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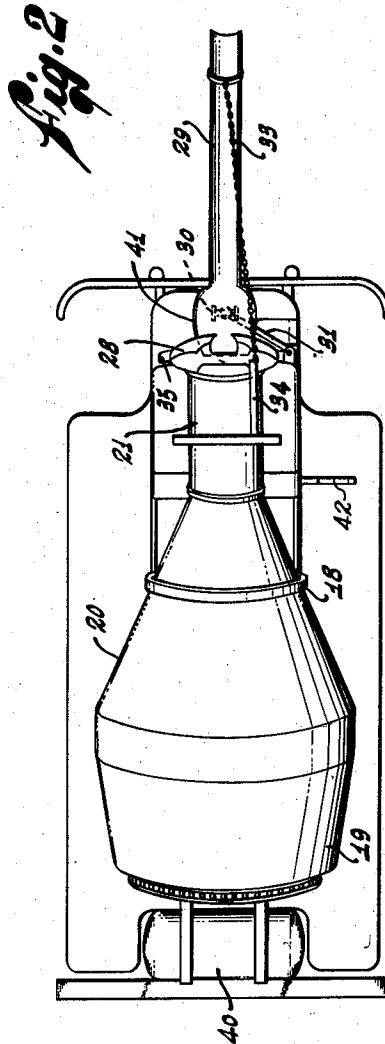
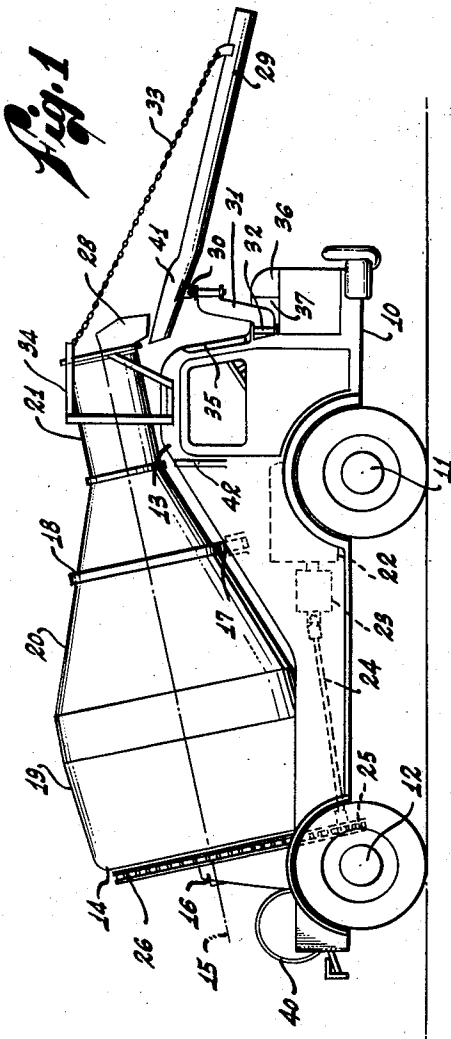
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2,859,949

FORWARD DISCHARGING TRANSIT CONCRETE MIXER

Filed July 18, 1955

2 Sheets-Sheet 1



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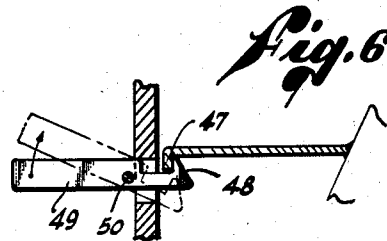
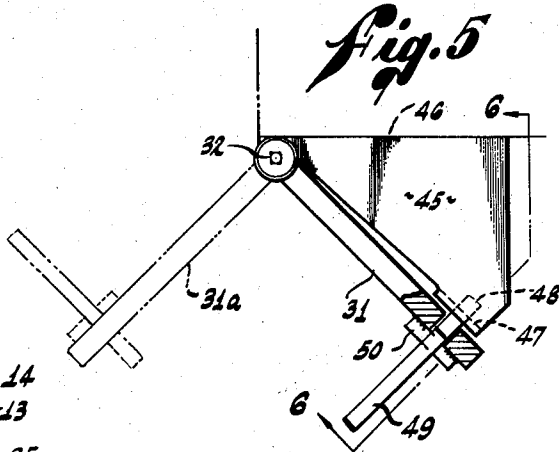
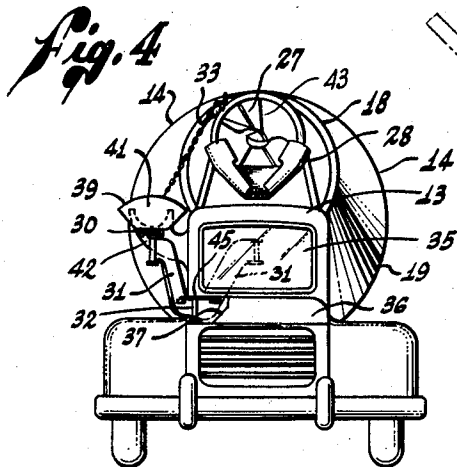
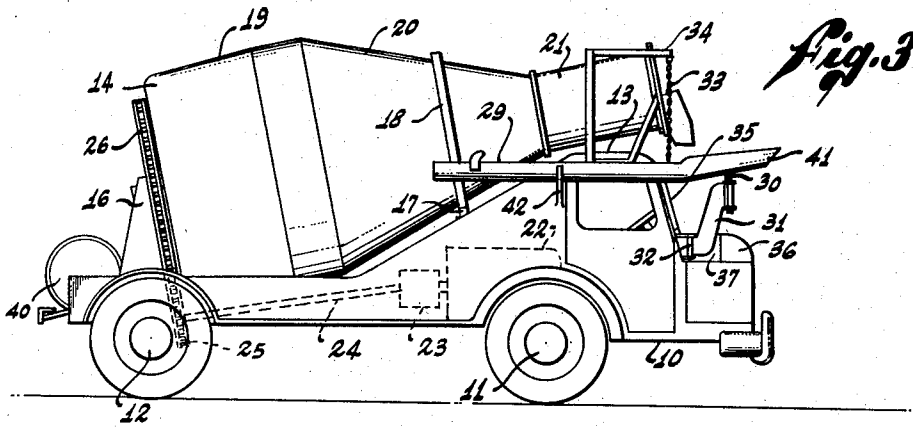
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FORWARD DISCHARGING TRANSIT CONCRETE MIXER

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2 Sheets-Sheet 2



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2,859,949

FORWARD DISCHARGING TRANSIT CONCRETE MIXER

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Application July 18, 1955, Serial No. 522,600

12 Claims. (Cl. 259—161)

This invention relates to transit concrete mixers. Such concrete mixers comprise a vehicle, means for propelling the vehicle, a mixer mounted on the vehicle, and means for operating the mixer both while it is standing in place and while it is in transit between locations, for example, between a central concrete mixing plant and various job locations. More particularly, this invention relates to a transit concrete mixer with the mixing drum arranged to rotate about a fixed axis inclined upwardly toward the forward end of the vehicle, and provided with one or more internal helical blades adapted to discharge the contents of the mixer upwardly and toward the forward end of the vehicle when said drum is rotated in a direction opposite to that used for mixing. In its preferred form, the invention employs a drum which diminishes in cross section toward its forward end, and which is shaped in its forward end to provide an elongated passage of reduced cross section passing over the driver's location and adapted to discharge the mixed concrete from a point above and forward of the driver's location. A further feature of the invention in its preferred form is a delivery chute arrangement pivotally mounted immediately forward of the driver's location and in full view of the driver, and adapted to receive concrete from said forward discharge of said mixer drum and distribute it to various points at the end of said chute in full view of the driver; provision is made for retracting said chute and its pivot mounting from the driver's view when the chute is not being employed for concrete delivery. In another preferred form, the engine and the power take-off for driving the mixer drum are located over the front axle and under the upwardly tilted forward end of the mixer drum, and the driver's cab is carried in cantilever suspension forward of the front axle.

When large quantities of concrete are to be used in a construction job, it is more efficient to mix the wet concrete at a central mixing plant located near gravel and sand pits than to mix it at the job site; also, the quality of mix produced by a large central mixing plant is likely to be better. The mixed wet concrete is then hauled in trucks to the construction jobs in which the concrete is to be used, and there poured. During transit, it is necessary that mixing action be continued to prevent segregation of the ingredient materials and undesirable settling of the wet concrete during transit. It is standard practice in the transit concrete mixer art to employ a rotating mixing drum mounted on a truck and driven by the truck engine or by an independent engine provided for the purpose. It is necessary, however, that special clutches and gear boxes be provided if the truck engine itself is to be used for rotation of the drum in transit, in order that the drum may be maintained at a constant optimum rate of rotation regardless of driving speeds and conditions.

It has been standard practice to mount the mixer drums on the transporting vehicle with the charging and discharging opening at the rear of the vehicle. It has not appeared practical in the past, to attempt to discharge

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concrete over the top of the driver's cab and over the front hood. Also, many transit concrete mixers are designed to tilt the drum and discharge the concrete by lowering the discharge opening below the level of the main mixing section. Such tilting and swiveling drums have the disadvantages that they require complex and expensive mechanisms, and that they tend to be damaged and put out of commission by the rough usage in construction work and by spilling of concrete into their working parts. The present invention makes use of a drum mounted on a rotary axis of fixed inclination and of such construction and design that material in the drum may be mixed by rotating the drum in one direction, and said material may be discharged from the drum without tilting the same by merely counter-rotating the drum. This is accomplished by one or more helical blades on the interior surfaces of the drum leading up to its discharge opening. A drum of this type, and the internal feed helix used in connection with it, is disclosed and described in United States Patent Reissue 23,320, reissued January 2, 1951 to Carl L. Willard and J. Jack Willard.

In transit concrete mixers of the type heretofore used, both charging and discharging must be done at the rear of the truck and it is necessary for the driver in the cab at the forward end of the vehicle to back into the charging location. This is not as easily done with precision as would be possible if he were able to drive his truck head on into charging location. Even more serious, however, is the problem of properly locating the discharge opening at the construction job location. On such jobs, the truck approaches are necessarily improvised and shifted from point to point. The driver must back into each new location with the accompanying difficulties of backward steering and without an adequate view of the discharge point. Also, because of poor visibility and poor steering control when backing up, the driver dares not approach the discharge point as closely as if he were approaching it with the forward end of his vehicle. The driver must exercise special care to avoid backing onto a surface too weak to support the truck, or backing completely over the edge of the supporting ramp and into the construction forms. After pouring begins, the driver cannot observe clearly all phases of the pouring operation from his cab, where the engine controls are located.

It is desirable in transit concrete mixers to have the discharge opening located at a point beyond the wheels so that discharge can be made over the work, and the reach of the delivery chute may be extended. However, with the conventional rear discharge mixer drum, it is not practical to extend a discharge portion of the drum for any length, as this would unduly increase the length of the truck.

In the rear discharge type of transit concrete mixer, the weight is heavily concentrated on the rear wheels since it is generally most practical to locate the drum with its largest portion over the rear wheel and its discharge opening extended backward from the rear axle. Such an arrangement not only locates most of the weight over the rear axle, but locates the center of gravity of the drum and its wet concrete content rather high off the ground as compared with what is usually considered good truck loading practice.

The rear discharge mixing drum type of transit concrete mixer does not utilize space within the truck to greatest advantage. The uptilted end of the mixer drum is reduced in cross section, but the space under it is back of the rear axle and in a location not conveniently used, not only from a structural standpoint, but also because such space is in a location vulnerable to damage during pouring operations. For example, the entire truck

chassis must be somewhat longer in order to accommodate fuel tanks at a point back of the driver's cab.

It is an object of the present invention to provide a forward discharging transit concrete mixer capable of being steered head-on up to the point of charging or discharging. In connection with this object, it is also an object to make it possible for the driver to conveniently observe discharge of the concrete.

Another object is to provide a forward discharge transit concrete mixer with both discharge openings and driver location in cantilever support forward of the front axle, thus extending the reach of the discharge opening of the mixer drum and the delivery chute while at the same time the driver is in his cab with the advantages of safety, full visibility of the pouring operation, and convenient location of steering engine controls.

It is a further object to provide a front discharge transit concrete mixer with the weight distributed with the greater percentage on the forward axle than has usually been possible in back discharge mixers, and with the center of gravity located nearer the ground than is the case with similar backward discharging concrete mixers.

Still another object is to provide a forward discharge transit concrete mixer with the uptilted end of diminished cross section arranged in a manner which makes it possible to use the space under it for the driver's cab, engine and power take-off, and fuel tanks.

The present invention makes use of a forward discharging mixer drum of the fixed inclined axis type, employing internal helical blades to effect charging or discharging, depending upon the direction of rotation.

The design and operation of the preferred specific embodiment of the invention will be described in connection with the accompanying drawings, in which:

Figure 1 is a side elevational view of the transit concrete mixer with the chute in position for forward discharge of concrete;

Figure 2 is a plan elevational view of the mixer as shown in Figure 1;

Figure 3 is a side elevational view of the forward discharge transit concrete mixer with the chute retracted out of the driver's range of vision;

Figure 4 is a front elevational view of the transit concrete mixer showing the delivery chute in retracted position;

Figure 5 is a plan view of the supporting arm of the delivery chute showing it in two positions; and

Figure 6 is a vertical sectional view, taken in the direction of the arrows 6—6 in Figure 5, showing a latch for locking the chute support in pouring position.

In Figure 1, the numeral 10 indicates a truck with the conventional front steering axle 11 and fixed rear axle 12. The driver's cab 13 is cantilever supported forward of front axle 11. A tilted mixer drum 14 is mounted with a fixed axis of rotation 15, being journaled at rear bearing support 16 and having its forward end carried on bogie wheels 17, which contact the circumferential track 18 encircling the forward part of mixer drum 14. The mixer drum 14 is comprised of an enlarged mixing section 19, a frusto-conical discharge section 20, and a discharge conduct section 21.

An engine 22, seen in dashed lines in Figure 1, is preferably located just over front axle 11 and under the conical section 20 of the mixer drum 14, is used to propel truck 10 (ordinarily by rear wheel drive) and, by means of a power take-off not shown, to engage a large gear 26 mounted on the rear end of mixer drum 14, and to drive mixer drum 14 in either mixing or discharging directions of rotation by means of a power take-off 23, shaft 24, chain 25, and large drive gear 26 mounted on the rear end of mixing drum 14. Mixing and mixer drum 14 and discharge therefrom are accomplished by internal helical blades and selected by means of direction as fully disclosed in the previously mentioned U. S. Pat-

ent Reissue 23,320, and as now well known in the smith-mixing art.

Mixed wet concrete is charged to the interior of drum 14 at the central concrete plant by way of forward opening 27, and discharge from the same opening at the pouring location delivers concrete to hopper 28 and thence to delivery chute 29 which is pivotably mounted at pivot 30 on swinging supporting arm 31, which is hinge-mounted at 32 to the frame of driver's cab 13. The lower end of delivery chute 29 is supported by means of a chain 33, which is attached to a chain bracket 34 mounted on the top of driver's cab 13. It will be noted that hinge mounting 32 is located below the range of vision of the driver through windshield 35. This location for hinge 32 minimizes obstruction of the driver's view but necessitates removal of depression of part of front hood 36 as indicated at 37 in order to permit supporting arm 31 to swing to and from cement discharge position.

The forward charging and discharging design illustrated makes it practical to locate fuel tank 40 at the rear of the vehicle, the position usually preferred because it is farthest removed from the driver's cab 13.

Preferably, the receiving end of delivery chute 29 is shaped in the form of a receiving pan 41 substantially wider than the transverse width of the chute 29 so that concrete can be discharged from the hopper 28 to receiving pan 41 without spilling, regardless of the horizontal angle through which the chute 29 is swung in the process of concrete delivery.

Figures 3 and 4 are side and front views of the transit concrete mixer with the supporting arm 31 swung out of the range of the driver's forward vision through windshield 35, and the chute 29 moved into stowing position alongside the driver's cab 13, in which it is supported by means of a bracket 42 mounted on the truck chassis just back of the driver's cab.

In Figure 4, the end of internal helical blades 43 are visible. These blades serve to mix the concrete during transit and, when counter-rotated, to discharge the concrete from mixer drum 14 in the manner of an Archimedes screw, as previously mentioned in this specification, and, as is well known in the prior art since the disclosure of United States Reissue Patent 23,320.

Figures 5 and 6 illustrate a simple and rugged latch for locking supporting arm 31 in position for discharge of cement via delivery chute 29. The plan view of Figure 5 shows the upper end of hinge 32, and, extending from it, a catch plate 45, which is permanently fixed, as shown, in a position diagonally across hood 36 in front of windshield 35, whose location is indicated in Figure 5 by dashed line 46. As seen in Figure 6, catch plate 45 has an overhanging lip 47 adapted to engage hook 48 on the end of latch bar 49, which is pivoted to swing in a vertical plane about pivot pin 50 mounted on the surface of supporting arm 31, which is shown in Figures 5 and 6 in position for cement delivery. When delivery chute 29 is stowed on bracket 42 as illustrated in Figures 3 and 4, supporting arm 31 is swung out of range of forward vision of the driver as indicated by the dashed lines 31A in Figure 5.

While I have illustrated and described what I now regard as the preferred embodiment of my invention, the construction is, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular form of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a transit concrete mixer of the type comprised of a transporting truck and a rotatable drum mounted on said truck with a fixed tilted axis of rotation and internal helical blades adapted to either mix concrete with-

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in said drum or discharge it from said drum depending upon the direction of rotation, the combination of: a driver's location suspended forward of the front axle of said truck; the mixer drum as described having its axis of rotation longitudinal with respect to said truck and tilted upwardly towards the forward end, said mixer drum being supported in fixed bearings in said truck and being comprised of a mixing section of enlarged transverse cross section located near the rear axle of said truck, a conical discharge section forward of said mixing section and diminishing in transverse cross section to a point near said driver's location, and a discharge conduit leading from the forward end of said conical discharge section over the driver's location and opening at a point above and forward of the driver's location; movable chute means for passing concrete from the forward discharge end of said drum to a location visible from said driver's location; and engine means for said transit concrete mixer supported in the bed of said truck and located at least in major part under said conical discharge section.

2. In a transit concrete mixer, the combination of: a mixer drum supported on said transit concrete mixer with a fixed inclined axis of rotation longitudinal with respect to said mixer and having its upper end toward the forward end of said mixer, said drum being adapted to be selectively rotated in both directions, and having a helical blade therein for charging, mixing, and discharging, and a discharge opening at the upper forward end of said mixer drum; a driver's housing at least partly under the upper forward end of said mixer drum, said driver's housing providing the driver with a field of forward vision; engine means under said uptilted forward end of said drum, back of said driver's housing, engaging the rear end of said drum to rotate the same; a supporting arm mounted on said transit concrete mixer by means of a hinge mounting, and adapted to swing to positions in or out of said driver's field of forward vision; and a concrete delivery chute for receiving concrete from the discharge opening of said mixer drum and delivering it to the point of pour, said chute being supported at least in part on said supporting arm.

3. In a transit concrete mixer, the combination of: a truck chassis; a mixer drum rotatably supported on fixed bearings in said chassis with a fixed axis of rotation inclined upwardly toward the forward end of said chassis, said mixer drum having a mixer section of enlarged cross section in its lower portion, and a discharge conduit section of substantially smaller transverse cross section at its forward end; a driver's location on said chassis at least partly under said forward end of said drum; hopper means adapted to receive concrete from the discharge opening at the forward end of said discharge conduit section; internal helical blades within said mixer drum adapted to carry concrete from said mixer section and discharge it from the discharge opening of said discharge conduit section to said hopper means, when said drum is rotated in a proper direction; engine means mounted in fixed position in said chassis and drivingly connected to said drum to rotate the same as aforesaid; a chute-supporting arm disposed obliquely to the horizontal and hinge-mounted at its lower end to said transit concrete mixer; and a concrete delivery chute supported at one end on the upper end of said supporting arm, and adapted to receive concrete from said hopper means and discharge said concrete to any one of several pour points.

4. In a transit concrete mixer, the combination of: a forward driver's location adapted to provide the driver with a field of forward vision; a mixing drum mounted on said transit concrete mixer with a fixed axis of rotation inclined upwardly toward the forward end of said mixer, said drum being adapted to be selectively rotated in both directions and having an internal helical blade adapted to discharge concrete from a discharge opening at the upper forward end of said drum, said drum being comprised of a mixing section of enlarged transverse

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cross-section near the rear axle of said transit mixer, a conical discharge section forward of said mixing section and diminishing in cross-section to pass over said driver's location; engine means for said transit mixer located at least in major part back of said driver's location and under said conical discharge section; and removable chute means for continuously passing concrete from said discharge of said mixing drum away from said driver's location.

5. In a transit concrete mixer, the combination of: a truck chassis; a forward driver's location mounted on said chassis and adapted to provide the driver with a field of forward vision; a plurality of drum-supporting bearings mounted in fixed positions on said chassis behind said driver's location; a mixing drum rotatably carried in said bearings with a fixed axis of rotation inclined upwardly toward the forward end of said chassis, said drum being adapted to be selectively rotated in both directions and having an internal helical blade adapted, while said drum is rotated in a given direction in said bearings, to discharge concrete from a discharge opening at the upper forward end of said drum, said drum being comprised of a mixing section of enlarged, transverse, cross-section behind said driver's location, a conical section forward of said mixing section and having a forward extension of diminished cross-section extending over said driver's location when said drum is carried in said bearings as aforesaid; power means for rotating said drum, said power means being mounted in fixed position on said chassis and being reversible whereby to rotate said drum in one direction to discharge concrete therefrom as aforesaid, or selectively in the other direction to mix concrete in said drum; and removable chute means for continuously passing concrete from said discharge opening of said drum away from said driver's location.

6. In a transit concrete mixer, the combination of: a truck chassis; a forward driver's location mounted on said chassis and adapted to provide the driver with a field of forward vision; a plurality of drum-supporting bearings mounted in fixed positions on said chassis behind said driver's location; a mixing drum rotatably carried in said bearings with a fixed axis of rotation inclined upwardly toward the forward end of said chassis, said drum being adapted to be selectively rotated in both directions and having an internal helical blade adapted, while said drum is rotated in a given direction in said bearings, to discharge concrete from a discharge opening at the upper forward end of said drum, said drum being comprised of a mixing section of enlarged, transverse, cross-section behind said driver's location, a conical section forward of said mixing section and having a forward extension of diminished cross-section extending over said driver's location when said drum is carried in said bearings as aforesaid; power means for rotating said drum, said power means being mounted in fixed position on said chassis and being reversible whereby to rotate said drum in one direction to discharge concrete therefrom as aforesaid, or selectively in the other direction to mix concrete in said drum; and chute means carried on said chassis on a hinge mounting located forwardly and to one side of said driver's location, said chute means being adapted when in a discharge position to continuously pass concrete from the discharge opening of said drum away from said driver's position and being swingable on said hinge mounting to a transit position wherein said field of vision is unobscured.

7. In a transit mixer, the combination of: a truck chassis; a mixer drum supported on said chassis with a fixed inclined axis of rotation longitudinal with respect to said chassis and having its upper end toward the forward end of said chassis, said drum being adapted to be selectively rotated in both directions and having a helical blade therein for charging, mixing, and discharging, and a discharge opening at the upper forward end of said drum; a driver's housing mounted on said chassis and at

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least partly under the upper forward end of said drum, said driver's housing providing the driver with a field of forward vision; power means mounted on said chassis and drivingly engaging the rearward end of said drum to rotate the same as aforesaid; a supporting arm mounted on said chassis by means of a hinge mounting, and adapted to swing to positions in and out of said driver's field of forward vision; and a concrete delivery chute for receiving concrete from the discharge opening of said drum and delivering it to a point of pour, said chute being supported at least in part on said supporting arm.

8. A transit concrete mixer, including: a truck having a cab; a rotary mixing drum, one end of which is open to receive and discharge concrete; means supporting said drum in fixed position on the truck behind said cab and with the open end thereof disposed substantially at the forward end of the cab; and means fixed on the truck for rotating said drum.

9. A transit concrete mixer, including: a truck having a driver's station at one end thereof; a rotary mixing drum, one end of which is open to receive and discharge concrete; means supporting said drum in fixed position on the truck with the open end thereof disposed substantially at the same end of the truck as is the driver's station; means on the truck for rotating said drum; and means for conveying concrete discharged from said drum extended, when in operative position, beyond said driver's station whereby an operator situated in the driver's station may control the truck to position the conveying means in a precise predetermined location.

10. A transit concrete mixer, including: a truck having a cab adjacent the front end thereof; a rotary mixing drum, one end of which is open to receive and discharge concrete; means supporting said drum in fixed position on the truck behind the cab with the rotary axis thereof inclined upwardly and forwardly and with the open end of the drum disposed above said cab substantially at the

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forward end thereof; and means fixed on the truck for rotating said drum.

11. A transit concrete mixer, including: a truck having a driver's station at one end thereof; a rotary mixing drum, one end of which is open to receive and discharge concrete; means supporting said drum in fixed position on the truck with the open end thereof disposed substantially at the same end of the truck as is the driver's station and at a higher elevation than said driver's station; means on the truck for rotating said drum; and an inclined chute for conveying concrete discharged from said drum, said chute when in operative position, being forwardly extended beyond said driver's station whereby an operator situated in the driver's station may control the truck to position the extended end of said chute in a precise predetermined location.

12. A transit concrete mixer, including: a truck having a cab; a rotary mixing drum, one end of which is open to receive and discharge concrete; means supporting said drum in fixed position on the truck behind said cab and with the open end thereof disposed substantially at the forward end of the cab; means fixed on the truck for rotating said drum; an inclined chute pivotally mounted on said truck in front of said cab and having a relatively high proximal end positioned to receive concrete from the open end of said drum and a relatively low distal end extending forwardly of said cab when in operative position.

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