driven forms no part of this invention, and therefore has not been illustrated.

It is also common knowledge to those skilled in the art that the contents of the drum are discharged by the action of the mixing blades upon rotation of the drum in such a direction that the concrete contained therein is advanced to and spilled out of the mouth of the drum.

The charging of the drum is facilitated by the provision of a hopper 7. This hopper in its general aspects is funnel-like and has an open top which may be closed by a suitable cover, not shown, and a substantially cylindrical discharge end portion 8.

The discharge end portion 8 is smaller in diameter than the mouth of the drum so that when the hopper is properly positioned the aggregates enter the drum at the center where their admission is not disturbed by the blading, and as the interior of the discharge end portion 8 is open and entirely unrestricted there is nothing to obstruct or interfere with rapid charging of the drum.

Encircling the discharge end portion 8 is a drum closure indicated generally by the numeral 9 and consisting of a plate-like collar 10 fixed to the hopper and an annular outer member 11 freely rotatably connected to the collar 10 by a combination bearing and seal 12 specifically illustrated in Figure 2.

The annular outer member 11 is of a size to fit against the face of the drip ring as shown in Figure 1, and, being freely rotatable about the collar 10, revolves with the drum when the charging hopper is in its closed charging position shown

in Figure 1. For the closure to be effective, the annular member 11 must seat tightly against the drip ring 6 around the entire periphery thereof, and to assure such tight fitting engagement even after the mixer has been in service for a while, the combined charging hopper and closure is mounted in a manner enabling the same to accommodate itself to the mouth of the drum.

To this end, the support for the combined charging hopper and closure consists of a pair of supporting arms 13 pivotally connected to the opposite sides of the hopper as at 14 and pivotally mounted by being fixed to a transverse shaft 15 which is journaled in suitable bearings carried by a supporting structure 16.

It is to be observed that the shaft 15 which serves as a hinged or pivotal mounting for the supporting arms 13 extends across the top of the mouth of the drum and that the connections 14 between the extremities of the arms 13 and the hopper are so positioned that when the hopper is in its closed charging position the transverse axis passing through the connections 14 intersects the axis of the drum. The connections 14 are thus diametrically opposite the drum axis.

It is, of course, desirable that this relationship be as accurate as possible and to enable the establishment thereof and correct for possible assembly errors, the construction illustrated in Figure 6 may be employed. As here shown, the arms 13 have their extremities 13' longitudinally adjustable.

The specific manner in which this longitudinal adjustment is provided for the extremities of the arms may be of any suitable design. In the construction shown, a pin 17 extends from the arm to be slidably received in a tubular extension 18 on an eye which forms the extremity 13' and an adjusting screw 19 locks the parts in any desired position of relative adjustment.

The connections 14 between the extremities of the supporting arms and the hopper are, of course, made to the nonrotatable part of the hopper. To receive these connections bosses 20 are mounted on the collar 10 to provide anchors for studs 21. The studs 21 are threaded into the bosses 20 and are coaxial so that the hopper is free to tilt or swing about the axis of the connections 14 thereby allowing the closure to adjust itself (about a horizontal axis) to the mouth of the drum. It is in this direction that misalignment is most apt to occur.

Misalignment about a vertical axis, although not common, is also accommodated by the incorporation of yieldability in the connections 14. For this purpose, the extremities of the arms are bored large enough to receive collars 22 of rubber or other similar material having cubical elasticity the bores of which receive sleeves 23 which are mounted on the studs 21. Side plates 24 close the ends of the bores in the arms and complete the enclosure for the rubber collars 22.

Oscillating the shaft 15 swings the arms 13 and thus lifts or carries the combined charging hopper and closure about the axis of the shaft 15 from a closed charging position shown in Figure 1 to an elevated open discharging position illustrated in Figure 3.

As the hopper is so swung between charging and discharging positions, it is, of course, desirable that it be held in substantially its proper position with relation to the supporting arms, and for this purpose yieldable connections 25 are

provided between the hopper and the arms at a distance from the pivotal connections 14.

These yieldable connections 25 consist of screw threaded rods 26 pivotally connected as at 27 to the arms and passing through plates 28 fixed to the sides of the hopper. Compression springs 29 confined between the opposite sides of the plate 28 and lock nuts 30 on the screw shaft 26 complete the yieldable connections.

Any suitable means may be employed for oscillating the shaft 15, and in the present instance a lever arm 31 is fixed to one end of the shaft to be actuated up and down by a link 32 which leads to any suitable actuating mechanism (not shown).

The combination seal and bearing specifically illustrated in Figure 2 and by which the rotating and nonrotating parts of the closure are connected, also may be of any desirable construction. In the present instance, the nonrotatable collar 10 has its inner face stepped and has a ring 33 fixed in one of the steps to define an annular bearing channel 34 in which an inwardly directed flange 35 on a ring member 36 fixed to the rotating annular part 11 rides. The ring member 36 also rides on the outer peripheral surface of the ring 33 and a grease packing 37 is provided at the contiguous cylindrical surfaces.

Grout which passes the packing 37 reaches the exterior without danger of contacting the bearing surfaces between the flange 35 and the groove 34 through openings 38 which extend circumferentially at spaced intervals about the ring member 36.

The bearing surfaces and also the grease packing 37 are adapted to be supplied with lubricant in any suitable manner.

From the foregoing description, taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides a very material improvement in the manner of mounting the combined charging hopper and closure of a truck mixer and by virtue of this improved mounting a tight junction between the closure and the mouth of the drum can be had at all times regardless of misalignment resulting from use of the apparatus, and that the mounting for the hopper and closure retains the admirable feature of completely exposing the mouth of the drum when the hopper is moved to its open discharging position, thereby affording an unrestricted clear view to the inside of the drum, which is quite desirable.

What I claim as my invention is:

1. In a concrete mixer including a rotatable drum having an open end through which the drum is charged and discharged: a charging hopper having an open unrestricted discharge end; an annular closure member mounted on and encircling the discharge end of the hopper for engagement with the edge of the open end of the drum; a supporting structure adjacent to the open end of the drum; depending arms pivotally mounted on said supporting structure to swing about a transverse axis near the top of the open end of the drum; pivotal connections between the hopper and said arms allowing the hopper to tilt about a substantially horizontal axis common to said connections, said arms constituting the sole support for the hopper so that the closure member mounted on the hopper may adjust itself to the drum as the hopper is brought to its charging position; and means for swinging said arms on their pivotal mountings to

swing the hopper between charging and discharging positions.

2. In a concrete mixer including a rotatable drum having an open end through which the drum is charged and discharged: a charging hopper having an open and unrestricted discharge end; an annular closure member mounted on and encircling the discharge end of the hopper for engagement with the edge of the open end of the drum; a supporting structure adjacent to the open end of the drum; depending arms pivotally mounted on said supporting structure to swing about a transverse axis near the top of the open end of the drum; pivotal connections between the hopper and said arms allowing the hopper to tilt about a substantially horizontal axis common to said connections, said arms constituting the sole support for the hopper so that the closure member mounted on the hopper may adjust itself to the drum as the hopper is brought to its charging position; means for swinging said arms on their pivotal mountings to swing the hopper between charging and discharging positions; and a yieldable connection between the hopper and at least one of said arms at a distance from the pivotal connections between the hopper and arms for yieldingly holding the hopper against tilting about its connections with the arms as the hopper is swung to an open discharging position.

3. A charging hopper construction for truck type concrete mixers of the type wherein the mixing drum has an open end providing a mouth through which the drum is charged and discharged: a funnel-like charging hopper having an open and unrestricted discharge end; a drum closure on the discharge end of the hopper including a rotatable part encircling the discharge end of the hopper and adapted for engagement with the mouth of the drum to revolve therewith about the discharge end of the hopper; and common means for mounting the combined hopper and drum closure and for actuating the same from a closed charging position to an open discharging position, said means comprising a pair of arms pivoted to the opposite sides of the hopper at points lying on a substantially horizontal axis passing through the discharge end of the hopper, a supporting structure adjacent to the mouth of the drum, a pivotal supporting connection between said arms and the supporting structure near the top of the mouth of the drum so that said arms constitute the sole support for the combined hopper and drum closure, and means for swinging said arms about their pivotal support.

4. A charging hopper construction for truck type concrete mixers of the type wherein the mixing drum has an open end providing a mouth through which the drum is charged and discharged: a funnel-like charging hopper having an open unrestricted discharge end; a drum closure on the discharge end of the hopper including a rotatable part encircling the discharge end of the hopper and adapted for engagement with the mouth of the drum to revolve therewith about the discharge end of the hopper; common means for mounting and actuating the hopper and the drum closure carried thereby from a closed charging position to an open discharging position, said means comprising a pair of arms pivoted to the hopper at diametrically opposite points on a substantially horizontal axis passing through the discharge end of the hopper, a supporting structure adjacent to the mouth of the drum, a pivotal

supporting connection between said arms and the supporting structure near the top of the mouth of the drum, and means for swinging said arms about their pivotal support; a yieldable connection between the hopper and at least one of the arms at a distance from the pivotal connections between the hopper and arms for yieldingly holding the hopper against tilting about its connections with the arms as the hopper is swung to an open discharging position and means providing yieldability in the pivotal connections between the hopper and the arms.

5. A charging hopper construction for truck type concrete mixers wherein the rotatable mixing drum has an open end providing a mouth through which the drum is charged and discharged: a funnel-like hopper having an open unrestricted discharge end; closure means on the discharge end portion of the hopper for closing the space between it and the mouth of the drum when the hopper is in its charging position, said means including a freely rotatable annular member encircling the discharge end portion of the hopper and adapted for engagement with the mouth of the drum to revolve therewith; a pair of supporting arms for the hopper and the closure means; means connecting the supporting arms with the nonrotating part of the hopper at opposite sides thereof and in a manner allowing relative pivotal movement between the arms and hopper about a transverse axis; a supporting structure adjacent to the open end of the drum; means supporting the arms from said supporting structure for swinging movement about a transverse axis near the top of the mouth of the drum, said arms being of such length that the transverse axis of their connections with the hopper substantially intersects the drum axis when the hopper is in its charging position; means for swinging the arms about their connections with the supporting structure and whereby the hopper may be swung from its charging position to an elevated discharging position at which all parts of the hopper are clear of the mouth of the drum to afford an unrestricted view into the drum and unrestricted discharge of the drum contents, said arms constituting the sole support for the hopper so that the hopper is free to adjust itself to the mouth of the drum to insure snug engagement between the rotating part of its closure means and the mouth of the drum as the hopper is brought into charging position; and a yieldable connection between the hopper and at least one of said arms at a distance from the pivotal connections between the hopper and arms for yieldingly holding the hopper against tilting about its connections with the arms as the hopper is swung to an open discharging position.

6. In a concrete mixer of the type having a drum provided with an open end which serves as a charging and discharging mouth for the drum: a combined charging hopper and closure including a rotatable part adapted for engagement with the mouth of the drum to revolve therewith; a pair of supporting arms for the combined charging hopper and closure; means pivotally mounting the arms to swing about a transverse axis near the top of the mouth of the drum; connections between the arms and the nonrotatable part of the combined charging hopper and closure lying on a transverse axis which intersects the center about which the rotatable part of the closure revolves; and means providing adjustment in the connections whereby the

location of said connections may be accurately adjusted to lie on a line intersecting the axis of the drum.

7. A charging hopper construction for truck mixers of the type wherein the mixing drum has an open end providing a mouth through which the drum is charged and discharged: a funnel-like charging hopper having an open unrestricted discharge end; a drum closure on and encircling the discharge end of the hopper and adapted for engagement with the mouth of the drum when the hopper is in its charging position; a pair of supporting arms; means pivotally mounting the arms to swing in unison about a transverse axis near the top of the mouth of the drum; pivotal connections between the extremities of the arms and the discharge end portion of the charging hopper so located with respect to the hopper that said connections are coaxial and have their common axis passing substantially through the center of the discharge end of the hopper, said connections comprising studs fixed with respect to the hopper and received in bores in the extremities of the arms; and collars of material having cubical elasticity interposed between the studs and the bores to give the connections limited yieldability in all directions; and a yieldable connection between the hopper and at least one of said arms at a distance from the pivotal connections between the hopper and arms for yieldingly holding the hopper against tilting about its connections with the arms as the hopper is swung to and from an open discharging position.

8. In a combined charging hopper and closure for the drum of a concrete mixer: a funnel-like hopper; a collar encircling and fixed to the discharge end portion of the hopper, said collar having a circular stepped periphery with its portion of smallest diameter facing the drum; an annular rotatable closure part adapted for engagement with the mouth of the drum; a ring member fixed to the inner peripheral edge portion of said annular closure member and having an inwardly directed annular flange seated on one of the steps on the periphery of the collar; and a ring seated in an adjacent inwardly disposed step of the collar and secured to the collar in a position overlying the annular flange to confine the same in place and cooperate with the collar in providing a free running bearing for the flange of the ring member, said last named ring and the ring member having contiguous cylindrical surfaces, and the ring member having circumferentially spaced openings between its annular flange and its cylindrical surface which is contiguous to that of the ring, through which grout which passes between said contiguous surfaces reaches the exterior without coming in contact with the bearing surfaces of the flange.

9. In a concrete mixer having a frame and a mixing drum mounted thereby which is provided with a material-transfer opening at one end: means for charging concrete-making materials into the drum, comprising a hopper for receiving the materials, having a port normally positioned to discharge them through said drum opening; means mounting said hopper upon the frame for movements from and toward the drum opening, in the plane of the axis of the drum, comprising at least one arm journaled upon the frame and having a pivotal connection with the hopper; resilient means for restraining relative movement between said hopper and arm about said pivotal connection, whereby to yieldably maintain a pre-

determined relationship between the two; and means for moving said arm.

10. In a concrete mixer having a frame and a rotatable mixing drum mounted thereby which is provided with a material-transfer opening at one end: means for charging concrete-making materials into said drum, comprising a hopper for receiving the materials, having a port normally disposed to discharge them through said drum opening; means non-rotatably mounting said hopper upon the frame for movements longitudinally of the drum axis from and toward said opening to provide for discharge of the concrete mixture, comprising a pair of arms journaled upon the frame and pivotally connected to the hopper; a resilient connection between said hopper and arms tending to yieldably maintain a predetermined relationship between them; and means for moving said arms.

11. In a concrete mixer having a frame and

a rotatable mixing drum mounted thereby which is provided with a material-transfer opening at one end: means for charging concrete-making materials into said drum, comprising a hopper for receiving the materials, having a port normally disposed to discharge them through said drum opening; means non-rotatably mounting said hopper upon the frame for oscillatory movements longitudinally of the drum axis from and toward said opening to provide for discharge of the concrete mixture, comprising a pair of transversely spaced arms journaled on the frame and pivotally connected to the hopper at opposite sides thereof; means movable with said arms; an adjustable resilient connection between the hopper and said last named means tending to yieldably maintain a predetermined relationship between the hopper and arms; and means for moving said arms.

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