March 19, 1963 C. THIBODEAUX 3,081,983

CONCRETE MIXER

Filed Dec. 31, 1959 2 Sheets-Sheet 1

Fig. 4

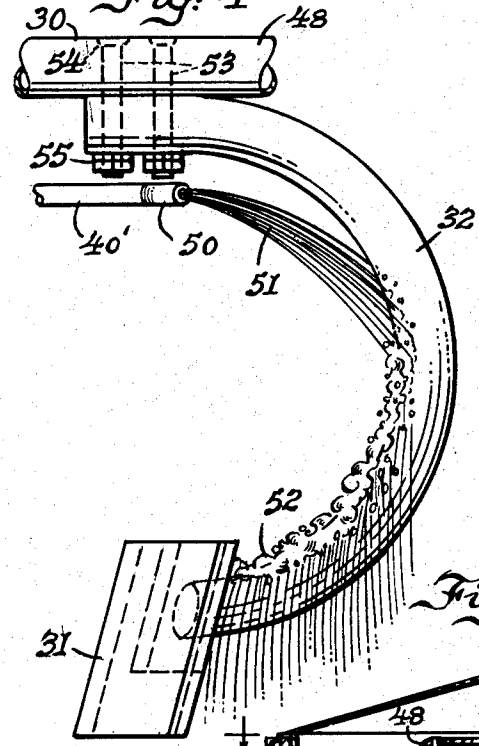


Fig. 5

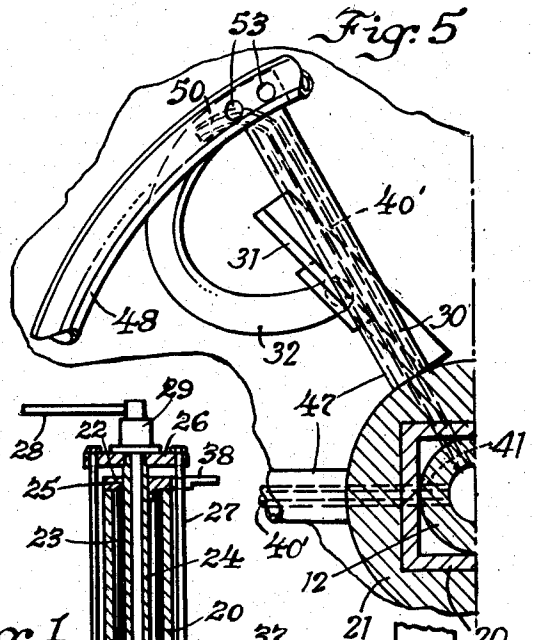
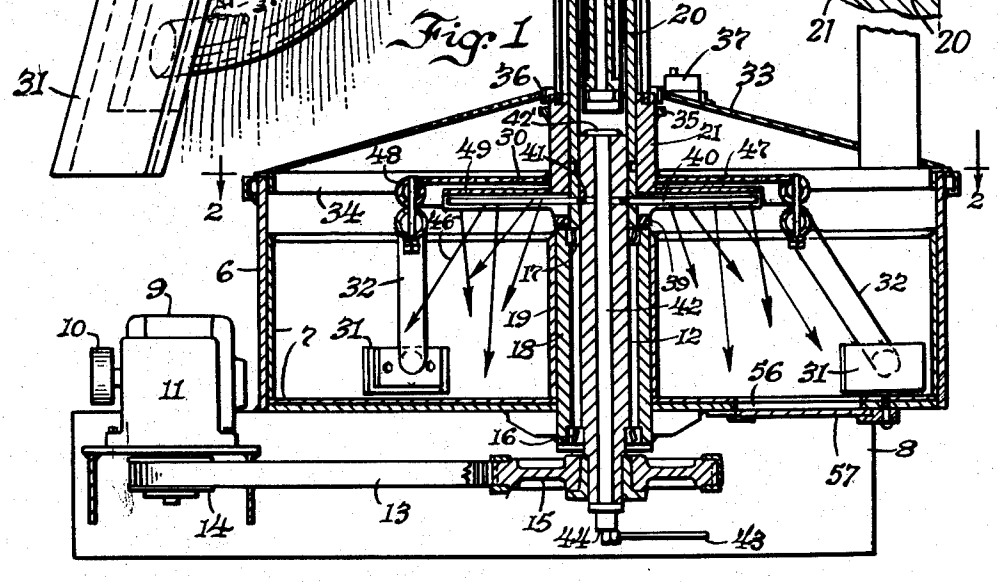


Fig. 1



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March 19, 1963 C. THIBODEAUX 3,081,983

CONCRETE MIXER

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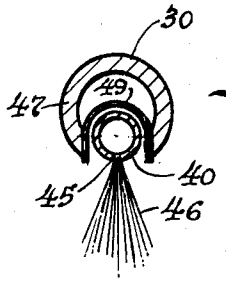
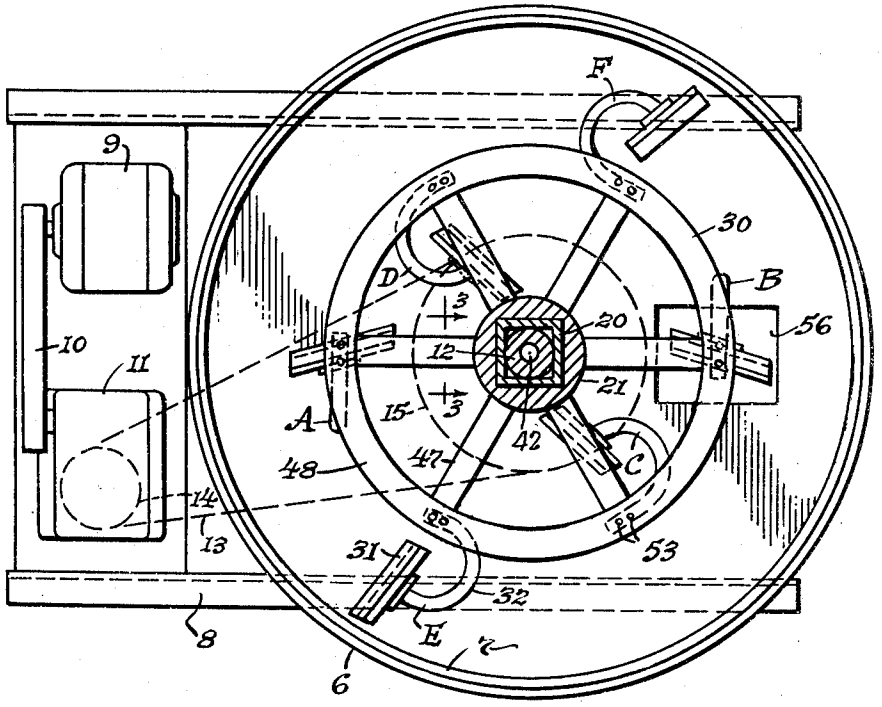


Fig. 3

Fig. 2



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CONCRETE MIXER

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11 Claims. (Cl. 259—178)

This invention relates to concrete mixers, and, in general, the concrete mixer of my invention is designed with a view to faster and more thorough mixing, greater safety in operation, and speedier and more thorough cleaning.

The concrete mixer of my invention, more specifically stated, incorporates the following novel features:

(1) The spider on which the mixing blades are mounted is raisable by hydraulic pressure out of the mixing tank or bowl to enable a workman to clean the mixing blades easily and thoroughly without having to enter the mixing bowl, thereby eliminating one of the biggest dangers of injury, and the mixing bowl with the blades retracted is much more easily cleaned, using only water for rinsing;

(2) A safety switch is provided on the cover of the mixer and arranged to be automatically thrown to open position when the mixing blades are retracted, to prevent the motor from running during the cleaning of the mixer, thereby eliminating another serious danger of injury to workmen;

(3) Water outlet pipes extend radially from the hollow rotatable center shaft or kelly-bar through which water for mixing with the concrete is delivered, the pipes being removably threaded in place to enable use of one set of pipes having a multiplicity of fine jet holes at different angles in longitudinally spaced relation for no-splash operation on dry material, and another set of pipes being provided having larger water discharge ports only in their outer ends for use with wet mixes, the pipes of either set remaining fixed when the spinder carrying the mixing blades is raised but turning with the spider when the blades are down in operative position, the radial arms of the spider being hollow and having downwardly opening channels in the bottoms thereof receiving the pipes so that these pipes are substantially enclosed when the mixing blades are down in the bowl;

(4) For wet mixes, the water pipes have their outer ends curved rearwardly with respect to the direction of rotation of the spider and each arranged to discharge a single stream onto the adjacent curved downwardly extending blade supporting arm, so that the arms serve more or less to conduct the flow into the material without splash, despite the increased amount of water being delivered, while at the same time introducing the water most advantageously into the material into each of the furrows directly behind the various blades as the furrows are formed thereby.

The invention is illustrated in the accompanying drawings, in which—

FIG. 1 is a central vertical section through a concrete mixer made in accordance with my invention;

FIG. 2 is a horizontal section on the line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional detail on the line 3—3 of FIG. 2, and

FIGS. 4 and 5 are a fragmentary side elevation and fragmentary plan view, respectively, showing how a water discharge pipe having a rearwardly curved outer end portion for discharging the water in a single large jet is arranged with respect to the curved downwardly projecting mixing blade supporting arm so that the arm directs the water with minimum splash into the material for most efficient mixing in relation to the operation of the mixing blades.

Similar reference numerals are applied to corresponding parts throughout the views.

Referring to the drawings, and at the outset mainly to FIGS. 1, 2 and 3, the reference numeral 6 designates the open top circular mixing tank or bowl having concentric inner and outer walls, as seen in FIGS. 1 and 2, with removable and replaceable wear resistant liner 7 suitably secured in the tank or bowl, the bowl resting on and being suitably secured to a base 8 on which an electric drive motor 9 is mounted, connected by means of a belt and pulleys, as indicated at 10, with a reduction gear unit 11 through which the drive is transmitted to a central vertical hollow shaft or kelly-bar 12 by means of a molded rubber belt 13 and pulleys 14 and 15. The center shaft or kelly-bar 12 is mounted in bearings 16 and 17 in a stationary hollow hub 18 provided in the center of the bowl 6, this hub defining the aforesaid "inner" wall of the tank or bowl and also having a wear resistant sleeve 19 provided thereon of similar material as the liner 7. A sleeve 20 of square cross-section is welded or otherwise suitably secured to the upper end portion of the shaft 12 and has a hub 21 slidable vertically thereon and rotatable therewith, and has a cap 22 fixed on its upper end which serves as a mounting for a hydraulic cylinder 23 in which a hollow piston 24 slidable in a center hole 25 in cap 22 is reciprocable. The piston 24 has a plate 26 fixed on the outer end thereof which is connected by means of bolts 27 with the upper end of hub 21, so that when oil under pressure is delivered through a flexible conduit 28 through a swivel connection 29 to the cylinder 23 through the piston 24 the hub 21 will be raised to lift the spider 30 and the mixing blades 31 and their supporting arms 32 with it out of the mixing bowl 6 to enable easier and more thorough cleaning of the mixing blades and the mixing bowl and without the dangers of injury to workmen that were otherwise attendant upon such cleaning operations. The cover 33, which normally rests on top of the bowl 6 and has its annularly flanged rim portion 34 fitting neatly inside the upper end thereof, is arranged to be raised with the spider 30 by means of a ring 35 surrounding and welded or otherwise suitably secured to the hub 21 and having abutment with a center hub 36 on the cover 33. A switch 37 electrically connected with the motor 9 is operable automatically by means of a stationary finger 38 projecting from the cap 22 to break the circuit for motor 9 when the mixing blades 31 have been fully retracted from the bowl 6, so that there is no danger of a workman being injured during the cleanup work by contact with moving blades. The switch 37 at the same time stops the electric motor (not shown) driving the pump supplying oil under pressure to the line 28, so that switch 37 functions also as a limit switch. After the cleaning operation is completed, the operator need only open a bypass valve (not shown) to return the oil from the cylinder 23 back to the sump of the oil pump in order to allow the mixing blades 31 to return to the operative position shown in FIG. 1 with the hub 21 resting on a ring 39 welded or otherwise suitably secured to the lower end of sleeve 20. Obviously, when the mixing blades 31 are retracted, it is a much easier matter to thoroughly clean the same and also thoroughly clean the mixing bowl, using only water for rinsing, and a thorough cleaning job can be done in a fraction of the time it used to take with old mixers where there was much less likelihood of doing a comparable cleaning job with the mixing blades in place in the mixing bowl.

Water outlet pipes 40 are entered through radial holes in the lower portion of sleeve 20 and threaded in registering radial holes 41 provided in the upper end portion of the center shaft 12 communicating with the axial bore 42 thereof to which water is supplied under pressure from a pipe 43 through a swivel connection 44 on the lower end

of the center shaft. The bore 42 is suitably closed at its upper end, as indicated at 42'. The pipes 40 have their outer ends suitably plugged and have small jet openings 45 in longitudinally spaced relation on the bottom thereof at different angles to discharge fine streams of water downwardly in the different directions indicated by the arrows 46 in FIG. 1 for no-splash wetting of dry material for what is known as "no-slump" concrete, such as is used in the making of pipe, concrete piles, and so forth. The flow is fairly gentle but by reason of the angling of the jets and the good distribution which that insures, plus the good design and distribution of the mixing blades 31 and the good operation thereof, a better quality of concrete is obtained with a shorter mixing time. The water added this way amounts to approximately two and one-half gallons per sack of cement. The spider 30 has six radial arms 47 fixed to and extending from the hub 21, as seen in FIG. 2, and rigidly connected at their outer ends to the ring frame 48 from which the blade supporting arms 32 extend, and all of these radial arms 47 are hollow, as shown in FIG. 3, and are open lengthwise of the bottom thereof and have downwardly opening radial channels 49 mounted therein lengthwise of the arms enclosing the water outlet pipes 40 on three sides, as best seen in FIG. 3, leaving only the ported bottoms thereof exposed for discharge of the streams or jets 46. When the mixing blades are raised out of the bowl the pipes 40 are left fully exposed for cleaning and also for removal and substitution of other water outlet pipes 40' shown in FIGS. 4 and 5, which are used for wet mixes.

The water outlet pipes 40' are not perforated but have their open outer ends curved rearwardly with respect to the direction of rotation of the spider, as indicated at 50 in FIG. 5, and each arranged to discharge a single stream of water, as indicated at 51 in FIG. 4, onto the adjacent forwardly curved downwardly extending blade supporting arm 32, so that the arms serve more or less to conduct the flow of water into the material without splash, despite the increased amount of water being delivered this way as compared with the fine streams 46 illustrated in FIG. 1, the amount of water delivered being two and one-half to four or five gallons per sack of cement for wet mixes (zero slump to five to six inches slump) such as are used for pouring basements, roadways, and so forth. The water spilling off the lower ends of arms 32, as indicated at 52 in FIG. 4, is introduced most advantageously into the material into each of the furrows directly behind the mixing blades 31 as these furrows are formed thereby in the operation of the mixer. Thus, there is good distribution of the water and a better quality of concrete is obtainable in a shorter mixing time. Reduced splash means less cleaning, and more efficient use of the water supplied for mixing obviously means a further improvement in the quality of the concrete obtained and further reduction in the mixing time required.

Two of the curved arms 32 in diametrically opposed relation are of planar form, as shown at A and B in FIG. 2 on diametrically opposite sides of the spider 30, these arms operating mixing blades 31 disposed at an intermediate distance radially from the center shaft 12. Two other diametrically opposed arms 32 are curved inwardly, as indicated at C and D in FIG. 2 on diametrically opposite sides of the spider 30 to operate mixing blades 31 immediately alongwise the hub 18 in the bowl 6, at the shortest distance radially from the center shaft 12. The remaining two diametrically opposed curved arms 32 have outward curvature for operation of mixing blades 31 adjacent the outer wall of the mixing bowl 6, at the greatest distance radially from the center shaft 12, as shown at E and F in FIG. 2. The blades 31 on all these arms 32 are wide enough so that the circular swath of the blades 31 on arms A and B overlap radially the circular swaths of the blades on arms C and D and on arms E and F, as evident from inspection of FIG. 2. Two vertical bolts 53 are provided in connection with the upper end of each

of the arms 32 for connection thereof to the underside of the circular frame 48 of spider 30, the tapered heads 54 of these bolts fitting in countersunk holes in the top of the frame 48 so as to lie flush with the top of the frame and make for easier cleaning of the mixer. Nuts 55 threaded on the protruding lower end portions of the bolts fasten the upper ends of the arms firmly to the bottom of the frame 48.

The batch of freshly mixed concrete is discharged from the bowl 6 through the door opening 56 in the bottom, and a hinged door 57 is shown closing this opening, the door being openable and closeable by means of a hydraulic cylinder (not shown).

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. A mixing machine for concrete or the like comprising a tank having an open top and an inner substantially vertical circular wall, an outer substantially vertical concentric wall, and a substantially horizontal bottom wall, bearings confined within the circular inner wall, a vertical drive shaft operating in said bearings, said shaft being hollow and providing an axial bore through which water may be supplied under pressure, the upper end of said bore being closed, drive means for rotation of said shaft connected with the lower end thereof, a water supply pipe under said tank communicating with said bore through a swivel connection with the lower end of said shaft, a spider operatively connected with the upper end of said shaft for rotation in said tank in a substantially horizontal plane in vertically spaced substantially parallel relation to said bottom wall, arms extending downwardly from said spider, mixing blades carried on said last-named arms and operable in said tank between the inner and outer walls thereof and in close relationship to said bottom wall, and water discharge means in said spider arranged to discharge water downwardly into the material as it is being mixed by said blades, said means comprising pipes threaded in holes provided in said shaft communicating with said bore.

2. A mixing machine as set forth in claim 1, wherein certain of said pipes have discharge portions on the outer ends thereof which direct the water onto the blade supporting arms for non-splash delivery downwardly along said arms into the material being mixed.

3. A mixing machine as set forth in claim 1, wherein certain of said pipes have discharge portions on the outer ends thereof which direct the water onto the blade supporting arms for non-splash delivery downwardly along said arms into the material being mixed, the arms being so related to the mixing blades that the water arrives at the material in posterior relationship to the blades and enters furrows formed in the material by the blades for better mixing with the material.

4. A mixing machine for concrete or the like comprising a tank having an open top and an inner substantially vertical circular wall, an outer substantially vertical concentric wall, and a substantially horizontal bottom wall, bearings confined within the circular inner wall, a vertical drive shaft operating in said bearings, said shaft being hollow and providing an axial bore through which water may be supplied under pressure, the upper end of said bore being closed, drive means for rotation of said shaft connected with the lower end thereof, a water supply pipe under said tank communicating with said bore through a swivel connection with the lower end of said shaft, a spider operatively connected with the upper end of said shaft for rotation in said tank in a substantially horizontal plane in vertically spaced substantially parallel relation to said bottom wall, arms extending downwardly from said spider, mixing blades carried on said last-named arms and operable in said tank between the inner and

outer walls thereof and in close relationship to said bottom wall, water discharge means in said spider arranged to discharge water downwardly into the material as it is being mixed by said blades, said discharge means comprising pipes threaded in holes provided in said shaft communicating with said bore, said pipes being disposed in a predetermined relationship to said spider and the arms extending downwardly therefrom for non-splash delivery of water downwardly along said arms into the material being mixed, the shaft having an upward extension of polygonal cross-section on which the spider is held against turning while guided for reciprocatory movement vertically relative to said tank to permit retracting the mixing blades upwardly from the tank, and means for raising and lowering said spider relative to said tank and to said pipes.

5. A mixing machine for concrete or the like as set forth in claim 4, wherein said upward extension is of enlarged dimensions and hollow, and said means for raising and lowering said spider relative to said tank includes a vertical cylinder on said extension, and a piston reciprocable vertically in said cylinder and operatively connected with said spider.

6. A mixing machine as set forth in claim 4, including a cover for the open top of said tank raisable and lowerable by connection at the center thereof with the central portion of the spider.

7. A mixing machine as set forth in claim 4, wherein the drive means connected with the lower end of said shaft includes an electric motor, the machine including a switch in the motor circuit, and means for automatically operating said switch to open circuit position when the spider has been raised to a predetermined elevation with respect to said tank.

8. A mixing machine as set forth in claim 4, wherein the drive means connected with the lower end of said shaft includes an electric motor for drive purposes, the machine including a switch in the motor circuit, and means for automatically operating said switch to open circuit when the spider has been raised to a predetermined elevation with respect to said tank, the machine including a cover for the open top of said tank raisable and lowerable by connection at the center thereof with the central portion of the spider, the cover carrying said switch and moving it relative to the last mentioned means to stop the motor when the spider and cover have been raised to a predetermined elevation with respect to said tank.

9. A mixing machine for concrete or the like comprising a tank having an open top and an inner substantially vertical circular wall, an outer substantially vertical concentric wall, and a substantially horizontal bottom wall, bearings confined within the circular inner wall, a vertical drive shaft operating in said bearings, said shaft being hollow and providing an axial bore through which water may be adapted to be supplied under pressure, the upper end of said bore being closed, drive means for rotation of said shaft connected with the lower end thereof, a water supply pipe under said tank communicating with said bore through a swivel connection with the lower end of said shaft, a spider operatively connected with the upper end of said shaft including substantially radial arms rotatable in a substantially horizontal plane in vertically spaced substantially parallel relation to said bottom wall, the arms of said spider having longitudinally extending recesses provided in the under side thereof, arms extending downwardly from said spider, mixing blades carried on said last-named arms and operable in said tank between the inner and outer walls thereof and in close relationship to said bottom wall, pipes threaded in holes provided in said shaft communicating with said bore and extending substantially radially from the shaft enclosed within the aforesaid recesses provided in the radial arms of said spider and having holes provided therein in longitudinally spaced relation along the lower wall thereof arranged to discharge water downwardly into the material in the tank as it is being mixed by said blades, said shaft having an upward hollow extension on which the spider is guided for movement upwardly to retract the mixing blades from the tank and away from said pipes, and means including a vertical cylinder in said hollow extension and a piston reciprocable vertically in said cylinder and operatively connected with said spider for raising and lowering said spider relative to said pipes.

10. A mixing machine for concrete or the like comprising a tank having an open top and an inner substantially vertical circular wall, an outer substantially vertical wall in concentric relation to said inner wall, and a substantially horizontal bottom wall, bearings confined within said circular inner wall, a vertical drive shaft operating in said bearings, drive means connected with the lower end of said shaft, a substantially horizontal circular frame operatively connected with the upper end of said shaft in concentric relation thereto and in vertically spaced substantially parallel relationship to said bottom wall, said frame having its peripheral portion disposed approximately midway between the inner and outer walls of said tank, generally C-shaped arms depending from and attached at their upper ends in circumferentially spaced relation to the peripheral portion of said frame so that their lower ends extend forwardly in the direction of rotation of said frame, certain of said arms having their lower ends at a relatively short radius with respect to said shaft, certain of said arms having their lower ends at a relatively long radius with respect to said shaft, and certain of said arms having their lower ends disposed at an intermediate radius with respect to said shaft, and mixing blades mounted on the lower ends of said arms facing forwardly with respect thereto and each disposed close to the bottom wall of said tank and inclined rearwardly from a vertical plane with respect to the direction of rotation of said frame and also disposed at an acute angle with respect to a radial line drawn therefrom to the axis of said shaft.

11. A mixing machine as set forth in claim 10, including means whereby water for mixing with the material is discharged into the material downwardly along said C-shaped arms to minimize splash and also insure delivery of water directly behind each of said blades into the furrows formed in the material by said blades.

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