Nov. 18, 1924. 1,516,293

M. F. HORST

CONTINUOUS AUTOMATIC CONCRETE MIXER

Filed Feb. 20, 1924 4 Sheets-Sheet 1

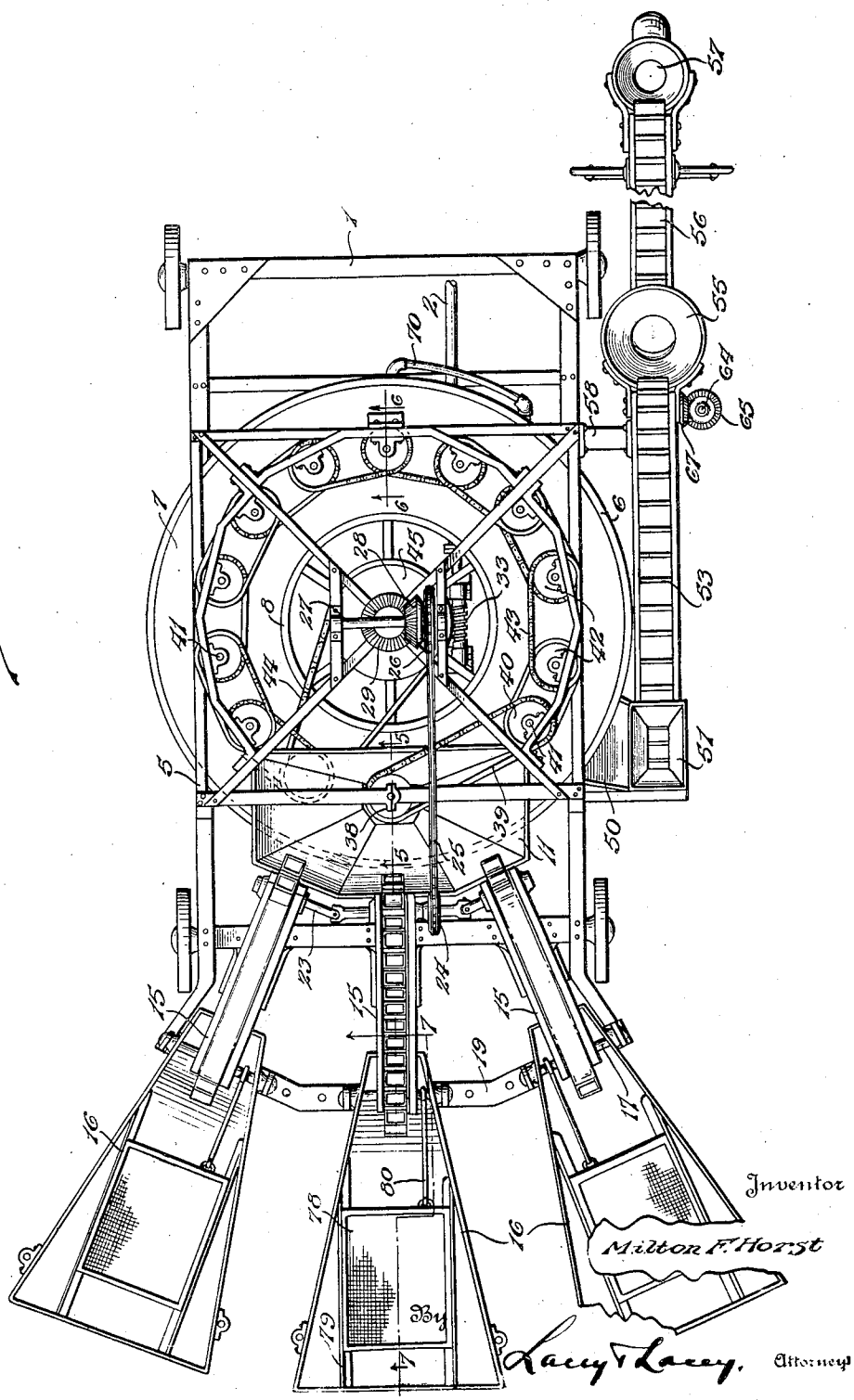


Fig. 1.

Inventor
Milton F. Horst
By
Lacey & Lacey, Attorneys

Nov. 18, 1924. 1,516,293

M. F. HORST

CONTINUOUS AUTOMATIC CONCRETE MIXER

Filed Feb. 20, 1924 4 Sheets-Sheet 2

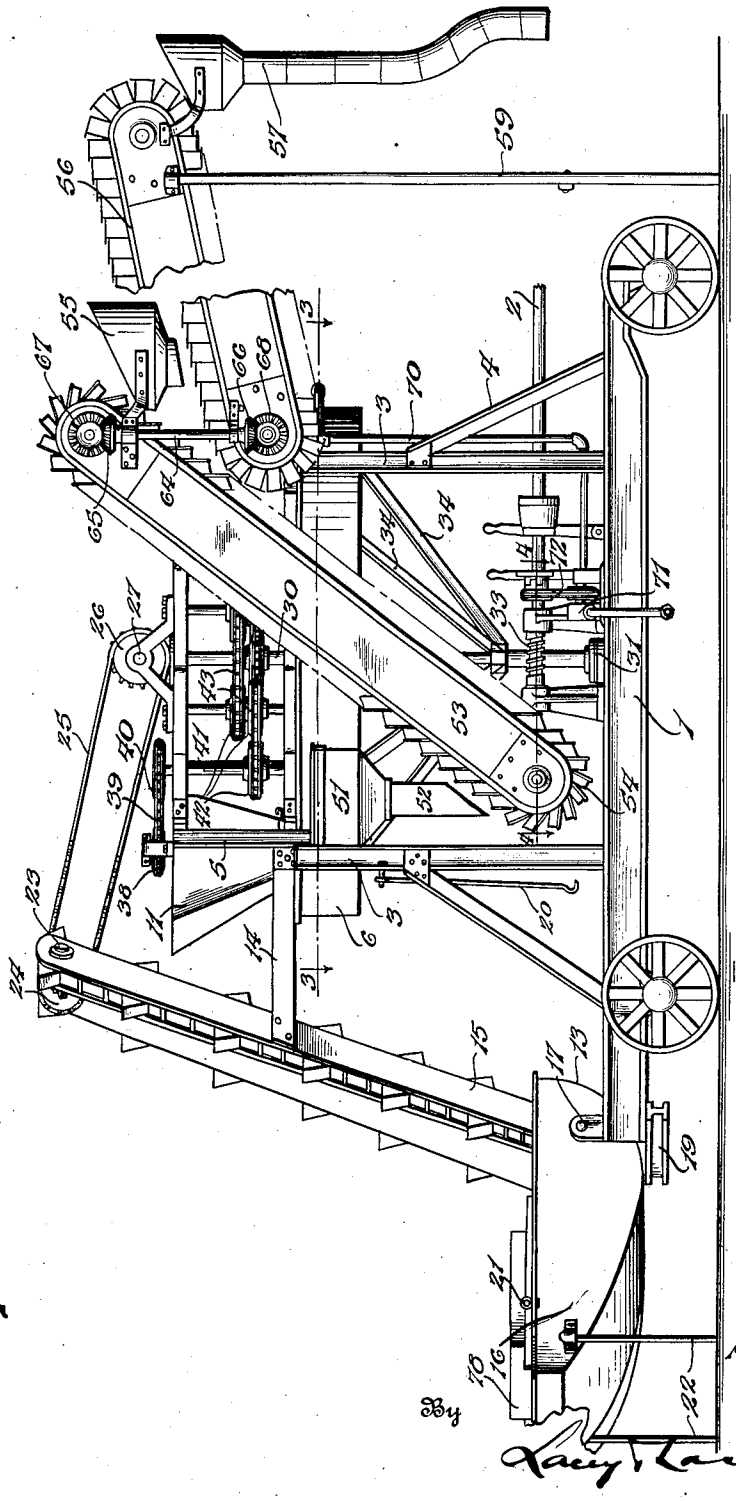


Fig. 2.

Inventor

Milton F. Horst

By Lacey & Lacey. Attorneys

Nov. 18, 1924. 1,516,293

M. F. HORST

CONTINUOUS AUTOMATIC CONCRETE MIXER

Filed Feb. 20, 1924 4 Sheets-Sheet 3

Fig. 3.

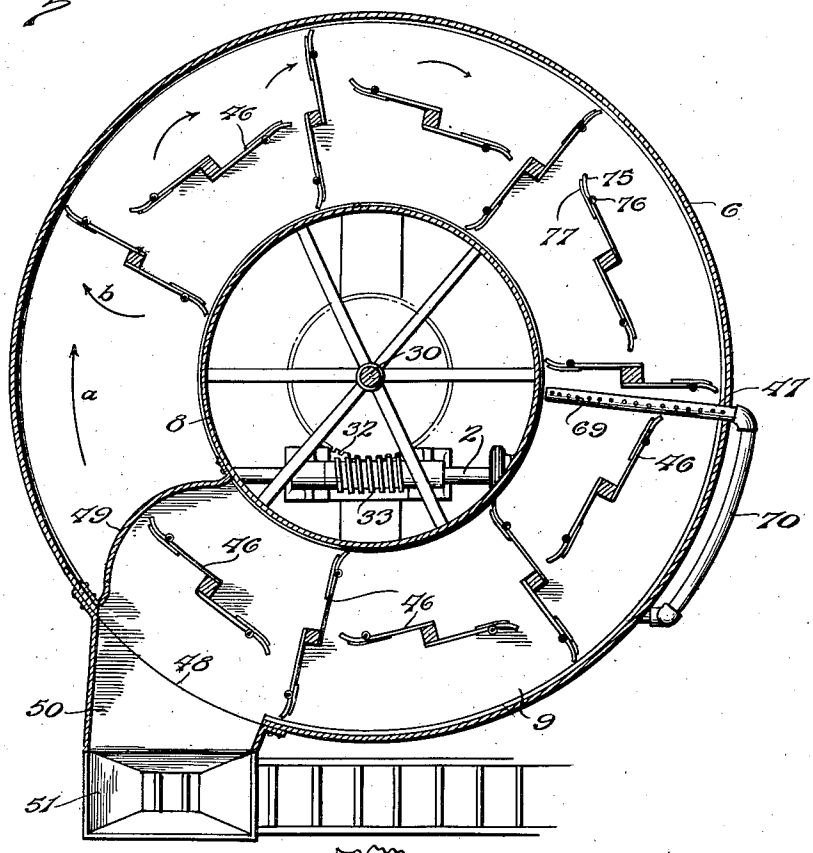
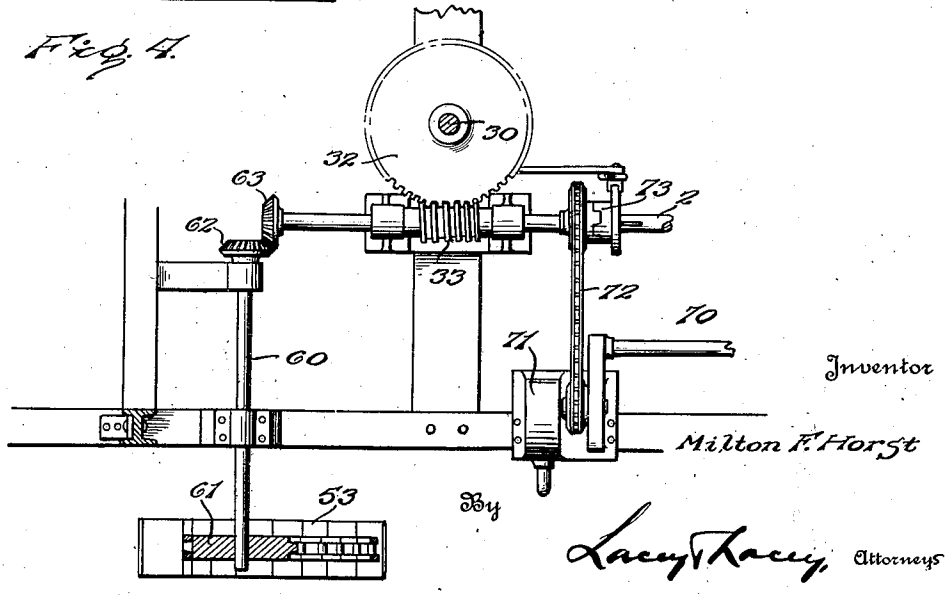



Fig. 4.




Inventor

Milton F. Horst

By

Lacey & Lacey, Attorneys

Nov. 18, 1924. 1,516,293

M. F. HORST

CONTINUOUS AUTOMATIC CONCRETE MIXER

Filed Feb. 20, 1924 4 Sheets-Sheet 4

Fig. 5.

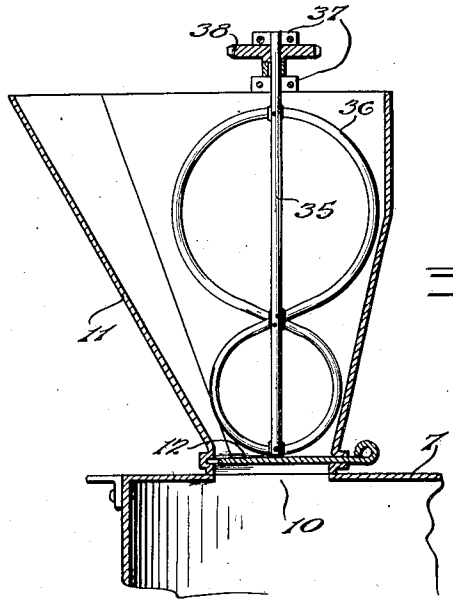



Fig. 6.

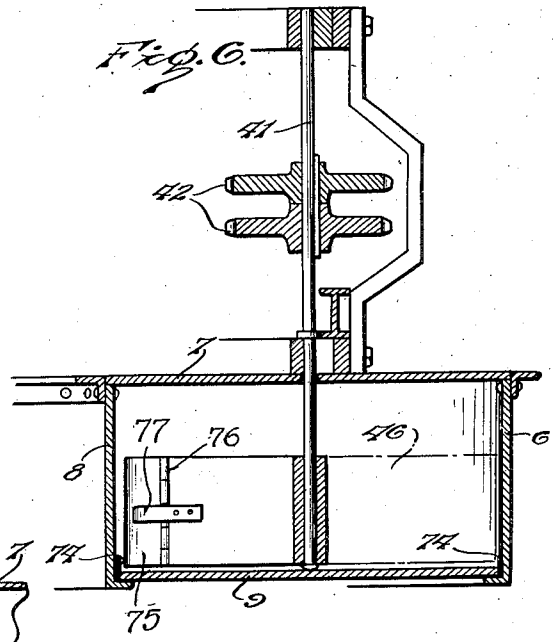
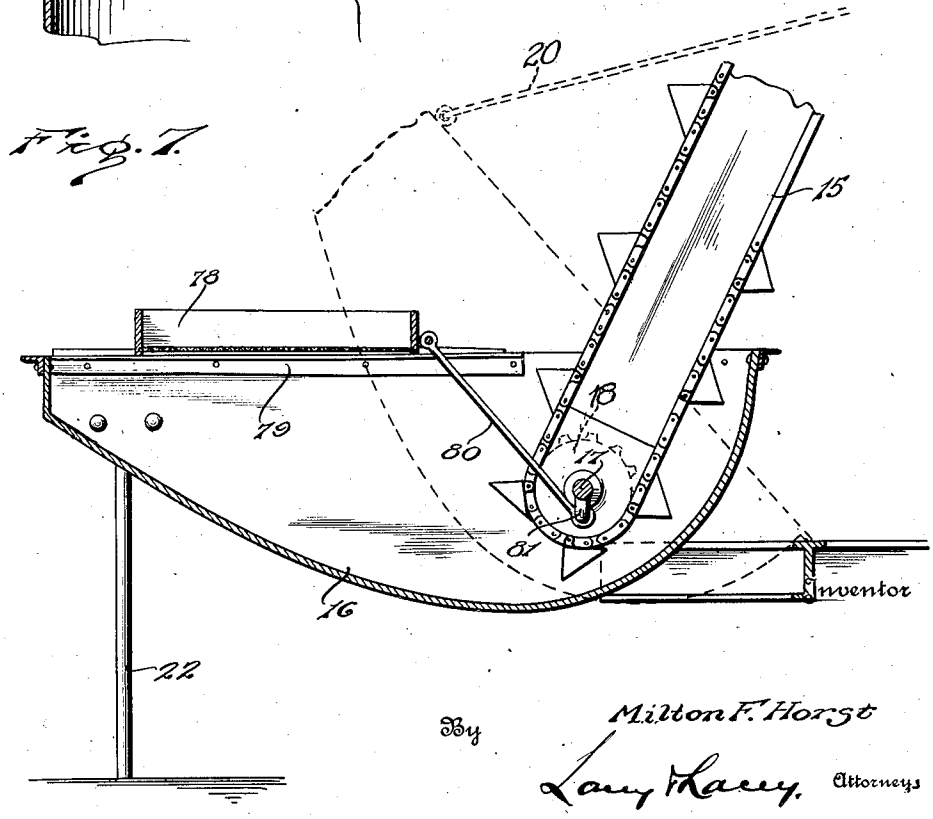



Fig. 7.




Inventor

By Milton F. Horst

Lacey & Lacey. Attorneys

Patented Nov. 18, 1924. 1,516,293

# UNITED STATES PATENT OFFICE.

MILTON F. HORST, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-THIRD TO CHRISTIAN H. HORST, OF LOS ANGELES, CALIFORNIA.

## CONTINUOUS AUTOMATIC CONCRETE MIXER.

Application filed February 20, 1924. Serial No. 694,066.

*To all whom it may concern:*

Be it known that I, MILTON F. HORST, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Continuous Automatic Concrete Mixers, of which the following is a specification.

This invention relates to concrete mixers and its primary object is to provide an apparatus which will operate automatically and continuously to mix concrete and deliver it at a point of use. The invention also has for its object the provision of a portable mechanism combining means for receiving concrete, sand and gravel in the proper proportions and delivering them to a preliminary mixing chamber, then conveying them to a point of discharge and continuing the mixture during the travel, water being added to the commingled cement, sand and gravel during the latter part of its travel to the discharge point, and then conveying the finished mixture to any desired point where it is to be used. The invention also seeks to provide an apparatus for the stated purpose in which the operation of mixing and delivering the concrete will be continuous as long as the supply is maintained and in which the parts will be compactly arranged and will be of such type as to be strong and durable. These stated objects and other objects which will incidentally appear in the course of the following description are attained in such an apparatus as is illustrated in the accompanying drawings, and the invention resides in certain novel features which will be particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a plan view of my improved concrete mixing machine;

Fig. 2 is a side elevation of the same;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 2;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged detail section on the line 5—5 of Fig. 1;

Fig. 6 is a similar section on the line 6—6 of Fig. 1, and

Fig. 7 is a similar section on the line 7—7 of Fig. 1.

While my apparatus may be stationary, I prefer to provide for its ready travel from point to point and to that end employ a truck 1 which may be of any convenient construction and may be drawn by draft animals or equipped with a motor whereby it may be caused to travel under its own power. When the truck is equipped with a motor, the same motor may be employed to impart rotation to the main driving shaft 2 but, if the truck is not motor equipped, said shaft may be extended to any convenient point and driven by any convenient engine. Upon the truck 1, I erect a frame consisting of standards 3 and suitable braces 4, which standards support a superstructure 5 of proper form and arrangement to securely support all the working parts. Carried by the upper ends of the standards 3 is an annular wall 6 which is connected by a cover plate or other form of bridge 7 with an inner concentric annular wall 8, as shown most clearly in Fig. 6. Between the lower edges of the walls 6 and 8 is an annular bottom plate 9 which is caused to rotate in the operation of the apparatus, as will presently fully appear. The cover plate or bridge member 7 is provided at one side of the apparatus, preferably the front side, with an opening 10 therethrough and supported in alinement with the said opening is a hopper or preliminary mixing chamber 11 having downwardly converging walls and equipped with a cut-off slide or valve 12 in its lower end whereby the flow of material into the annular chamber defined by the walls 6 and 8 and the bottom plate 9 may be regulated. Supported by suitable bearing brackets 13 at the front end of the truck and by arms 14 extending from the standards 3 and the superstructure 5 are a plurality of elevators 15 which may be of any preferred endless chain bucket type and by which the ingredients of the concrete are carried to and delivered into the hopper or preliminary mixing chamber 11. The lower ends of these elevators are disposed within receiving hoppers 16 which are mounted upon the shafts 17 which carry the sprockets 18, about which the lower bights of the elevator chains are trained, and the side walls of these receiving hoppers converge rearwardly toward the elevators, as clearly

shown in Fig. 1. The shafts 17 may be supported so that the entire apparatus will be reinforced and braced by a beam 19 connected with the front end of the truck and extending between the rear pivoted ends of the hoppers, as will be readily understood upon reference to Figs. 1 and 2. These hoppers are loosely fitted about the shafts 17 so that, when the apparatus is not in use, they may be swung upwardly and partly over the lower portions of the respective elevators, as indicated by dotted lines in Fig. 7, and secured in the raised position by hooks 20 secured upon the standards 3 or other fixed parts and adapted to engage in eyes 21 upon the hoppers. When the apparatus is in use, the outer ends of these hoppers are supported by props 22 in an obvious manner. In the upper ends of the frames of the elevators 15, I mount a jointed or flexible shaft 23 upon which are secured the sprockets supporting the upper bights of the elevator chains and upon one section of which is secured a sprocket 24, about which is trained a chain 25 which extends inwardly from the elevators to a point about at the center of the machine where it is trained about a second sprocket 26 secured upon a shaft 27 journaled in suitable bearings upon the superstructure 5, a beveled gear 28 being secured upon said shaft and meshing with a similar gear 29 on the upper end of a vertical shaft 30.

The shaft 30 extends downwardly to the truck 1 and has its lower end fitted in a step bearing 31 which may or may not be of the ball bearing type, as may be preferred. The upper end of the shaft is, of course, mounted in a suitable bearing in the superstructure 5 and upon the said shaft in its lower end portion is secured a worm gear 32 meshing with a worm 33 on the main driving shaft 2. Above the worm gear 32, I secure to the shaft 30 a plurality of radial arms 34 which extend upwardly as well as outwardly and are rigidly secured at their upper ends to the under side of the annular bottom plate 9 of the main mixing chamber. It will thus be seen that, when rotation is imparted to the vertical shaft 30, the annular bottom plate 9 will be caused to follow the movement of the shaft and motion will also be imparted to the elevators 15 so that the material to be mixed will be raised to and discharged into the hopper 11.

Within the hopper 11 is disposed a stirrer or agitator comprising a vertical shaft 35 and a mixer member 36 which is preferably in the form shown in Fig. 5 consisting of two loops or rings of stout wire or a light rod disposed in the vertical plane of the shaft and in superposed relation, the entire mixer or agitating member resembling an inverted figure 8. The lower end of the shaft 35 is free but its upper end is mounted in and supported by bearings 37 upon the supporting structure 5, and a sprocket wheel 38 is secured upon the shaft between the bearings, as shown. A chain 39 is trained around the sprocket 38 and around a similar sprocket 40 secured upon the upper end of a shaft 41 which is disposed vertically within the superstructure 5 and journaled in suitable bearings provided therefor upon the superstructure. The shaft 41 carrying the sprocket 40 is one of a series of similar shafts which are disposed concentrically about the vertical shaft 30 midway between the walls 6 and 8 and rotatably fitted in suitable bearings upon the superstructure. Each of these shafts has secured thereto a pair of sprockets 42, and sprocket chains 43 are trained about the sprockets upon adjacent shafts, as shown in Figs. 1 and 2, whereby all the shafts will be simultaneously rotated in the same direction and at the same speed. The shaft at the end of the series remote from the sprocket 40 is connected by a sprocket chain 44 with a sprocket wheel 45 upon the main vertical shaft 30 so that the rotation of the said main shaft 30 is transmitted to the several vertical shafts 41 and also to the mixer shaft 35 to simultaneously rotate them in the same direction. Each shaft 41 extends through the cover plate or bridge 7 into the mixing chamber between the walls 6 and 8 and has secured upon its lower end a pair of mixing blades or agitators 46 which are disposed edgewise within the mixing chamber and are of such dimensions that in one position their free ends will be disposed close to the walls of said chamber, as will be readily understood upon reference to Fig. 3. In operation, the material which has been given a preliminary mixing in the hopper 11 is discharged into the space between the walls 6 and 8 onto the bottom plate 9 which is rotating in the direction of the arrow *a* in Fig. 3 and is thereupon carried around through the mixing chamber by said moving bottom plate. Simultaneously with this travel of the material, the mixing blades 46 will be rotated, as indicated by the arrows *b* in Fig. 3 and a very thorough commingling of the several ingredients will be effected. At a point substantially diametrically opposite the hopper 11, a water pipe 47 is disposed across the top of the mixing chamber to deliver water in the proper volume to the dry mixed concrete so that during the rest of the travel of the same it will be wet mixed.

The outer end portion 75 of each mixer blade is hinged to the main body of the blade, as at 76, and a leaf spring 77 holds the two parts in alinement. Should a large stone or other obstruction, by any chance, be lodged between the end of the blade and the wall of the chamber, the hinged end will

yield to and ride over the obstruction, resuming its normal position after the obstruction is passed.

In the outer annular wall 6 at a point adjacent the hopper 11 is a discharge opening 48 and extending between the two walls 6 and 8 above the bottom plate 9 at the rear side of the said opening in the direction of travel of the mixture is a deflecting transverse wall 49 by which the mixed material is directed into and through the opening 48 to pass through a chute 50 into a hopper 51. The hopper 51 has a discharge spout 52 depending from its lower side through which the material will immediately flow to an elevating conveyer 53 and will be received in the buckets 54 of said conveyer. The conveyer 53 will discharge into a second hopper or chute 55 below which is disposed a second endless conveyer 56 which receives the concrete from the hopper 55 and carries it to a delivery tube or chute 57 which is preferably of a jointed sectional construction whereby it may be extended to any desired point of use so that the mixed concrete may be delivered into the wall or other structure which is to be formed therefrom. The elevating conveyer 53 is supported by suitable brackets, as 58, secured to and projecting from the superstructure and the outer end of the conveyer 56 is supported by props 59, as will be understood upon reference to Fig. 1. The conveyer 56 may be caused to deliver into a third conveyer and as many such conveyers may be employed as may be necessary to convey the material to the point of use. It will also be understood that the conveyers 56 may be so arranged as to successively carry the concrete to a higher level so that a building of any height may be supplied with the concrete mixed in my apparatus. To operate the elevating conveyer 53, the shaft 60 which carries the sprocket 61 supporting the lower bight of the elevator chain is mounted in suitable bearings upon the truck and is equipped at its inner end with a beveled gear 62 meshing with a similar gear 63 on the front end of the main shaft 2. The conveyer 56 is driven by a vertical shaft 64 mounted in suitable bearings upon the frame of the conveyer and of the elevator 53 and equipped at its upper and lower ends with beveled gears 65 and 66 meshing with similar gears 67 and 68 secured, respectively, upon the shaft at the upper end of the elevator 53 and the shaft at the front end of the conveyer 56. This gearing is clearly shown in Fig. 2.

The water pipe 47 is disposed substantially upon a radius of the mixing chamber between the walls 6 and 8 and is provided with openings 69 through which the water may escape onto the concrete being carried below the pipe by the traveling bottom plate 9. Water is supplied to this pipe 47 by a main 70 extending partly around the outer wall 6 and downwardly to a point adjacent the truck 1 where it is connected to the delivery side of a pump 71 which may be of any preferred type and is illustrated in a conventional manner only. Sprocket gearing, indicated at 72, operatively connects the main driving shaft 2 with the shaft of the pump, and a clutch 73 is provided upon the main shaft so that the pump may be put in operation or cut off at will.

It may sometimes be found desirable to provide a screen or sieve in connection with one or more of the receiving hoppers 16. Such a hopper is shown at 78 slidably mounted on ways 79 and connected by a pitman 80 with a crank 81 on the shaft 17.

The sand, gravel and cement are delivered into the receiving hoppers 16 in the proper proportions and, inasmuch as the bottoms of these hoppers are inclined downwardly toward the elevators 15, the material will at once gravitate to the rear ends of the hoppers where it will be taken up by the buckets of the respective elevators. The elevators will deliver the material into the preliminary mixing hopper 11, the sides of which converge toward the opening 10 and the agitator arranged in alinement with said opening. This agitator is constantly rotated as long as the power of the engine or motor is being applied to the main shaft 2 and a preliminary mixing or commingling of the sand, gravel and cement is effected. The slide or cut-off valve 12 being drawn to open position, the partly mixed material will be delivered directly into the space between the circular walls 6 and 8 and onto the traveling bottom plate 9 which will at once cause it to travel around through the space between said circular walls and eventually reach the opening 48 through which it will be discharged by the action of the mixers 46 adjacent the said opening and the deflector 49. By the time the material reaches a point below the water pipe 47, the several ingredients will be thoroughly commingled and the wet concrete will, consequently, be quickly brought to the proper consistency after the water is discharged onto the same. The possible leakage of concrete through the space between the bottom carrying plate 9 and the walls 6 and 8 will be negligible, but, if it be desired to guard against such leakage, packing 74 of felt or other material may be arranged along the lower edges of the walls 6 and 8, as shown in Fig. 6. My apparatus is compactly arranged and is simple in the construction of its parts. It will operate efficiently and continuously as long as power is applied to the main shaft 2. Owing to the simplicity of its construction, repairs are not apt to be needed but if they

should be needed the compact arrangement of the working elements will permit ready access to the worn or broken part.

Having thus described the invention, I claim:

1. A concrete mixer comprising inner and outer annular stationary concentric walls, a moving bottom between said walls, means for delivering material onto said bottom, and a circular series of mixing elements disposed between said walls above the said bottom for successively acting on the material.

2. A concrete mixer comprising inner and outer annular stationary concentric walls, a traveling bottom between said walls, means for delivering material onto said traveling bottom, a circular series of rotating mixers disposed concentric with and midway between the walls for successively acting on the material, and constantly operating means for continuously discharging the mixed material through the outer wall.

3. A concrete mixer comprising stationary inner and outer annular concentric walls and a bridge plate connecting the upper edges of said walls, an annular bottom plate mounted for travel between the walls, means for delivering material onto said bottom plate and between the walls, a circular series of rotatable mixers mounted between the walls concentric therewith and above the bottom carrying plate for successively acting on the material, means carried by the bridge plate for simultaneously rotating all of said mixers in the same direction, means arranged centrally within the space enclosed by the inner wall, and constantly operating means for discharging the mixed material through the outer wall.

4. A concrete mixer comprising an annular mixing chamber including concentric circular walls and a bridge plate connecting the upper edges of said walls, the outer wall having a discharge opening therethrough, a deflector extending between the walls adjacent the discharge opening, an annular bottom plate mounted between the concentric walls, means for effecting travel of said bottom plate in a path concentric with the walls, means for delivering material onto said bottom plate at one side of the deflector, a plurality of rotating mixers disposed above the said bottom plate, and means for delivering water onto the material carried by said bottom plate at a point remote from the point of deposit of material onto the plate.

5. In a concrete mixer, the combination of stationary concentric annular walls, means for carrying material through the space between the walls in a circular path, means for continuously agitating the material at all points of its said travel, a hopper above said walls delivering into the space between them, means for delivering material to be mixed into said hopper, a vertical shaft supported on the top of said hopper and depending thereinto, lateral agitator loops on said shaft within the hopper, and means for continuously rotating said shaft.

6. A concrete mixer comprising a supporting structure, an annular mixing chamber comprising stationary inner and outer concentric walls carried by the supporting structure, a vertically disposed shaft mounted in the said supporting structure concentric with the walls of the annular mixing chamber, an annular carrier constituting a bottom for the mixing chamber, upwardly and outwardly extending arms below the carrier rigidly connecting said carrier with the vertical shaft, means for delivering material onto the carrier, a circular series of mixers disposed within the mixing chamber for successively acting on the material on the carrier, means for rotating the vertical shaft, and means above the mixing chamber operatively connecting said shaft with the mixers whereby all the mixers will be simultaneously rotated in the same direction.

In testimony whereof I affix my signature.

MILTON F. HORST [L. S.]