Oct. 31, 1950

J. D. FARRELL

2,527,538

CONCRETE MIXER

Filed Aug. 9, 1946

2 Sheets-Sheet 1

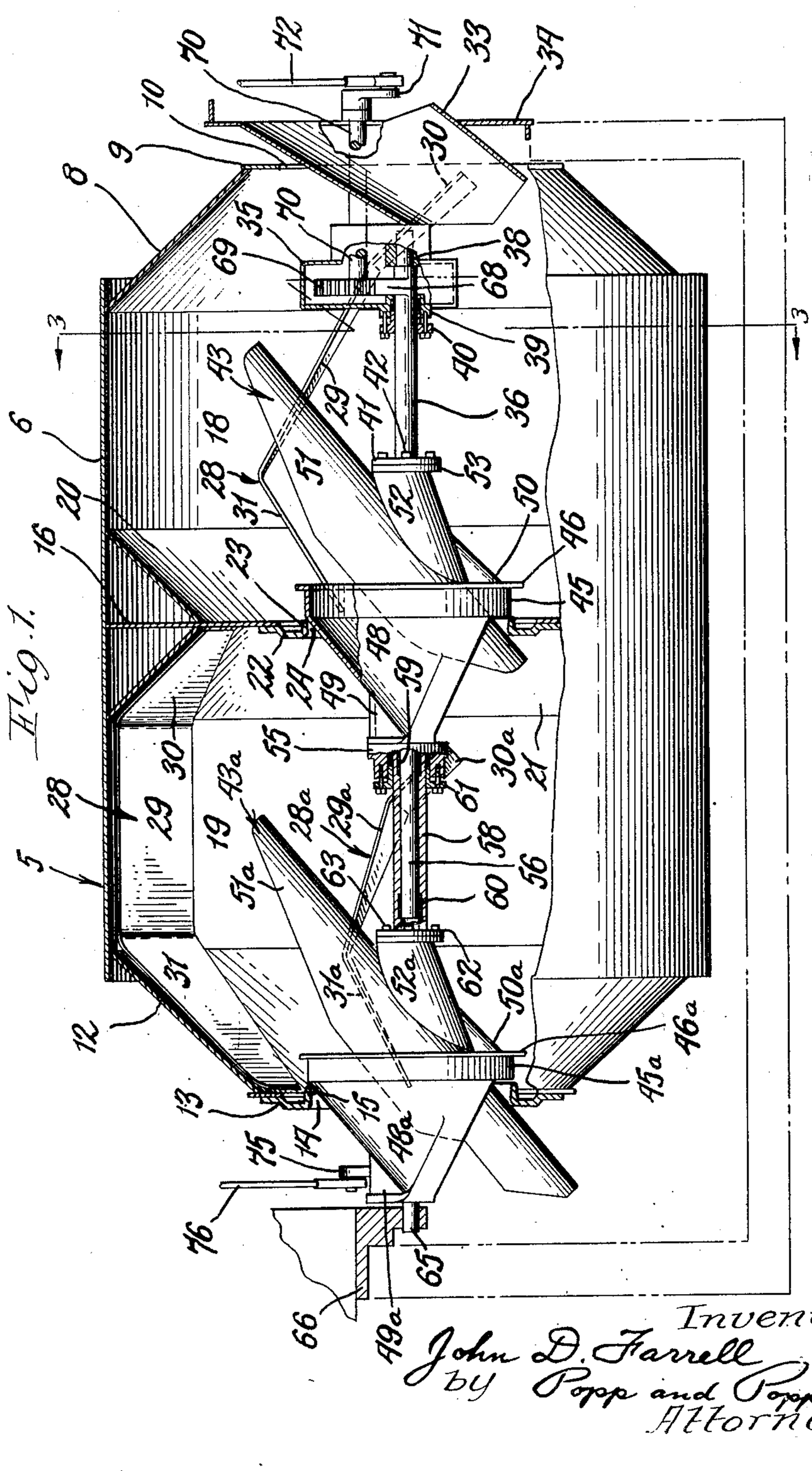

Fig. 1.

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Fig. 3.

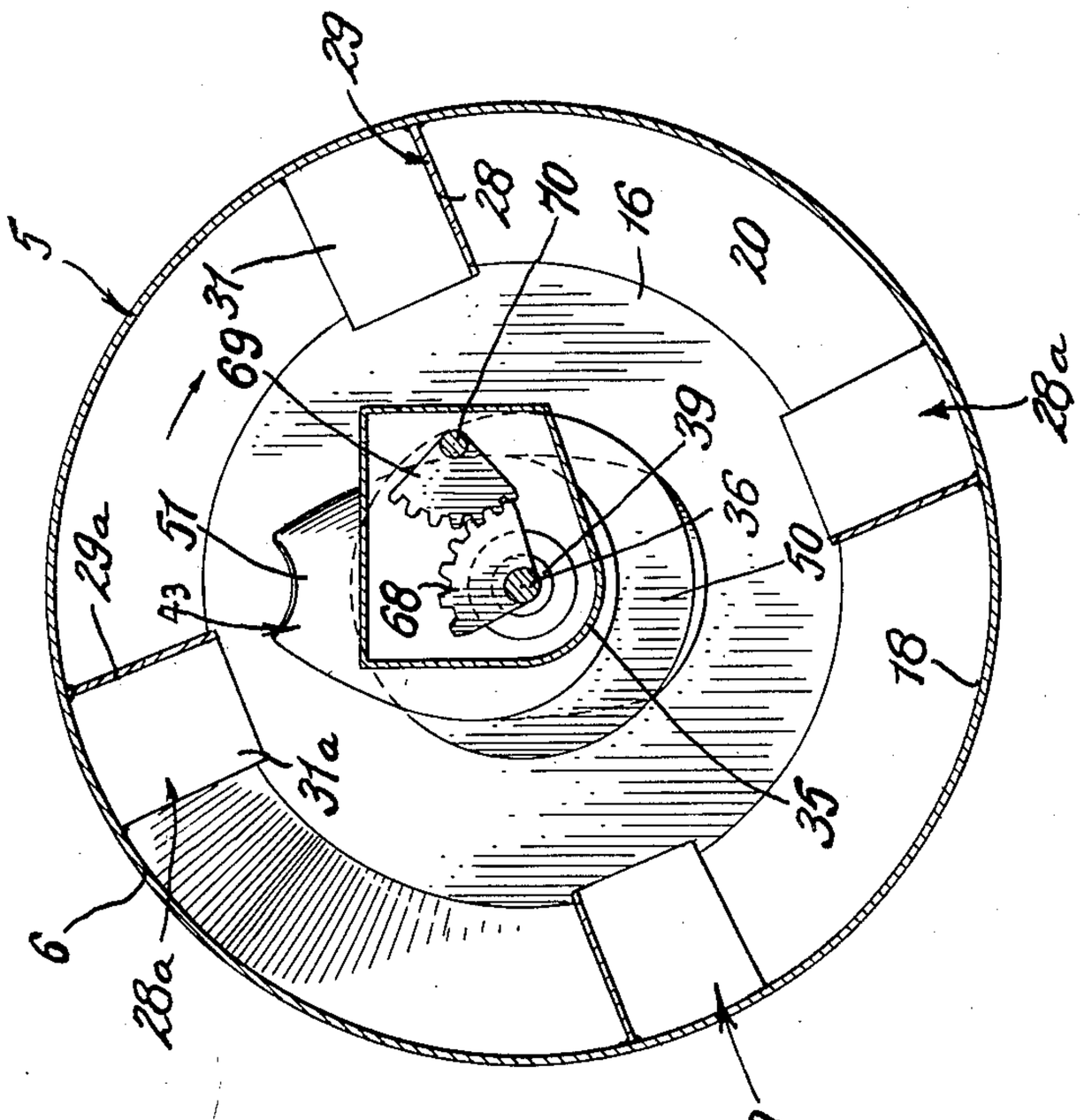
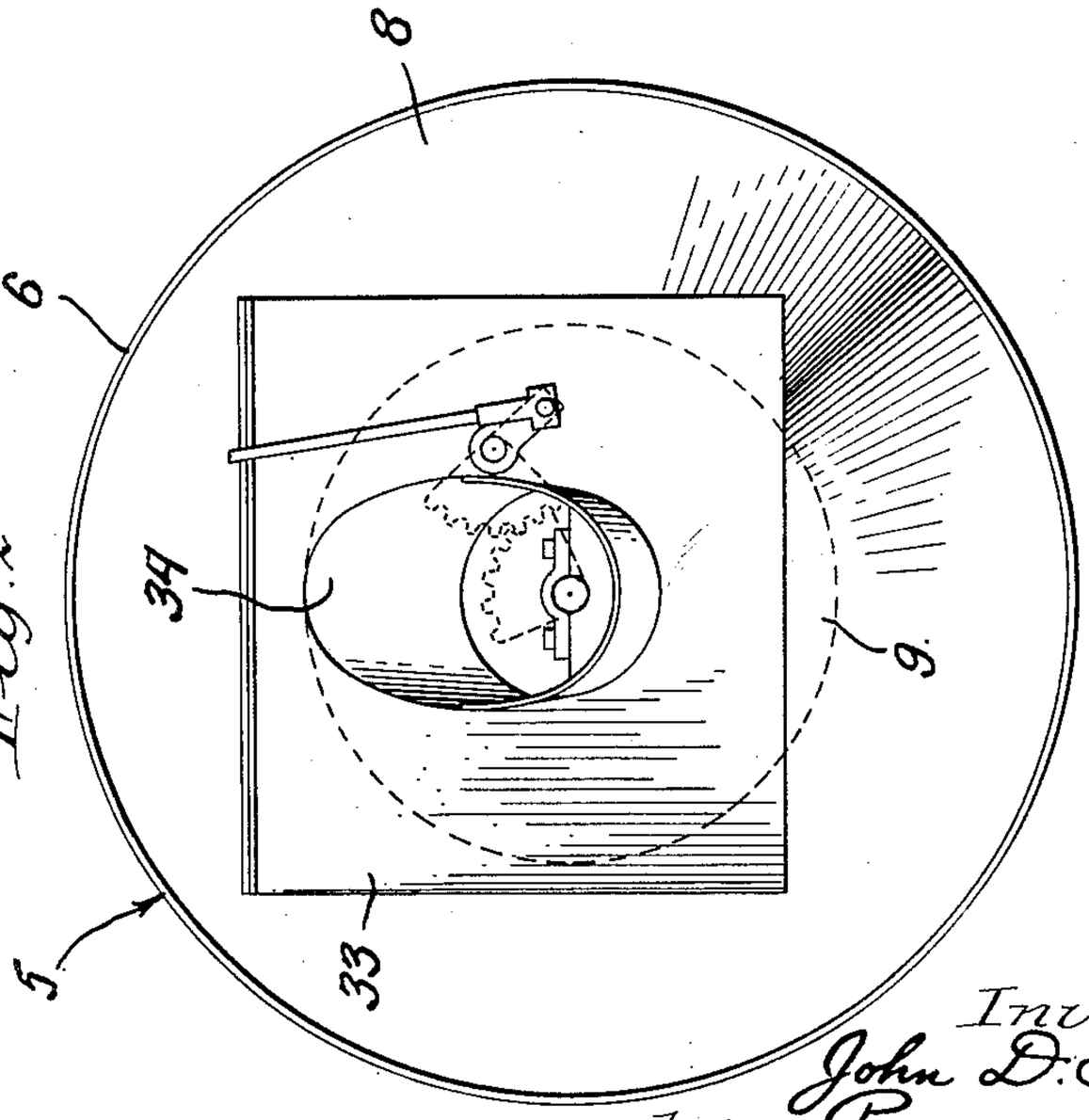


Fig. 2



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2,527,538

CONCRETE MIXER

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3 Claims. (Cl. 259—161)

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This invention relates to concrete mixers of the type embodying plural or double drum constructions in which the concrete aggregates are first introduced into one mixing drum or chamber and partially mixed therein and thereafter transferred to a second mixing drum or chamber wherein the mixing operation is completed, the mixed concrete aggregates being finally discharged from the second drum or chamber. More particularly, the invention relates to improvements in the mechanism for transferring the aggregates from drum to drum and for discharging the fully mixed aggregates from the second drum or chamber.

One of the principal objects of the invention is to provide a simple and effective joint mounting for the separately operable transfer and discharge chutes which effect, respectively, the transfer of the aggregates from the first to the second mixing drum, and the discharge of the fully mixed aggregates.

Another object is to jointly support such separately operable transfer chute and discharge chute from available stationary parts at opposite end openings of the double drum structure.

Another object is to provide such an aggregate transfer and discharge mechanism for a double drum mixer which avoids the necessity for special sealing means between the mechanism and the transfer and discharge openings of the double drum structure.

Another object is to provide such a mechanism in which the transfer chute control is arranged to extend through the inlet end opening of the double drum structure, and in which the discharge chute control is arranged to extend through the discharge opening thereof, and in which both controls are directly coupled to the respective chutes in a simple, strong and positive manner and without interferences with the mixing, transfer or discharge operations.

Other objects are to provide such a transfer and discharge mechanism which is simple and strong and which will stand up under conditions of severe and constant use without getting out of order or requiring repairs.

Other objects and advantages will appear from the following description and drawings in which

Fig. 1 is a fragmentary vertical section through the double drum of a double-drum concrete mixer and showing the aggregate transfer and discharge mechanism embodying the present invention.

Fig. 2 is an end elevation of a double drum shown in Fig. 1 and viewed from the inlet end thereof.

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Fig. 3 is a vertical transverse section taken on line 3—3, Fig. 1.

The double drum, indicated generally at 5, is mounted for continuous rotation about its axis and is driven in the direction of the arrows associated with Fig. 3 by any suitable means, the mounting and driving means for the double drum forming no part of the present invention and hence not being shown. The double drum is shown as comprising a cylindrical steel shell 6 provided at its inlet end with a frusto-conical end head 8 terminating in a ring 9 which forms an inlet opening 10, these parts being welded or otherwise secured together. At its opposite end the cylindrical shell 6 is provided with a frusto-conical end head 12 terminating in a ring 13 which forms a discharge opening 14, these parts like-wise being welded or otherwise secured together and the ring 13 having an inwardly projecting annular flange 15 which surrounds the discharge opening 14.

At its center the cylindrical shell is provided with an annular partition 16 which is welded at its periphery to the inside of the shell and which divides the shell into a first mixing compartment or chamber 18 and a second or final mixing compartment or chamber 19. The opposite sides of this partition 16 are reinforced by frusto-conical end heads 20 and 21, each being arranged in the corresponding compartment or chamber 18, 19 and welded at its opposite edges to the partition and to the inside of the cylindrical shell 6. The partition 16 is provided with a concentric circular opening and secured to the partition within the compartment or chamber 19 is a ring 22 having an annular flange 23 which forms a transfer opening 24 which is concentric with the axis of rotation of the double drum 5.

Each of the chambers or compartments 18, 19 are provided with an annular series of buckets or sweeps which are welded to the inside faces of the cylindrical shell 6 and the frusto-conical end heads and which serve both to lift successive increments of the aggregates in the bottom of each chamber or compartment to an elevation where they slide off to return to the bottom of the chamber and also to move the aggregate in each chamber axially back and forth, thereby to secure thorough, uniform and rapid mixture of the aggregates in each chamber, as well as to deliver the aggregate to the transfer and discharge chutes, as hereinafter described. These buckets or sweeps can be of any suitable form and are shown as being of two shapes or types designated at 28, 28*a*, arranged in alternation with each other around the interior of each compart-

ment or chamber 18, 19. The buckets or sweeps 28 of one type or shape are comparatively long, having a central portion 29 welded to the cylindrical shell 6 to extend at an angle or in generally helical relation thereto and end portions 30 and 31 which are arranged at obtuse angles to the central part 29 and to each other. The alternating buckets or sweeps 28*a* are of the same general form but shorter and hence the same reference numerals have been applied and distinguished by the suffix *a*. The sweeps 28, 28*a* extend inwardly from the inside walls of the compartments as shown in Fig. 3, and it will therefore be seen that as the drum rotates in the direction of the arrow associated with Fig. 3, each bucket or sweep picks up a part of the aggregates in the bottom of the corresponding compartment and lifts it to an elevation near the top of the drum where it falls back into the mass in a bottom of the drum. At the same time the helical angularity of the different portions of the sweeps 28, 28*a* moves the amounts picked up back and forth axially of the drum, this angularity tending, however, to move the portions being elevated toward the transfer or discharge ends of the compartments so that transfer and discharge of the contents of the compartments 18, 19 can be effected, as hereinafter described.

In the inlet opening 10 leading to the first compartment or chamber 18 is arranged a stationary tubular intake chute 33 which is shown as carried by a stationary supporting plate 34 arranged outside of the drum structure and as extending downwardly through the intake opening 10 into the first mixing compartment 18. The unmixed aggregates can be supplied to this intake chute by the usual skip (not shown) or in any other suitable manner.

A gear box 35 is mounted on this stationary intake chute 33 within the compartment 18, this gear box being fixed on this chute at the upper margin or rim of its discharge opening and in line with the axis of the double drum structure 5. In this gear box is journaled a transfer chute supporting shaft 36, the extremity of this shaft being journaled in a blind bearing 38 and the shaft extending through a bearing 39 protected by a gland or stuffing box 40. The transfer chute supporting shaft 36 is arranged coaxial with the double drum structure 5 and projects toward the transfer opening 24.

The opposite end of this transfer chute supporting shaft 36 has a collar 41 fixed thereto and this collar is secured, as by screws 42, to a transfer chute structure indicated generally at 43. This transfer chute structure is shown as comprising a ring 45 arranged in the chamber 18 in closely fitted relation to the margin of the transfer opening 24 to prevent the escape of aggregate therebetween and preferably flanged at its opposite end, as indicated at 46, for strength. This ring 45 has fixed thereto a hood 48 which projects into the compartment or chamber 19 and the extremity of this hood 48 is formed to provide a nose 49 having a face arranged perpendicular to the axis of the double drum structure and which it intersects. This ring 45 also has fixed to its lower side a wall 50 supporting a transfer chute 51. This transfer chute 51 is generally C-shaped in cross-section and in the operative position shown is arranged upright and at an angle of about 45°. The transfer chute structure is provided with a horizontal cylindrical extension 52 fixed to the underside of the transfer chute 51 and having fixed thereto an end collar 53 to which the collar 41 is secured by the screws 42.

An axial extending collar 55 and a stub shaft 56 are fast to the nose 49 of the transfer chute structure, both being coaxial with the axis of the double drum structure 5 and being in spaced relation to each other. The stub shaft 56 is journaled in a tube 58, bearings 59 and 60 being provided at opposite ends of this tube for this purpose.

The corresponding end of the tube 58 projects into the collar 55 and to protect the bearings 59 and 60 a stuffing box or gland 61 is provided on the collar 55 around the tube 58.

The opposite extremity of the tube 58 is shown as having a collar 62 fixed thereto and this collar is secured, as by screws 63, to a discharge chute structure indicated generally at 43*a*. This discharge chute structure 43*a* is substantially similar to the transfer chute structure and the same reference numerals have therefore been employed and distinguished by the suffix *a*, the description not being repeated.

The nose 49*a* carries a stub shaft 65 which is arranged coaxial with the axis of the double drum structure 5 and is journaled in a stationary part 66 of the mixer frame, which stationary part is arranged outside of the double drum structure 5 adjacent its discharge opening 15 and in line with the axis thereof.

As previously indicated, the transfer and discharge chute structures 43, 43*a* are separately movable into operative and inoperative positions. For this purpose the transfer chute, supporting shaft 36 is provided, within the gear box 35, with a segmental gear 68 which is fast thereto and meshes with a companion segmental gear 69 in the gear box 35 and fast to a control shaft 70. This control shaft is journaled in the gear box 35 and projects horizontally outwardly therefrom alongside the intake chute 33 and through the intake opening 10 of the double drum structure 5. Outside of the double drum structure this control shaft 70 has fast thereto an arm 71 to the free end of which is pivotally connected an operating shipper rod or link 72.

To operate the discharge chute assembly 43*a*, an arm 75 is fast to the nose 49*a* of this structure to project laterally therefrom and the free end of this arm is pivotally connected to an operating shipper rod or link 76.

In the operation of the concrete mixer as above described, it will be understood that the control can be manual, or under automatic control of the usual batchmeter set in operation by the elevation of the skip in charging the mixer.

It will also be understood that water is introduced into the charge of aggregates, and Portland cement admitted through the intake chute 33 to the first compartment 18, either under manual or batchmeter control. The double drum structure 5 rotates continuously while the mixer is in operation. It will also be assumed that the partly mixed charge has been transferred from the first chamber 18 to the second chamber 19 for further mixing and that the first chamber is to receive a charge.

In admitting the charge of aggregate, Portland cement and water through the intake chute 33, both the transfer chute 51 and the discharge chute 51*a* are in their inoperative position, this being with these chutes arranged in a horizontal position with their concave sides facing horizontally so that any aggregates falling upon the inlet ends of these chutes fall back into the same

chamber 18 or 19 instead of being conveyed by the chutes therefrom.

The charge of aggregate, Portland cement and water is then admitted through the intake chute 33 to the first mixing chamber 18, the second mixing chamber 19, under the condition assumed containing a partially mixed charge. In both chambers the buckets or sweeps 28, 28*a* rotate with the double drum structure 5 and lift successive increments of the charges in the bottoms of the compartments 18 and 19 to a point near the top thereof where the increments fall from the buckets or sweeps back to the charges in the bottoms of those chambers. At the same time, the helical arrangement and angular form of the buckets or sweeps 28, 28*a* operate to shift the elevated increments back and forth axially of the compartments to further insure intimate and uniform admixture thereof.

When the mixture of the charge in the second compartment 19 has been completed, the discharge chute 43*a* is rendered operative to discharge the mixture therefrom. For this purpose the control shipper rod or link 76 is actuated to oscillate the arm 75 fast to the nose 49*a* of the discharge chute structure 43*a* and so as to rotate the discharge chute 51*a* of this structure 90° from its horizontal inoperative position assumed to its vertical operative position shown in Fig. 1. In so moving, the discharge chute structure rotates in the bearing provided for its stub shaft 65 in the stationary frame part 66 and on the bearings 60 and 59 which journal its tube 58 on the stub shaft 56 of the transfer chute structure 43. As these bearings are coaxial with the axis of the double drum structure 5, the discharge chute 51*a* is rotated about this axis to its vertical position in which its concave side faces upwardly. The increments of the batch in the second compartment 19 being lifted by the buckets or sweeps 28, 28*a* therein, thereby fall into the discharge chute 51*a*, instead of falling back to the bottom of the compartment 19, and thence slide by gravity down this chute and out of the end discharge opening 15.

The angular form of the blades or sweeps 28, 28*a* in the compartment 19 insures the rapid discharge into the discharge chute 51*a* and when this discharge is completed the discharge chute 51*a* is moved to its inoperative position and the transfer chute 51 to its operative position. In moving the discharge chute to its inoperative position the shipper rod 76 is moved in a reverse direction to swing the arm 75 on the discharge chute assembly 90° and rotate the discharge chute structure 43*a* in the bearing for its stub shaft 65 and on shaft 56 so as to bring the discharge chute 51*a* to a horizontal position in which its concave side faces horizontally and hence is incapable of receiving and conveying the increments elevated by the buckets or sweeps 28, 28*a*. In moving the transfer chute 51 to its operative position the shipper rod 72 is actuated to rotate the arm 71 and control rod 70 a predetermined distance. This rotates the segmental gear 69 fast to this control shaft and the segmental gear 68 fast to the transfer chute supporting shaft 36. This rotates the transfer chute structure 43 about the axis of the double drum structure 5, this structure rotating in the bearings 38, and 60 and 59 provided in the stationary gear box 35 and in the tube 58 of the discharge chute assembly, respectively. This rotation of the transfer chute structure 43 is 90° so as to bring its chute 51 from the horizontal

inoperative position to the vertical position shown in Fig. 1, in which its concave side faces upwardly to receive the increments falling from the buckets or sweeps 28, 28*a* in the first compartment 18, these received increments sliding down this transfer chute into the second compartment 19.

After the partially mixed aggregate has been so discharged from the first compartment 18, the shipper rod 72 is moved in a reverse direction to return the transfer chute 51 to its horizontal inoperative position, the parts thereby being in the condition first assumed and the cycle being repeated by the introduction of another charge of aggregate, Portland cement and water through the intake chute 33 into the first mixing compartment 18.

From the foregoing it will be seen that the present invention provides a very simple, sturdy and amply protected mounting for the transfer and discharge chute structures, and which permits their independent operation, this mounting being achieved by the mutual support provided by the stub shaft 56 provided on one of these structures and journaled in the tube 58 provided by the other of these structures and by the separate end bearings for these structure provided in the stationary parts 35 and 66 adjacent the opposite end openings of the double drum structure 5.

I claim:

1. In a concrete mixer having a rotating mixing drum provided with an intake opening at one end, a discharge opening at its opposite end, a central transverse partition dividing said drum into a first compartment adjacent said intake opening and a second compartment adjacent said discharge opening and having a transfer opening alining with said intake and discharge openings and means for elevating increments of the batch in each compartment to a place near the top thereof and permitting them to fall, the combination therewith of means for transferring the batch of aggregate from said first to said second compartments and from said second compartment through said discharge opening, comprising a transfer chute arranged in said first compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said first compartment and to conduct them through said transfer opening, a discharge chute arranged in said second compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said second compartment and to conduct them through said discharge opening, means at said axis of said compartments rotatably connecting said chutes and holding them against angular displacement with reference to said axis, comprising a stub shaft rigidly secured to one of said chutes and journaled in a tube rigidly secured to the other of said chutes, said tube and stub shaft being coaxial with said axis, a stationary journal adjacent said intake opening and supporting the corresponding end of said transfer chute to rotate about said axis, a stationary journal adjacent said discharge opening and supporting the corresponding end of said discharge chute to rotate about said axis, and means for separately rotating said chutes about said axis.

2. In a concrete mixer having a rotating mixing drum provided with an intake opening at one end, a discharge opening at its opposite end, a central

transverse partition dividing said drum into a first compartment adjacent said intake opening and a second compartment adjacent said discharge opening and having a transfer opening alining with said intake and discharge openings and means for elevating increments of the batch in each compartment to a place near the top thereof and permitting them to fall, the combination therewith of means for transferring the batch of aggregate from said first to said second compartment and from said second compartment through said discharge opening, comprising a transfer chute arranged in said first compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said first compartment and to conduct them through said transfer opening, a discharge chute arranged in said second compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said second compartment and to conduct them through said discharge opening, means at said axis of said compartments rotatably connecting said chutes and holding them against angular displacement with reference to said axis, comprising a stub shaft rigidly secured to said transfer chute and extending into said second compartment and journaled in a tube rigidly secured to said discharge chute, said tube and stub shaft being coaxial with said axis, a stationary journal adjacent said intake opening and supporting the corresponding end of said transfer chute to rotate about said axis, a stationary journal adjacent said discharge opening and supporting the corresponding end of said discharge chute to rotate about said axis, and means for separately rotating said chutes about said axis.

3. In a concrete mixer having a rotating mixing drum provided with an intake opening at one end, a discharge opening at its opposite end, a central transverse partition dividing said drum into a first compartment adjacent said intake opening and a second compartment adjacent said discharge opening and having a transfer opening alining with said intake and discharge openings

and means for elevating increments of the batch in each compartment to a place near the top thereof and permitting them to fall, the combination therewith of means for transferring the batch of aggregate from said first to said second compartment and from said second compartment through said discharge opening, comprising a transfer chute arranged in said first compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said first compartment and to conduct them through said transfer opening, a discharge chute arranged in said second compartment at an angle to the axis thereof and rotatable about said axis to a position to receive said falling increments in said second compartment and to conduct them through said discharge opening, means at said axis of said compartments rotatably connecting said chutes and holding them against angular displacement with reference to said axis, comprising a stub shaft rigidly secured to one of said chutes and journaled in a tube rigidly secured to the other of said chutes, said tube and stub shaft being coaxial with said axis, and a stuffing box between said stub shaft and tube, a stationary journal adjacent said intake opening and supporting the corresponding end of said transfer chute to rotate about said axis, a stationary journal adjacent said discharge opening and supporting the corresponding end of said discharge chute to rotate about said axis, and means for separately rotating said chutes about said axis.

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