March 18, 1952 R. C. GRAHAM 2,589,492

LOADING AND DISTRIBUTING MEANS FOR CONCRETE MIXERS

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Fig. 1.

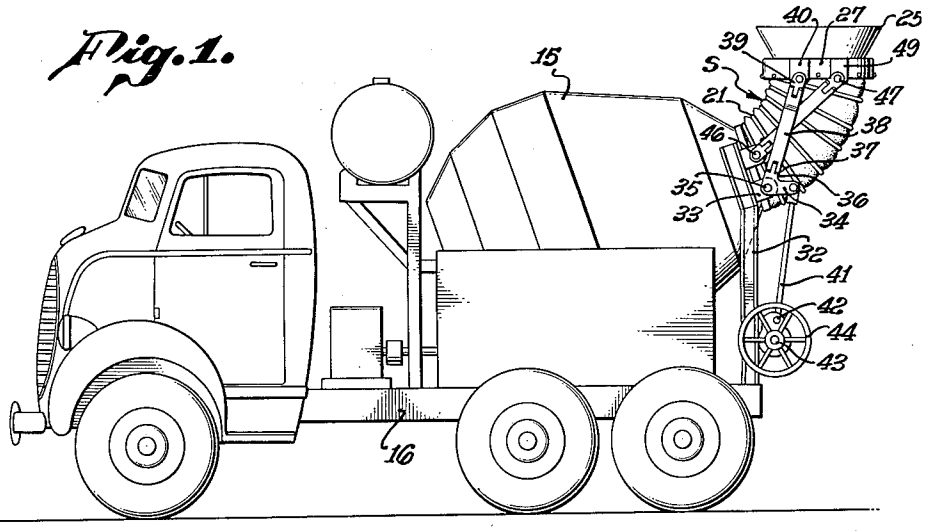


Fig. 2.

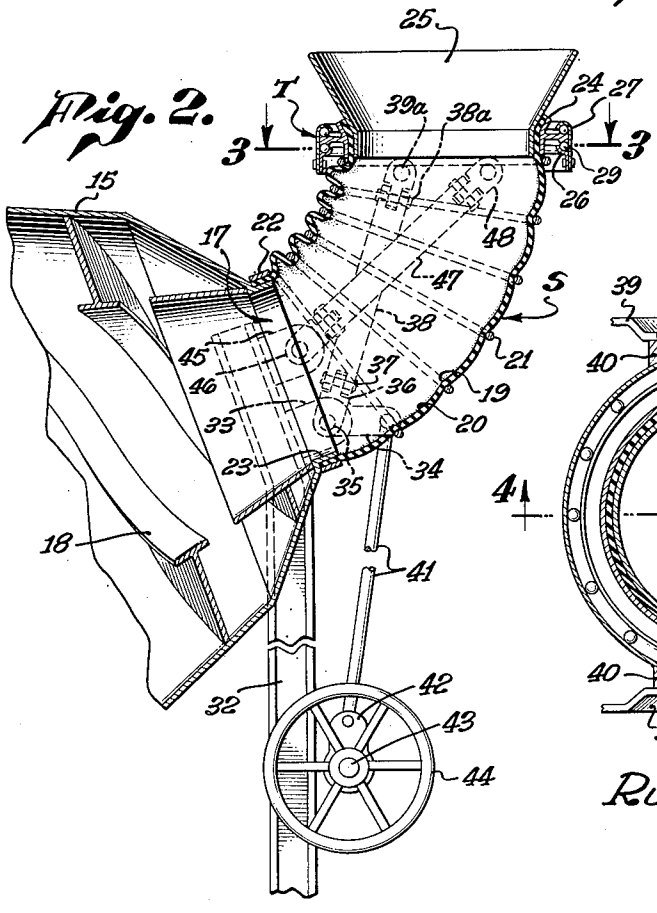


Fig. 4.

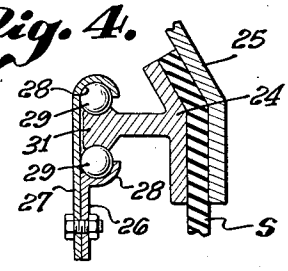
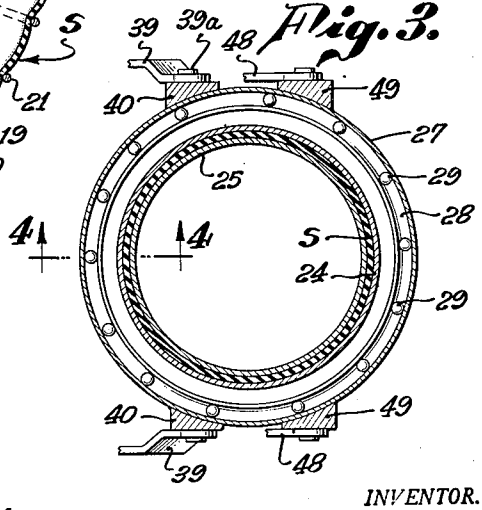


Fig. 3.



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LOADING AND DISTRIBUTING MEANS FOR CONCRETE MIXERS

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Fig. 5.

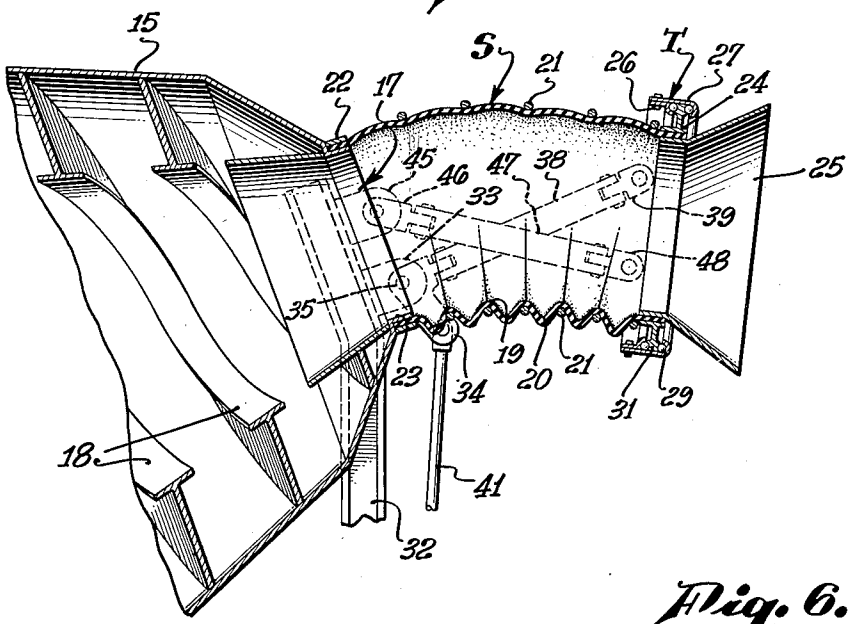
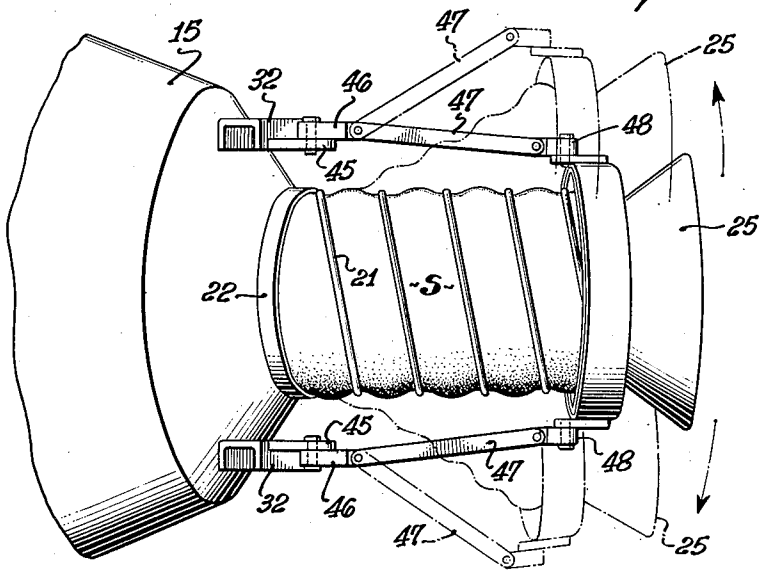


Fig. 6.



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LOADING AND DISTRIBUTING MEANS FOR CONCRETE MIXERS

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Fig. 7.

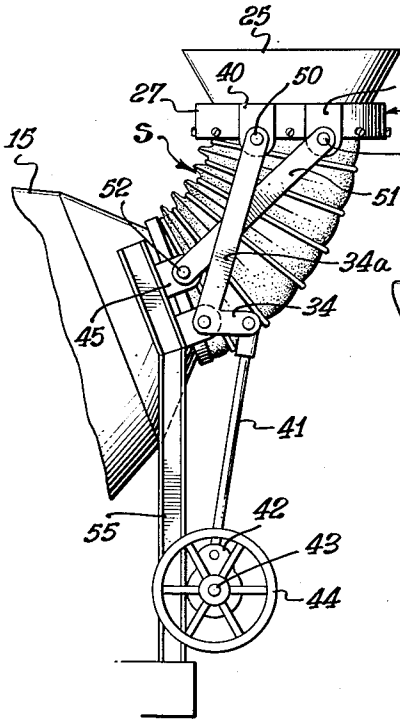


Fig. 8.

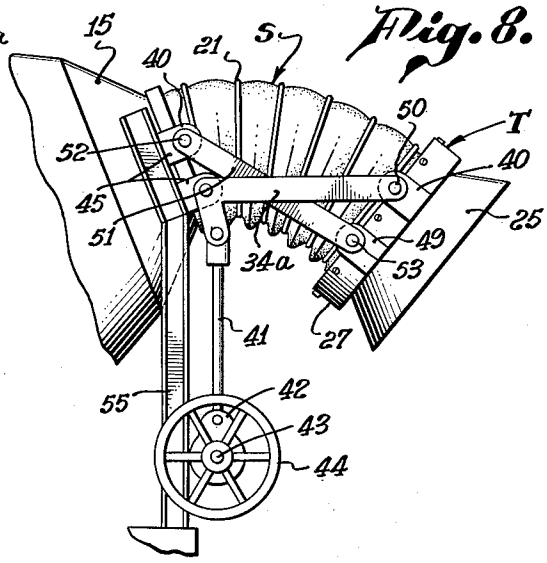
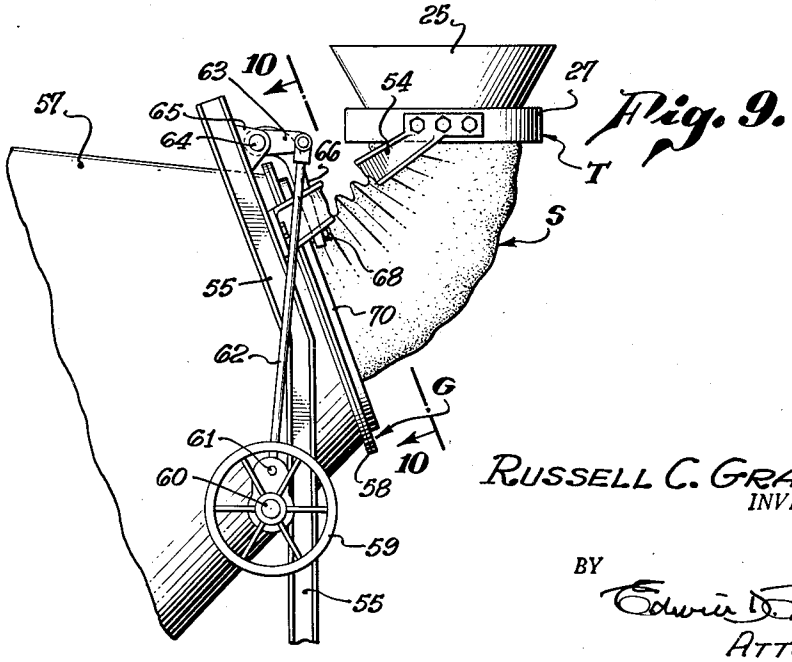


Fig. 9.



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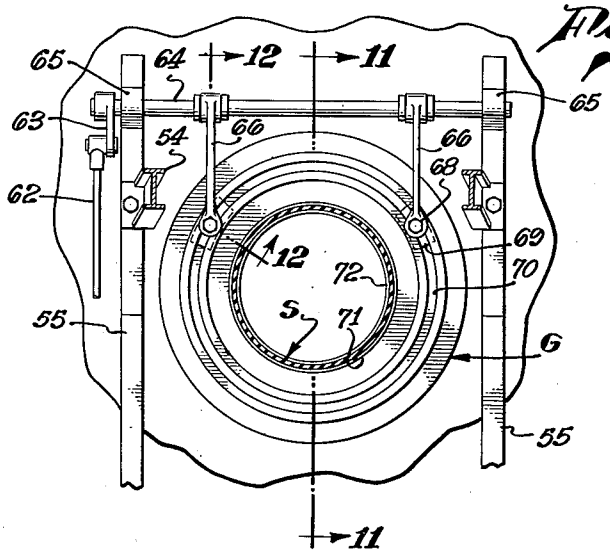
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March 18, 1952 R. C. GRAHAM 2,589,492

LOADING AND DISTRIBUTING MEANS FOR CONCRETE MIXERS

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Fig. 10.



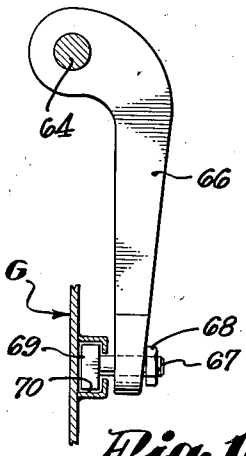


Fig. 12.

Fig. 11.

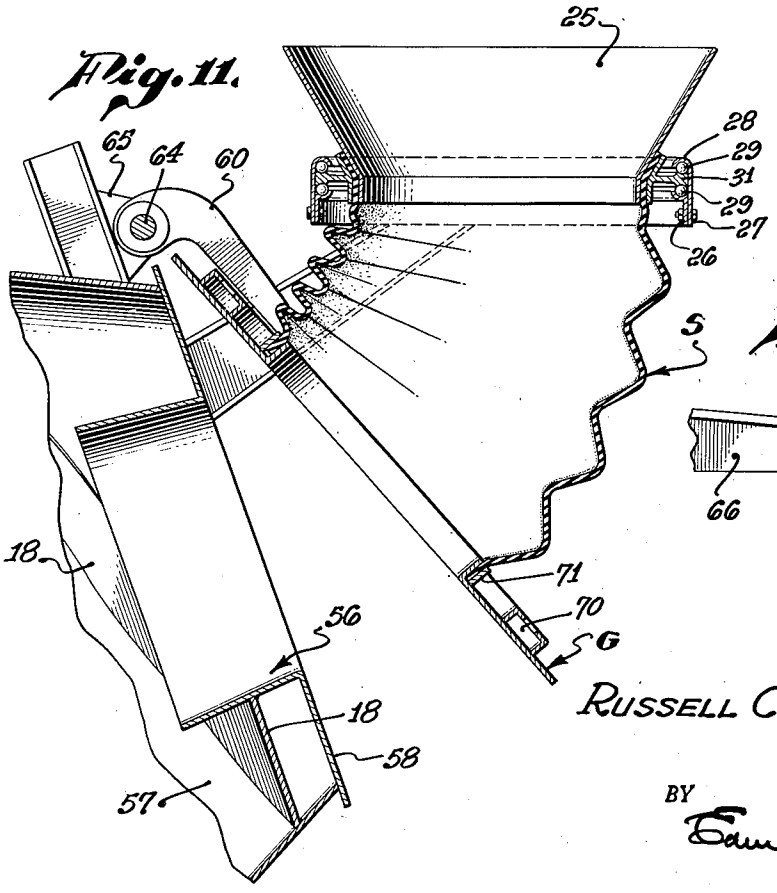
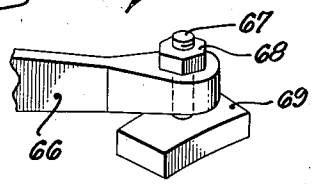


Fig. 13.



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Patented Mar. 18, 1952

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UNITED STATES PATENT OFFICE

2,589,492

LOADING AND DISTRIBUTING MEANS FOR CONCRETE MIXERS

Russell C. Graham, Sierra Madre, Calif.

Application September 6, 1949, Serial No. 114,256

20 Claims. (Cl. 259—161)

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My invention relates to concrete mixers particularly, although not necessarily, of the transit type which are mounted on a truck chassis and includes a mixing drum rotatable in one direction to effect mixture of its contents while the truck is in transit, and in the other direction to effect discharge of its mixed contents upon the truck reaching a construction job. In some types mixing of the drum's contents occurs only during the discharging operation as determined by the arrangement of the mixing blades in the drum.

To attain a high discharge the drum axis is inclined upwardly and rearwardly to a rear end opening in the drum with which is associated a hopper through which the drum is charged and in some cases discharged. There are two general types of hoppers, one which is revolvable on the drum to occupy a charging position and a discharging position, and another hingedly mounted to occupy charging position and an open position permitting discharge. To discharge the concrete at points remote from the drum as is necessary in most construction jobs, both types of hoppers employ a distributing chute since the point of discharge of the hopper is adjacent to the drum.

In the revolvable type of hopper it is held stationary by a latching device except when revolved by the drum to either charging or discharging position. Therefore, since the mixing drum is continuously rotating in one direction or the other, a sealed connection is required between the drum and the hopper to allow drum rotation without hopper rotation. It is this connection which requires frequent repair to prevent leakage of grout from between the drum and hopper, since the parts of the connection are subject to rapid wear. Accordingly, the maintenance costs are considerable not to mention the nonuse of the mixer incident to such repair.

In the case of the hingedly mounted hopper, it too has a sealed connection with the drum while in charging position to allow rotation of the drum when mixing and yet permit the hopper to remain stationary. Therefore, the same disadvantages here arise as with the connection for the revolvable hopper.

It is a purpose of my invention to provide a concrete loading and distributing means for a concrete mixer which combines in a single unitary structure both the functions of a hopper and a chute to attain a high discharge and at various points remote from the mixing drum. This loading and distributing means includes a spout or

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conduit which is flexible to allow it to be moved from a loading or charging position to various distributing or discharging positions, and in all of its positions it is permanently connected to and mounted for rotation with the mixing drum. The connection of the spout with the drum, however, is such that no parts thereof are relatively rotatable to produce resultant wear, and therefore a sealed union between the drum and spout is maintained to eliminate frequent repair or replacement of such parts and the costs incident thereto.

It is also a purpose of my invention to provide a spout or conduit which is constructed of rubber or any other pliable and tough material, so that under rotative movement by the mixing drum the spout when in charging or loading position, in which it assumes a bent form, is constantly flexed to prevent dry and particularly wet concrete from adhering to its inner wall to insure complete passage of all of the concrete through the spout and into the drum.

A further purpose of my invention is the provision of a spout or conduit having on its inner wall projections in a spiral form which are operable under rotation of the spout when in charging position to provide a positive feed of concrete material through the spout, and when in discharging or distributing position to provide a positive feed of the mixed concrete through and outwardly of the spout.

Still another purpose of my invention is the provision of a spout, which, while rotatably mounted, is connected to the mixing drum for rotation thereby only when in charging position so as to utilize the constant flexing motion imparted thereto to prevent adherence of wet concrete to the inner wall thereof, and the internal projections to impel the concrete through the spout and into the drum.

I will describe only two forms of loading and distributing means, and one form of loading means for a concrete mixer, each embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing in side elevation a truck mixer having applied thereto one form of loading and distributing means embodying my invention, such means being shown in charging position for loading the drum.

Fig. 2 is an enlarged vertical sectional view through a portion of the mixing drum, and the loading and distributing means of my invention in the same position as shown in Fig. 1.

Fig. 3 is an enlarged horizontal sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged vertical sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a view similar to Fig. 2 showing the loading and distributing means in one of its discharging positions.

Fig. 6 is a top plan view of the loading and distributing means in association with the mixing drum, and illustrating in broken lines the lateral positions to which the spout may be moved.

Fig. 7 is a side elevational view showing another form of loading and distributing means embodying my invention in applied position to a mixing drum, and in charging position for loading the drum.

Fig. 8 is a view similar to Fig. 7 showing the spout in one of its discharging positions for distributing cement from the drum.

Fig. 9 is a view similar to Fig. 7 showing a third form of my invention, and constituting a loading means for the mixing drum.

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9.

Fig. 11 is an enlarged vertical sectional view taken on the line 11—11 of Fig. 10, and showing the gate in open position as distinguished from the closed position shown in Fig. 9.

Fig. 12 is an enlarged vertical sectional view taken on the line 12—12 of Fig. 10.

Fig. 13 is an enlarged fragmentary detail perspective view showing the connection between one of the arms and the corresponding shoe of the supporting mechanism shown in Fig. 10.

Having specific reference to the drawings, the form of my invention shown in Figs. 1 to 6, is shown as applied to a conventional type of transit mixer including a mixing drum 15 mounted on a truck chassis 16 for rotation in either direction about an axis inclined upwardly and rearwardly, with the rear end of the drum provided with an opening 17 through which the drum is adapted to be loaded or charged with concrete either in dry or wet form, and from which the mixed concrete is adapted to be discharged for distribution to a construction job.

As shown in Fig. 5, the drum 15 contains blades 18 which are arranged to charge the drum with concrete and mix the same therein only when the drum is rotated in one direction. When the drum is rotated in the other direction the blades function to discharge the mixed concrete from the drum through the opening 17. It will be understood, of course, that my invention in all of its embodiments is not only applicable to drums having the above described blade arrangement, but also to drums having a blade arrangement which functions to mix the concrete as the drum is rotated to discharge the same therefrom.

The embodiment of my invention shown in Figs. 1 to 6, comprises a flexible spout or conduit S which is constructed of rubber or any other tough material having the requisite wearing properties and yet the desired flexibility. While the spout may be made with a smooth inner surface, it is desirable, for a purpose to be described hereinafter, that it be formed with a spiral pleat or fold so as to provide on its inner surface ridges or projections 19 with intervening grooves 20 which extend spirally of the spout, and preferably continuously from end to end.

To maintain the projections and grooves in a spiral arrangement even when the spout is turning, a spiral spring 21 is arranged about the spout with its convolutions disposed in the grooves 20, and the spring ends suitably secured to maintain its spiral form and rotate with the spout.

As best shown in Fig. 2, the spout S, at its lower end, is secured to the drum 15 in surrounding relation to the opening 17 by a band 22 which clamps the spout end to a collar 23 formed on the drum. Thus the spout is secured at one end of the drum for rotation therewith in either direction. The upper end of the spout is mounted for rotation about its own axis by securing it between an annulus 24 and a funnel 25, the annulus in turn, being revolvable in a support T. This support is made up of inner and outer rings 26 and 27 which are bent to form outer races 28 for two series of ball bearings 29 between which inner races 30 are formed on an annular flange 31 extending laterally from the annulus 24.

While I have shown and described the support T as embodying ball bearings, it is to be understood that wheels may be employed in substitution for the balls should they be found more desirable for the purpose.

The support T is universally adjustable to occupy various positions both horizontally and vertically by the provision of a manually operable mechanism mounted on and actuatable from the rear end of the truck chassis. This mechanism may comprise a pair of beams 32 secured to and rising from the rear end of the chassis, and disposed at opposite sides of the drum 15. The upper ends of the beams have lower ears 33 fixed thereon and on which bellcrank levers 34 are fulcrumed as at 35. One arm of each lever is provided with an ear 36 pivotally connected as at 37 on an axis at right angles to its fulcrum, to the lower end of a link 38 extending upwardly to one side of the spout S where, by a short link 39, it is pivotally connected to a projection 40 formed on the ring 27. These pivots are indicated at 38*a* and 39*a*, and they are at right angles to each other as shown.

The other arm of each lever 34 is pivotally connected to the upper end of a rod 41, and the lower end of the rod is connected to a crank 42 fixed on a cross shaft 43 provided at one end with a hand wheel 44 for rotating the shaft to actuate both of the rods through the cranks.

The beams 32 also have upper ears 45 to which short links 46 are connected, and these links, in turn, are pivoted to the lower ends of long links 47. The upper ends of the links 47 are pivotally connected to the short links 48 with the latter, in turn, connected to ears 49 on the ring 27. The mounting of the links 47 is substantially identical to the mounting of the links 38, and thus both pairs of links are capable of universal movement to, in turn, support the bearing support T and, hence, the spout end and funnel 25 for universal adjustment to occupy various vertical and horizontal positions in the charging and discharging of the drum with concrete.

The links 38 are movable in vertical planes through movement of the rods 41 lengthwise under rotation of the cranks 42 by the shaft 43, to secure any vertical positioning of the spout and its support T. However, to obtain various horizontal or lateral positions of the spout, the spout is manually pushed in either direction, as illustrated in Fig. 6, the links 38 and 47 permitting of such movements.

In practice, when loading the drum 15 the spout S occupies the charging position shown

in Fig. 1 so that wet or dry concrete can be poured into the funnel 25 from a source of supply situated above the spout. During this loading operation the drum is driven in the direction indicated by the arrow in Figs. 1 and 2, and the lower end of the spout being secured to the drum and its upper end rotatably mounted in the support T, the entire spout is rotated by the drum to cause the spiral projections 19 and grooves 20 to be rotated in such direction as to impel the concrete downwardly through the spout and into the drum. Thus the projections cooperate with the grooves to produce a positive feed of the concrete through the spout.

Concurrently with this feeding operation the spout, because of its mounting and the curved form that it now assumes, is, under rotation thereof by the drum, constantly flexed inwardly and outwardly and particularly at the lower side thereof. This prevents the concrete, especially when wet, from adhering to the walls of the spout to insure uninterrupted flow of the concrete through the spout.

The functioning of the spout during a charging operation as above described, manifestly accelerates loading of the drum, leaves no concrete in the spout, and, in point of fact, assists in mixing the concrete due to the tumbling action to which it is subjected by the rotative and flexing movements of the spout.

When unloading the drum at a construction job, it is driven in the opposite direction from that when loading to cause the concrete to be ejected from the drum and into the spout. Prior to such drum rotation the wheel 44 is rotated to actuate the links 47 so as to lower the support T and, hence, the spout S to the position shown in Figs. 5 and 6, for example, wherein the spout is extended substantially horizontally from the rear of the drum. As indicated in broken lines in Fig. 6, the spout can, if necessary, be pushed laterally in either direction to position the funnel at any point desired to discharge the concrete into any particular form or other receptacle.

Once the spout has been positioned as required the drum is set into operation, causing rotation of the spout in the support so as to turn the projections 19 in such direction as to impel the concrete outwardly through the spout and into the form. If it is desired to distribute the concrete along a form this can be readily effected by moving the funnel end of the spout horizontally in either direction. Incident to this discharging operation the spout is constantly flexed as it rotates to loosen any wet or dry concrete which may otherwise adhere to it and thus impede its free flow through the spout.

As against prior truck mixers having a hopper and a chute, and wherein the hopper has a rotative connection with the drum so as to provide a non-leakable seal between the hopper and the drum and yet allow rotation of the latter while the hopper remains stationary, the form of my invention just described provides two distinct advantages. One is that the spout is permanently connected and mounted to rotate with drum at all times, thus eliminating any relatively rotatable parts to produce friction and consequent wear, and to maintain a permanent seal between the spout and drum. The other advantage provided is that a high discharge is attained without the use of a chute, since it is evident that the spout in any of its discharging positions is at and may be even above the level of the drum discharge. Not only is a high discharge attained, but a discharge at various distances from the drum depending upon the length of the spout employed and the degree to which it is extended from the drum. This, of course, permits pouring of concrete into forms or receptacles situated remotely from the mixer, and heretofore accessible only by the use of a chute. Not only is the spout useable on mixers of the type shown in Fig. 1, but also on mixers in which the drum is at a low elevation and rotatable about a horizontal axis, since the spout through the mechanism provided can be elevated at its discharge end to effect a high as well as a remote discharge.

Referring now to Figs. 7 and 8, I have here shown another form of loading and distributing means for a transit mixer, which is identical to the first form except as to the mechanism for supporting and moving the bearing support T to cause the spout S to occupy charging and discharging positions. The present mechanism affords adjustment of the spout only in a vertical plane to provide the same advantages as to loading and distributing except those attained as a result of the horizontal adjustment.

The only difference in the two mechanisms is that in the present mechanism the short links 39, 46, 48 are not employed. Instead, one arm 34a of the bellcrank levers 34 is extended to the ears 40 and connected thereto by pins 50 to provide horizontal pivots. Links 51 connect the ears 45 and 49 through horizontal pins 52 and 53.

Manifestly, with the links 51 and the levers 34 mounted to swing about horizontal pivots, rotation of the hand wheel 44 operates to swing the levers vertically for moving the spout to or from the charging position shown in Fig. 7, to or from the lowest discharging position shown in Fig. 8, or to higher discharging positions as will be evident.

In Figs. 9 to 13 I have shown a third form of my invention which embodies the same construction of flexible spout S but without the spring 21, since it is not necessary particularly to maintain the pleats in the spout as the spout is rotatable with the drum only when the latter is being charged. Also, the upper end of the spout and the funnel 25 are rotatably mounted in the same support T, but the outer ring 27 of the support is fixedly supported on a pair of beams 54 secured to and inclined upwardly from beams 55 rising from the chassis 16.

The beams 54 and 55 are positioned at opposite sides of the mouth 56 of a mixing drum 57 so that the support T, the funnel 25 and the upper end of the spout are all supported horizontally in a plane above the mouth to allow charging of the drum with concrete from a point above the drum. The mouth 56 is inclined to the vertical and is bounded by an annular flange 58.

As best shown in Fig. 9 a hand wheel 59 is fixed on a shaft 60 supported on one of the beams 55, and this shaft is provided with a crank 61 to which the lower end of a rod link 62 is connected. The upper end of the link 62 is pivoted to a crank 63 fixed to a shaft 64 mounted in bearings 65 carried by the beam 55.

A pair of upwardly inclined arms 66 are fixed at their upper ends to the shaft 64, and their lower ends carry studs 67 and nuts 68 with shoes 69 fixed to the studs and positioned in a race 70 formed on the outer side of a gate G. This gate is in the form of a flat annulus, and its

outside diameter is equal to or greater than that of the flange 58.

Manifestly, by means of the arms 66 and the shoes 69, the gate G is supported not only for bodily movement to occupy the closed position shown in Fig. 9, or the open position shown in Fig. 11, through rotation of the shaft 64 by operation of the hand wheel 59, but it is rotatably mounted on the arms so that in closed position it can rotate with the mixing drum.

The lower end of the spout S is secured to the gate G by a ring 71 which clamps it to a collar 72 formed on the inner periphery of the gate. Thus, when the gate is in closed position, the rotative movement imparted to it by the rotating drum 57, causes rotation of the spout as a whole within the stationary support T.

In practice, when loading the drum 57 with wet or dry concrete, it is driven in such direction that the blades 18 therein operate to feed the concrete into the drum. With the gate G in closed position the lower end of the spout is extended so that the spout as a whole forms a continuation of the drum mouth, while the lower face of the gate is brought into firm driven contact with the flange 58. Thus the gate is set into rotation and with it the spout, so that the spiral pleats in the latter now operate to impel the concrete discharged from above into the funnel 25, through the spout and into the drum. Due to the flexing of the spout as it rotates, the concrete, wet or dry, is prevented from adhering to the spout wall, thus insuring a constant and complete passage of the concrete through the spout.

Once the drum is loaded the gate is swung to open position thereby lifting the lower end of the spout and opening the drum mouth so that upon rotation of the drum in the other direction for discharging, the concrets will be expelled from the mouth and beneath the spout.

As in the other forms of my invention the driving connection between the drum and the spout, while not permanent is such as to provide an effective seal between the drum and the gate when the latter is closed, and as the gate and the shoes 69 are the only parts of the connection subject to excessive wear, they can be easily, inexpensively and quickly replaced when required.

What I claim is:

1. In combination: a concrete mixing drum rotatable in either direction about a substantially horizontal axis, and having a charging and discharging opening therein; means in said drum responsive to rotation thereof in one direction for discharging concrete from the drum through said opening; a flexible spout coupled permanently at one end to said drum at said opening for rotation with the drum; and means supporting the other end of said spout for rotation and various transverse movements independently of the drum.

2. In a concrete mixer: a rotatable mixing drum having an opening for charging and discharging the drum; a flexible spout fixedly connected at one end to said drum at the opening thereof for rotation with the drum; means supporting the other end of the spout for rotation about its own axis; and mechanism for moving said means to cause the corresponding end of the spout to occupy a position for charging and various positions for discharging.

3. In a concrete mixer: a rotatable mixing drum having an opening for charging and discharging the drum; and a conduit connected to said drum for rotation therewith, and flexible to occupy different positions for charging and discharging of the drum through said conduit; and means within the spout operating when the latter is rotating and in discharging position to feed concrete through and out of the spout.

4. In a concrete mixer: a rotatable mixing drum having an opening for charging and discharging the drum; and a conduit connected to said drum for rotation therewith, and flexible to occupy different positions for charging and discharging of the drum through said conduit; and spiral projections within the conduit operating when the latter is rotating and in discharging position to feed concrete through and out of the spout.

5. In a concrete mixer: a rotatable mixing drum having an end opening for charging and discharging the drum; a conduit of flexible material folded to form an internal spiral groove, and secured at one end to the drum for rotation therewith; and means supporting the other end of the conduit for axial rotation and transverse movement so that it can be laterally moved while rotating to occupy a position permitting charging of the drum from above, and another position permitting discharging of the drum.

6. In a concrete mixer: a rotatable mixing drum having an end opening for charging and discharging the drum; a conduit of flexible material folded to form an internal spiral groove, and secured at one end to the drum for rotation therewith; means supporting the other end of the conduit for axial rotation and transverse movements so that it can be laterally moved while rotating to occupy one position permitting charging of the drum from above, and another position permitting discharging of the drum; and mechanism operable to move said supporting means to either of said positions.

7. In a concrete mixer as embodied in claim 5, wherein a coiled spring is mounted on said conduit to preserve the folded form thereof.

8. A combination as embodied in claim 1, wherein said spout is provided interiorly with means operating under rotation of the drum in one direction for positively feeding material through the spout in charging the drum, and in the other direction for positively feeding the concrete through and from the spout when discharging the drum.

9. A combination as embodied in claim 8, wherein the means interiorly of the spout comprises spiral projections.

10. In a transit mixer; a rotatable drum having an opening, a spout of pliable material secured at one end to said drum so as to surround said opening and rotate with the drum; and means for mounting the other end of the spout for rotation about an axis which is shiftable to cause the spout end to occupy various positions laterally with respect to the other end of the spout.

11. In a transit mixer; a rotatable drum having an opening, a spout of pliable material secured at one end to said drum so as to surround said opening and rotate with the drum; means for mounting the other end of the spout for rotation about its own axis; and mechanism for supporting said mounting means so that it can be shifted to cause the spout end to occupy various positions laterally with respect to the other end of the spout.

12. A loading and distributing means for

transit concrete mixers; including a spout of pliable material; means adapted for securing one end of the spout to a mixing drum for rotation therewith; and means for mounting the other end of the spout for rotation about an axis which is movable to cause the spout end to occupy various positions laterally with respect to the drum end of the spout.

13. A loading and distributing means for transit concrete mixers; including a spout of pliable material folded to form a spiral pleat interiorly thereof; means adapted for securing one end of the spout to a mixing drum for rotation therewith; and means for mounting the other end of the spout for rotation about an axis which is movable to cause the spout end to occupy various positions laterally with respect to the drum end of the spout.

14. A loading and distributing means for concrete mixers of the type having a drum provided with an opening and rotatable in one direction for mixing concrete introduced therein through the opening, and in the other direction for discharging the mixed concrete from the drum through the opening, including a flexible spout; means adapted to permanently couple one end of the spout to the drum for axial rotation therewith; a mounting for the other end of the spout in which it is axially rotatable; and mechanism by which said mounting can be so moved that said other spout end is adjustable in a vertical plane.

15. A loading and distributing means for concrete mixers of the type having a drum provided with an opening and rotatable in one direction for mixing concrete introduced therein through the opening, and in the other direction for discharging the mixed concrete from the drum through the opening, including a flexible spout; means adapted to permanently couple one end of the spout to the drum for axial rotation therewith; a mounting for the other end of the spout in which it is axially rotatable; and mechanism by which said mounting can be so moved that said other spout end is universally adjustable.

16. A loading and distributing means as embodied in claim 14, wherein said mechanism includes elements so correlated as to allow manual movement of said mounting and the spout end in any horizontal plane within the vertical range of adjustment of the spout end.

17. A loading and distributing means for concrete mixers of the type having a drum provided with an opening and rotatable in one direction for mixing concrete introduced therein through the opening, and in the other direction for discharging the mixed concrete from the drum through the opening, including a flexible spout; means adapted to permanently couple one end of the spout to the drum for axial rotation therewith; a mounting for the other end of the spout in which it is axially rotatable; and means within said spout operable to impel concrete therethrough in one direction or the other according as the spout is rotated in one direction or the other.

18. Loading means for a mixer having a rotary drum with a single charging and discharging opening, including: a spout of pliable material spirally pleated; means adapted for securing one end of the spout to the rotary drum for rotation therewith; and means rotatably supporting the other end of the spout.

19. In a concrete mixer: a rotatable drum having an opening; a flexible spout having one end fixed to the drum for rotation therewith in register with the drum opening; a support for the other end of said spout in which the latter is mounted for rotation about its own axis; a funnel fixed concentrically to and communicating with the other end of said spout so as to be rotatable therewith; a mechanism connected to the support and operable to move the support, the funnel and the last-named end of the spout to and hold them in various positions laterally with respect to the other end of the spout.

20. In a concrete mixer: a rotatable drum having an opening; a feed funnel having a discharge port; means rotatably mounting said funnel with said port in spaced relation to the drum opening; a longitudinally extensible and contractible spirally pleated spout having one of its ends fixed to said funnel for rotation therewith in register with the discharge port, and its other end drivably engaging the drum in register with its opening, whereby the drum may rotate the spout and said funnel; and means connected to the spout for extending and contracting the same, whereby to move its last named end into and out of engagement with the drum.

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