

Dec. 9, 1941.

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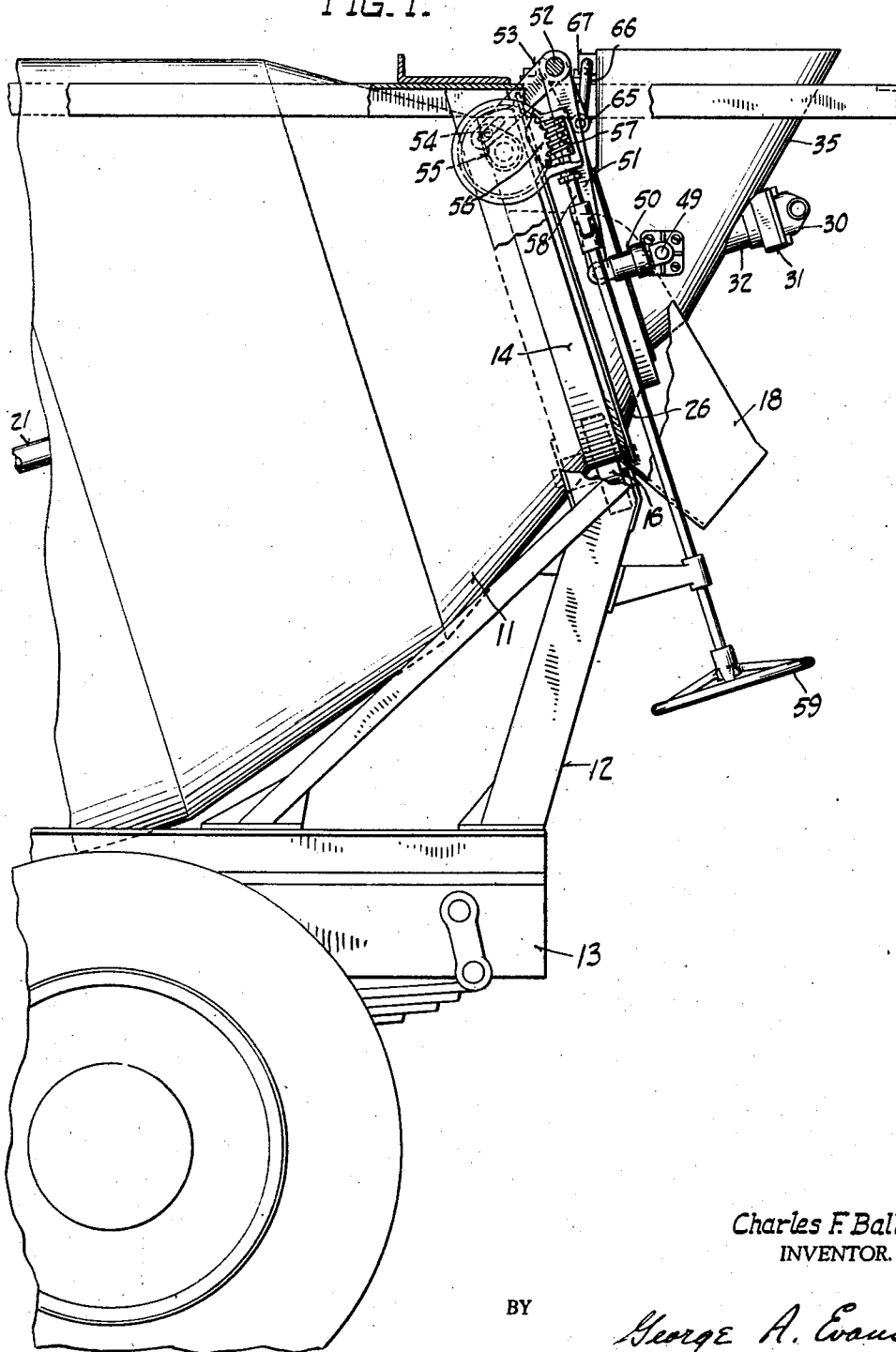
2,265,751

CHARGING DEVICE FOR TRUCK MIXERS

Filed Dec. 6, 1939

4 Sheets-Sheet 1

FIG. 1.



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4 Sheets-Sheet 2

FIG. 2.

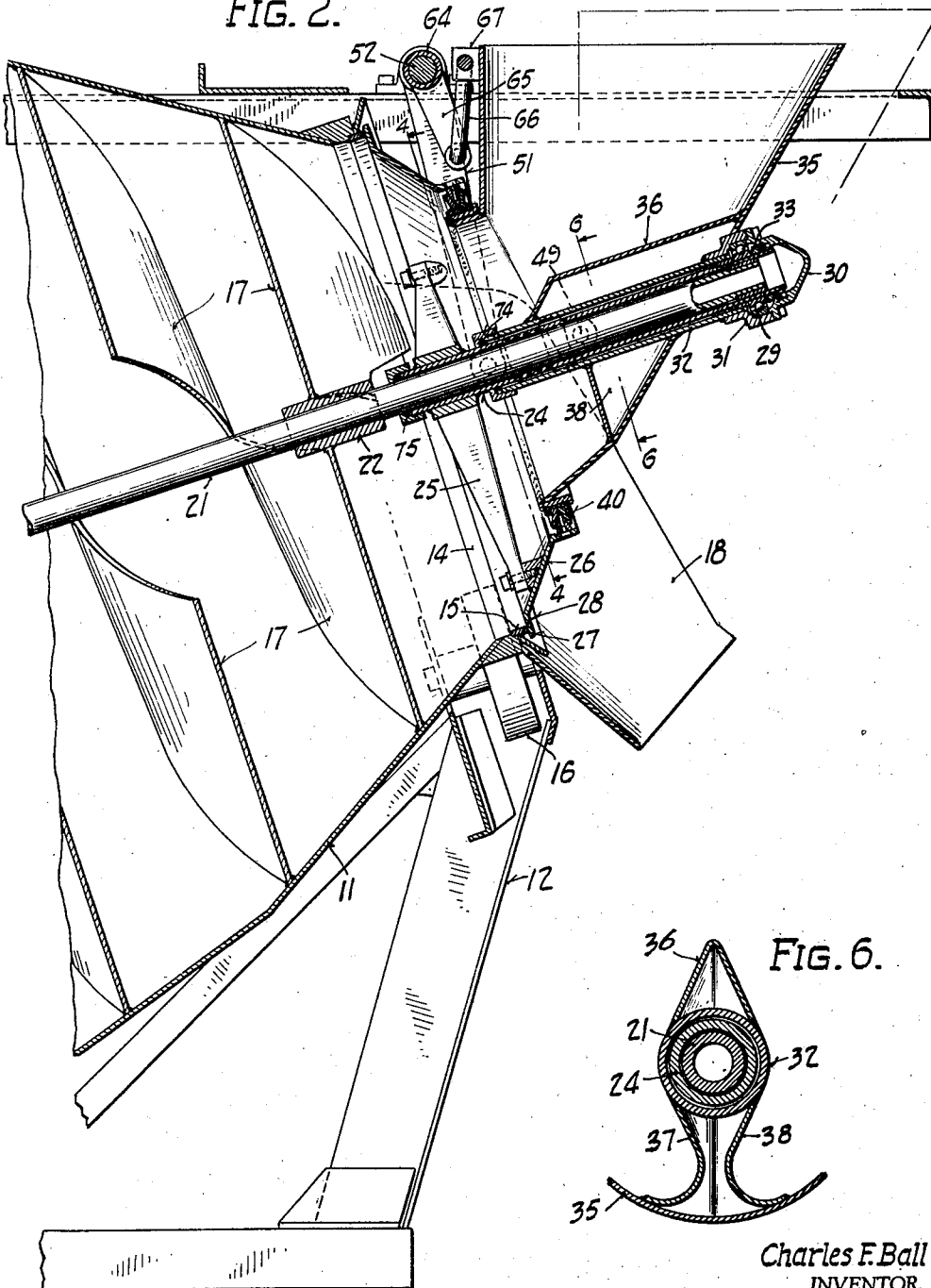
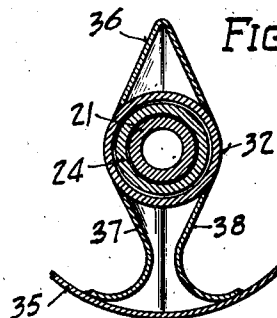


FIG. 6.



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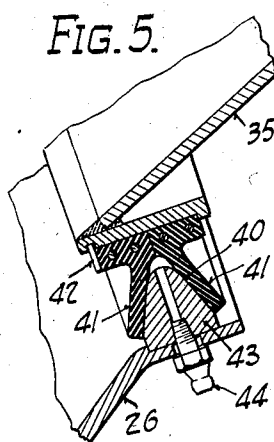
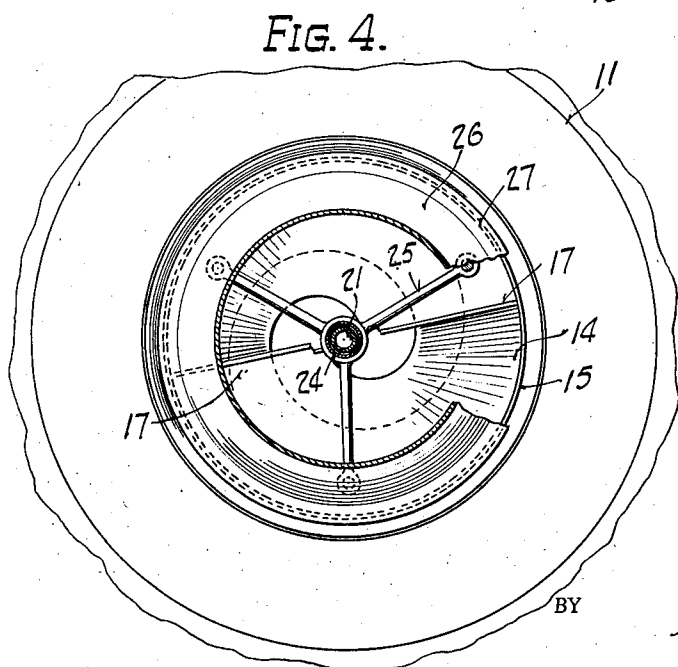
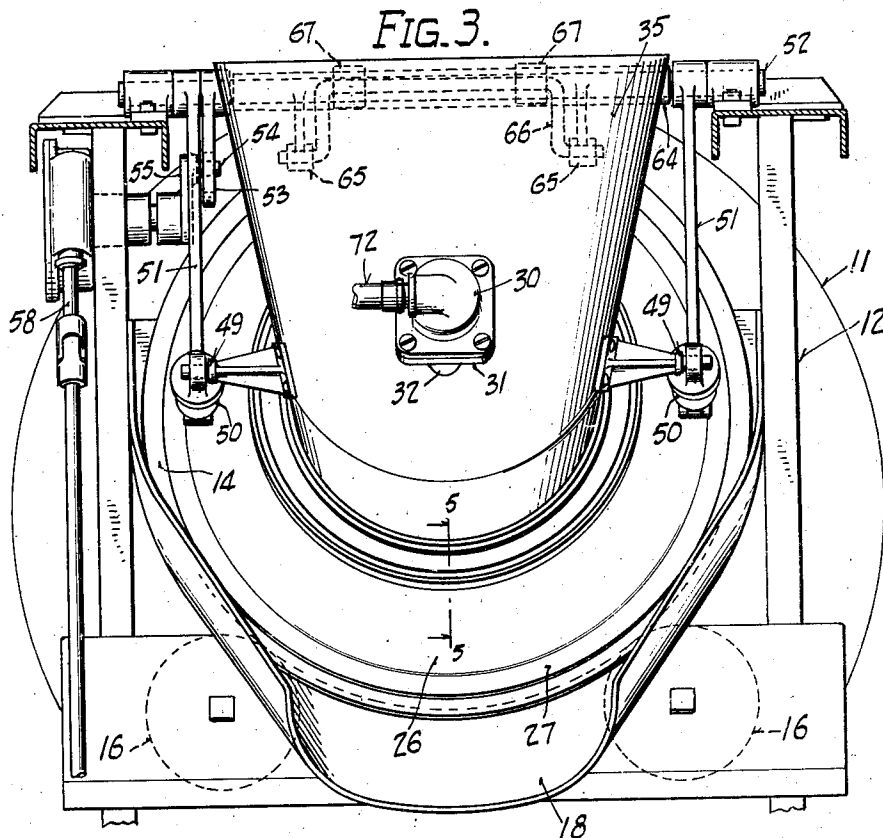
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4 Sheets-Sheet 3



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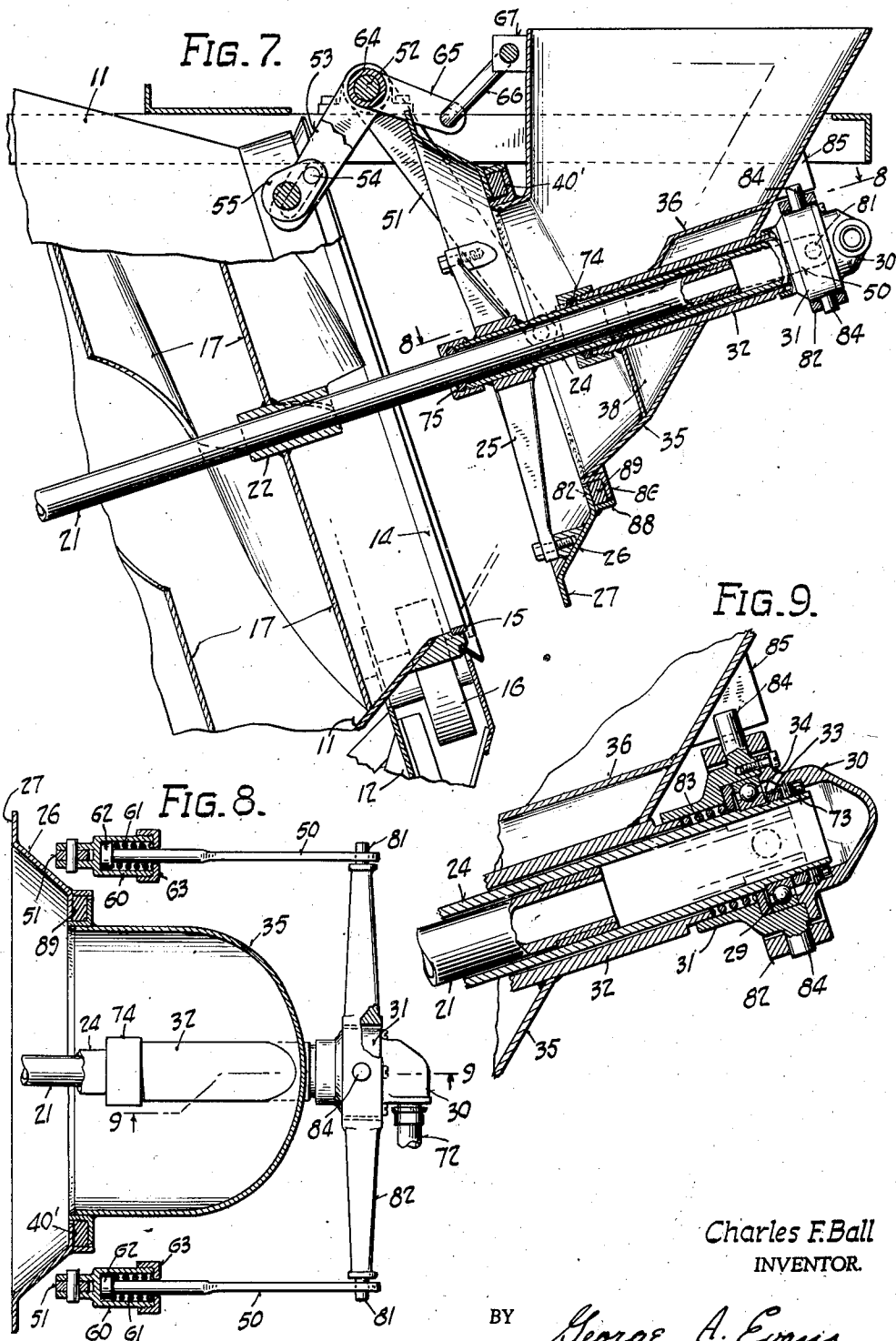
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CHARGING DEVICE FOR TRUCK MIXERS

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4 Sheets-Sheet 4



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2,265,751

CHARGING DEVICE FOR TRUCK MIXERS

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Application December 6, 1939, Serial No. 307,784

19 Claims. (Cl. 259—164)

This invention relates to concrete mixers and particularly truck mixers in which a rotatable mixing drum is mounted on a motor truck for transportation purposes. In such mixers, it is customary to arrange the axis of the drum longitudinally of the truck with the forward end adjacent the cab, closed, and the opposite end, at the rear of the truck, provided with an opening for discharging the mixed concrete. This opening has also been used for charging the drum, spiral blades being arranged within the drum for moving material toward or away from said opening depending upon the direction of rotation of the drum.

It is an object of the present invention to provide new and improved means for charging a drum of the type referred to, whereby a large percentage of the drum's volume may be filled with concrete material and the time required for charging and discharging reduced to a minimum.

A further object of the invention is to provide a charging hopper for mixer drums, which may be moved into co-operating position with an end discharge opening, and when in this position maintained under pressure in such sealed-tight relationship with the drum that the latter may be rotated, not only in the mixing direction, but also in a discharge direction and material worked back into the hopper by the drum blades, from whence it may return to the drum under gravity action. Accordingly it is possible not only to obtain end to end mixing action during rotation opposite to that of normal mixing, but also to observe and sample through the hopper, prior to discharge of the drum contents, the mixed concrete which has been moved into the hopper as aforesaid.

Another object of the invention is to provide a charging device of rugged construction mounted in such a manner with respect to the frame of the truck mixer that road shocks may be absorbed and a minimal of wear result between the charging device and its seat on the mixer drum.

With the above objects in view, the invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined in the appended claims.

Two embodiments of the invention are shown in the accompanying drawings in which like numbers are used to designate like parts in all views, and in which

Figure 1 is a side elevation of the rear portion of a truck mixer showing an embodiment of the invention;

Figure 2 is a central longitudinal section of the device shown in Figure 1;

Figure 3 is a rear elevation of the device shown in Figure 2;

Figure 4 is a transverse section taken on the line 4—4 of Figure 2;

Figure 5 is a detailed section of the seal taken on the line 5—5 of Figure 3;

Figure 6 is a transverse section through the hopper taken on the line 6—6 of Figure 2;

Figure 7 is a section similar to Figure 2 showing a modified form of the invention;

Figure 8 is a section taken on line 8—8 of Figure 7; and

Figure 9 is an enlarged central section taken on the line 9—9 of Figure 8.

Referring to Fig. 1 of the drawings, the numeral 11 designates the mixer drum which is mounted for rotation on a frame 12 carried by the chassis of the motor truck 13. The forward parts of the drum and truck are not shown, it being understood that the forward end of the drum is closed and is supported by a bearing housed in the frame 12. An example of such a truck mixer and drum is shown in U. S. Patent 2,045,532, issued June 23, 1936, to J. C. Merwin and C. F. Ball, the drum in that patent being rotated on an inclined axis with the rear or discharge end higher than the forward end. While the present invention is particularly useful with drums having a high end discharged as shown in said patent, it is by no means limited to such applications, but may be utilized to obtain greatly improved results with drums which are rotated on a horizontal axis.

The rear portion of drum 11 is frusto-conical, providing an open end 14 to which is secured a flange or bearing ring 15, arranged axially of the drum and co-operating with rollers 16 mounted on frame 12. Spiral blades 17 within the drum are designed to move concrete from the opening toward the closed end when the drum is rotated in one direction, and upon reversal of the direction of rotation, to move concrete from the drum through the opening. The diameter of the opening 14 may be of substantial size, a suitable diameter being about thirty-four inches for a mixer drum having a capacity of approximately four cubic yards of material, such an opening insuring rapid charging and discharging. Surrounding the sides and bottom of the drum opening 14 is a chute 18 for directing concrete discharged from the drum, said chute being disposed beneath the opening so as not to interfere with the charging device hereinafter described.

Extending along the axis of the drum, through the opening 14 is a tubular member or shaft 21 which is supported by and rigidly connected to the interior of the drum by means of an annular boss 22 secured to blades 17. In the drawing, tubular member 21 extends through the opening 14 and its rearward end communicates with a source of water supply.

Concentric of tubular member 21 is a second tubular member or sleeve 24 carrying a spider 25 to which is connected an annular member or pressure plate 26 having a flanged portion 27 arranged transversely of the axis of drum rotation. The outer periphery of the flange 27 seats against the flange 15 of the drum and forms a seal 28. At the rearward end of the sleeve 24 a radial thrust bearing 29 is provided which is retained by a cap 30 which may be used as water supply fitting, and which is attached to a housing 31 mounted on a third tubular member or sleeve 32, sleeve 32 being arranged concentrically of sleeve 24 and tube 21. By means of bearing 29, thrust may be transferred from sleeve 32 inwardly to sleeve 24 along the axis of tube 21. Similarly thrust for moving sleeve 24 outwardly of the drum may be taken through bearing 29 and nut 33 threaded to the end of sleeve 24. For locking the bearing in its cage, the outer surface of nut 33 is splined and a lock washer 34 is inserted between the bearing and the nut.

A hopper or feeding device 35 is rigidly associated with sleeve 32, said sleeve extending transversely of the hopper slightly below the middle thereof. As clearly shown on Figures 2 and 3, the three concentric tubular members 21, 24 and 32 extend through the hopper with the bearing 29 disposed behind the rear wall of the hopper where it is easily accessible. Above the sleeve 32, within the hopper, is a deflecting plate or fin 36 having a peaked top, whereas on the opposite or underside of sleeve 32 are a pair of symmetrical plates 37 and 38 meeting to form a fairly sharp forward edge and flared out at the bottom to merge with the wall of the hopper. Plates 36, 37 and 38, best shown in Figure 6, afford a stream-lined deflector for material through the hopper and prevent material from collecting around the tubular members.

The inner portion of hopper 35, which presents a face radial of the drum axis is provided with a perimetric seal 40 to permit relative rotation between the annular member 26 and the hopper without leakage of concrete. As best shown in Figure 5, a pair of flexible members 41 are assembled to provide an annular channel, the sides of which extend radially from the hopper. Members 41 are retained on the end of the hopper by a split ring 42 and straddle a tapered or spreading ring 43 extending inwardly from annular member 26. Grease fittings, such as 44, communicating with the space at the bottom of the annular channel may be arranged in the ring 43 to supply lubricant for the seal 40.

For moving the feeding device into and out of charging position, a pair of trunnions 49 are disposed at opposite sides of the hopper, these trunnions being in approximate transverse alignment with the basic supporting tube 21. Each trunnion is pivoted in one end of a link 50, the opposite end of which is pinned to an arm 51 secured to a transverse shaft 52 pivoted at the top of frame 12. Shaft 52 is actuated by an arm 53 which is slotted and engages a pin 54 carried by a crank 55 keyed to a worm wheel 56. The worm wheel is driven by a worm 57 mounted on 75

a rod 58 operatively connected to a hand wheel 59 located in a convenient position for manual operation. By means of the linkage described, rotation of the hand wheel causes the hopper and the annular member 26 to move in an axial direction with respect to the drum, such motion being along the line of tubular member 21 upon which the feeding device is mounted. To equalize the pressure on both sides of the hopper and to absorb road shocks and strains caused by tilting of the frame, each link 50 may be made in two parts with one telescoping the other. This arrangement is best illustrated in Figure 8, which, although it relates to a modified form of the invention, discloses a section through the same spring assembly as is employed in the form shown in Figure 1. The portion of link 50 which is pinned to the arm 51 terminates in a tubular housing 60 enclosing a coil spring 61 interposed between a flanged portion or seat 62 (at the forward end of the portion of link 50 attached to the trunnion) and a cap 63 threaded on the end of the housing. Consequently when force is applied to draw the hopper toward the drum, pressure is exerted from cap 62 through the spring 61 to seat 62, which pulls the hopper toward the left on the drawings. Conversely when the hopper is moved from the drum, the shoulder at the bottom of the housing 60 abuts against the seat 62 and moves the link 50 to the right.

The upper portion of the hopper is held against torque by a parallel link mechanism which includes a sleeve 64 mounted on shaft 52, pendant arms 65 carried near the opposite ends of said sleeve and a U-shaped rod 66, which is pinned to the lower extremities of arms 65 and journaled on bearings 67 mounted on the hopper. This mechanism will resist torque and at the same time enable the hopper to be moved on the tubular member 21.

As previously stated, member 21 may be utilized as a water conduit in which case it is tubular with the inner end extending well into the drum where it may be protected by a type of valve means, well known in the art, for preventing concrete from working back into the pipe. At the outer end of the pipe, bolted to the bearing housing 31, is a cap 30 to which is connected a flexible hose 72 communicating with the source of water supply. A packing seal 73 is disposed between cap 71 and the tubular member 24. Packing seals are also provided between sleeves 24 and 32 as at 74 and between sleeve 24 and tube 21 as at 75 to permit relative rotation and prevent concrete from entering the sleeves, seal 75 also acting as a wiper to remove concrete collecting on the tube 21.

The operation of the device is as follows:

When it is desired to charge the drum, the hand wheel 59 is turned to swing shaft 52 in a clockwise direction as shown in Fig. 1. The force is transmitted through the back of the hopper and draws the sleeve 32 and the hopper toward the drum. This force is likewise transmitted through the bearing 29 to move the sleeve 24 toward the left on the pipe 21. Eventually upon sufficient translation of sleeve 24 and spider 28, annular member 26 will be drawn into tight contact with the end of the drum. During such translation the hopper will be moved a similar distance so the seal 40 will at all times be maintained.

After material is charged, the drum is rotated and the pressure at the seal 28 is sufficient to cause the annular member 26 to rotate with the

drum, said member running in the seal 40 between it and the hopper 35 which remains stationary. These seals are so effective that material may be charged well above the lower edge of seal 28 and consequently the drum may be charged while it is rotated to cause a shrinkage of the mix and enable larger volumes to be charged.

It will be observed that the spiral blades 17 which extend nearly to the end of the drum form tortuous passages through which material is moved, the direction of movement axially of the drum depending upon the direction of rotation. During rotation in a discharge direction, each blade will at one time in the course of its movement form a chute sloping toward the opening 14, while at the same time, the other blade, which has progressed beyond this position, forms part of a passage leading back into the drum. Hopper 35, by providing a space communicating with these two passages permits the concrete to be moved into the hopper and thence back to the drum, the bottom of the hopper and the bottom of the cone portion of the drum forming an inclined surface sloping downwardly toward the closed or forward end of the drum. By providing a drum which rotates on an inclined axis, this back and forth movement is still further improved. Moreover, with an inclined drum end charging is facilitated since the bottom of the charging passage is more nearly vertical than with a machine rotated on a horizontal axis.

To discharge the drum, the hopper and associated members are moved to the dotted line at the right, shown on Figure 2, by rotating the hand wheel 59 in the appropriate direction. The mixed concrete is then worked out through the opening 14 by the blades 17 and falls into the chute 13.

In Figures 7, 8 and 9 a modified form of the invention is shown in which the links 59 associated with the actuating mechanism are not connected to trunnions carried by the hopper 35, but are extended and house bearings 31 at the ends of a transverse horizontal bar 32 disposed behind the hopper. Midway of bar 32 is an aperture which contains the bearing assembly, shown in detail in Figure 9, in most respects similar to that in the form first described, but differing essentially in the fact that the housing 31 is not attached to the hopper, but is spaced therefrom by a spring 33 which is seated against the outer end of sleeve 32 associated with the hopper. The bearing assembly is linked to the transverse member 32 by pins 34 extending in vertical alignment from the bearing housing 31 through apertures in the transverse member. A pair of lugs 35 attached to the back of the hopper form keepers limiting rotation of the housing 31 by straddling the outer portion of pin 34 on the upper side of the housing. Slight clearance is provided between the member 32 and the bearing housing in order that member 32 may pivot on the pins 34.

A somewhat modified form of seal 40' is also employed between the pressure plate 26 and the hopper, since under the action of spring 33 the hopper is forced axially of the drum against the pressure plate. To facilitate this action, a radially extending flange 36 is formed on the end of the hopper adjacent the pressure plate, and the pressure plate is turned inwardly of the hopper so as to provide a radial face 37 parallel to the flange 36 and spaced a short distance on the drum side thereof. Another flange 38 extends

axially across the bottom of the packing space and a packing member 39 of generally rectangular cross section is interposed within the space thus provided.

In operation, force which is applied to move the hopper into charging position acts through bearing 29 to seat plate 26 against the drum, the means employed to effect which are the same as in the form first described. Continuously, pressure is applied through the spring 33 to urge the hopper toward the plate to maintain a seal 40' against which the plate may run while the hopper remains stationary.

With either embodiment of the invention, the objects originally stated may be obtained. Neither embodiment is intended to limit the scope of the invention, which is to be limited solely by the following claims.

I claim:

1. In combination with a rotatable mixing drum having an opening in one end thereof, a shaft arranged axially of said drum and said opening, a charging device slidably mounted on said shaft, but held against rotation therewith, a pressure plate disposed between said opening and said charging device, means for moving said pressure plate and charging device into cooperative position for charging said drum, said pressure plate being held under pressure against said drum to cause it to rotate therewith, and sealing means between said pressure plate and said charging device.

2. In combination, with a rotatable mixing drum having an opening in one end thereof, a shaft arranged axially of said drum and said opening, an annular member slidably mounted on said shaft having a portion disposed to enclose said opening, a hopper carried by said annular member and co-operating therewith for charging said drum, a seal between said annular member and said hopper and means for applying pressure to seat said annular member fixedly against said drum and to maintain said hopper stationary during rotation of said annular member with said drum.

3. In combination with a rotatable mixing drum having an opening in one end thereof, a shaft arranged axially of said drum opening, a first tubular member slidably mounted on said first shaft, a pressure plate carried by said tubular member and arranged to seal said opening, a second tubular member journaled on said first tubular member, a hopper mounted on said second tubular member, a running seal between said hopper and pressure plate and means for moving said pressure plate and hopper axially of said shaft into charging position and exerting pressure thereon, whereby said pressure plate may be held under pressure to rotate with said drum while said hopper is being held stationary and said pressure plate runs in said seal.

4. In combination with a rotatable mixing drum having an end opening and a shaft arranged axially thereof, a first tubular member slidably mounted on said shaft, a pressure plate carried by said first tubular member with its outer edge arranged to enclose said drum opening, a hopper journaled on said first tubular member and a radial thrust bearing disposed between said first and second tubular members through which pressure may be applied to cause said plate to seal the drum opening.

5. In combination with a rotatable mixing drum having an opening at one end thereof, a tubular member mounted in said drum and ex-

tending axially therefrom, a hopper slidably mounted on said tubular member but spaced axially from said drum, an intermediate member rotatably mounted on said tubular member confining the space between said drum and said hopper, a bearing between said hopper and said intermediate member and means associated with said hopper for retaining said bearing and for exerting pressure through said bearing to cause said intermediate member to move with said hopper toward and away from said drum.

6. In combination with a rotatable mixing drum having an opening at one end thereof, a shaft arranged axially of said drum, a charging hopper slidably mounted on said shaft and a deflector disposed within said hopper for directing material around said shaft.

7. A charging device for concrete mixers comprising a shaft arranged axially and exteriorly of one end of the mixer drum, a hopper slidably mounted on said shaft, trunnions extending transversely of said shaft at opposite sides of said hopper and operatively connected to said hopper to move it into and out of charging position, and actuating mechanism including compressible links associated with each trunnion for equalizing the pressure applied on the trunnions.

8. In a mixing machine which has an open-end, rotatable drum and a shaft extending axially thereof, a charging device comprising a tubular member slidably mounted on said shaft, a spider and annular plate mounted on said tubular member, a second tubular member mounted on said first tubular member, a hopper mounted on said second tubular member and a bearing disposed between said first and second tubular members rearwardly and outside of said hopper.

9. In a machine for mixing concrete, a drum mounted for rotation on a fixed axis, one end of said drum having an opening for materials and the interior of the drum being provided with agitation-inducing blades terminating at the opening and disposed to produce movement of the material toward said opening during rotation of the drum in one direction; a member mounted exteriorly of the drum and movable to and from said opening, said member when in position contiguous to the opening providing a zone beyond the opening for receiving without discharge material worked to said opening by blade action during rotation in said direction, and from which zone said material will be constantly returned by gravity to the drum thereby producing an endwise mixing action without discharge of the material during rotation in said direction; and means for moving said member away from the opening to cause discharge of the mixture from the latter.

10. In a machine for mixing concrete, a drum mounted for rotation on a fixed axis, one end of said drum having an opening for materials and the interior of the drum being provided with agitation-inducing blades defining passages leading to said opening; a hopper for charging materials into the drum, movable longitudinally thereof to and from a charging position axially spaced from the drum opening; an annular member intermediate the drum and hopper and movable with the latter to and from engagement with the end portion of the drum, said member and hopper in the charging position providing a space beyond the drum opening into which the materials may be received from said drum passages during

agitation and from which space they may be constantly returned to the drum by other of said passages; and means for moving said hopper and member to disengage the latter from the drum, whereby the mixture may be discharged through said opening.

11. In a machine for mixing concrete, a drum mounted for rotation on an inclined axis, the upper end of said drum having a full diameter opening for materials and the interior of the drum being provided with agitation-inducing blades disposed to produce movement of the material to said opening during rotation of the drum in one direction; a hopper having an opening of lesser diameter than said drum opening for charging materials therethrough into the drum, said hopper being movable longitudinally thereof to and from a charging position axially spaced from the drum opening; an frusto-conical annulus having its smaller end communicating with the hopper opening, said annulus being movable with the hopper to bring its larger end into communication with said drum opening in the charging position of the hopper, in which position said annulus provides a zone beyond the drum opening into which the material may be moved by said blade action and from which zone the material will be constantly returned to the drum by gravity action; and means for moving said hopper and annulus away from said charging position, whereby the mixture may be discharged from the drum through its opening by said blade action.

12. In a machine for mixing concrete having a rotatable mixing drum provided with an end opening for materials, a charging hopper having a discharge opening disposed complementarily to but axially spaced from the drum opening, said hopper being mounted for rectilinear movements toward and from the drum opening; an annular member rotatable relative to said hopper and rectilinearly movable therewith, said member extending from said hopper opening toward the drum opening; and means for moving said hopper and member to engage the latter with the drum to constitute an extension thereof and to produce rotation of said member.

13. In a machine for mixing concrete, a rotatable mixing drum having an opening in one end thereof for charging and discharging materials; a charging hopper having a discharge opening of smaller diameter than said drum opening disposed complementarily to and axially spaced from said drum opening, said hopper being mounted for rectilinear movements toward and from the drum opening; a frusto-conical member rectilinearly movable with said hopper and rotatable relative thereto, disposed between the hopper and drum openings; means for moving said hopper and member to engage the latter with the drum whereby it may rotate therewith; and a running seal between said member and hopper.

14. In combination with a rotatable mixing drum having an opening in one end thereof and a shaft integral with said drum extending axially and outwardly from said opening, a charging device slidably mounted on said shaft, a substantially frusto-conical pressure plate disposed between said drum and said charging device with its larger end arranged to enclose said drum opening, said plate also being slidably mounted on said shaft, but being free to rotate with respect to said charging device, and means for applying pressure to seat said pressure plate against

said drum in order that it may rotate therewith.

15. In a truck mixer having a frame and an open-end, rotatable mixing drum mounted thereon, a shaft arranged axially of said drum, a sleeve slidably mounted on said shaft and carrying a substantially frusto-conical plate with its larger end arranged to enclose said drum opening, a hopper constantly maintained in upright position journaled on said sleeve with its lower end enclosing the smaller end of said plate, an annular seal between said plate and said hopper, a bearing between said hopper and said sleeve, and actuating mechanism mounted on said frame for moving said hopper and said plate into charging position and for maintaining said plate in pressural engagement with said drum so that it may rotate therewith.

16. In combination with a rotatable-mixing drum having a charging opening in one end thereof; a charging duct arranged to be aligned with said opening, but spaced axially therefrom; a rotatable, material-conducting member disposed between said duct and said drum and arranged to enclose said drum opening, means for applying pressure to maintain said duct in proper charging position relative to said member and for accurately seating said member with respect to said drum, said member being movable with said duct into and out of charging position and being rotatable with said drum when in pressural contact therewith.

17. In combination with a rotatable mixing

drum having an opening at one end, a shaft axially mounted in said drum and extending exteriorly thereof, a charging hopper arranged to charge material through said opening and having an internal sleeve slidably mounted on said shaft, and means connecting the underside of said sleeve with the bottom of said hopper, said means directing material away from the space between said sleeve and said hopper.

18. A charging device for rotatable mixing drums provided with an end charging opening, said device comprising a substantially frusto-conical or dished annulus mounted adjacent said charging opening for rotation with the drum, a non-rotatable charging duct supported adjacent said annulus and having its discharge end disposed to pass material through the opening in said annulus, and sealing means between said duct and annulus.

19. In combination with a rotatable mixing drum having an end opening for charging and discharging materials and a shaft integral with said drum extending axially and outwardly from said opening, a charging hopper mounted on said shaft, a thrust bearing disposed between said shaft and said hopper rearwardly of said hopper, means exerting pressure through said bearing to urge said hopper toward said drum, means for retaining said hopper in upright position during drum rotation and a seal disposed between said hopper and said drum.

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