May 21, 1963 M. W. JOHNSON 3,090,607

CEMENT MIXER

Filed Aug. 1, 1961 4 Sheets-Sheet 1

FIG. 1

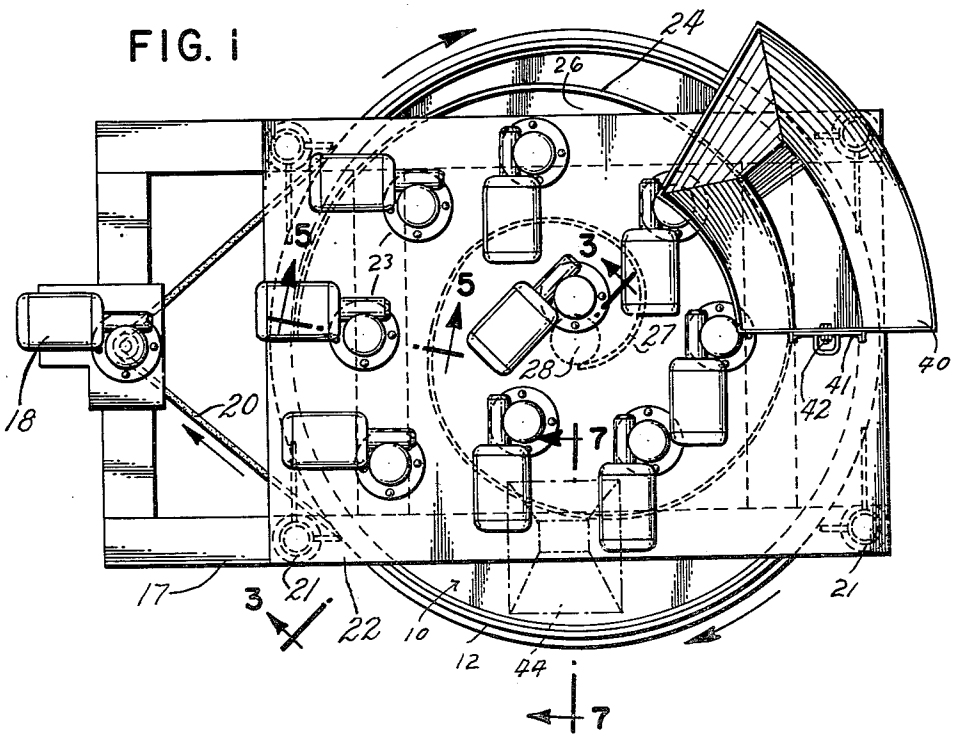
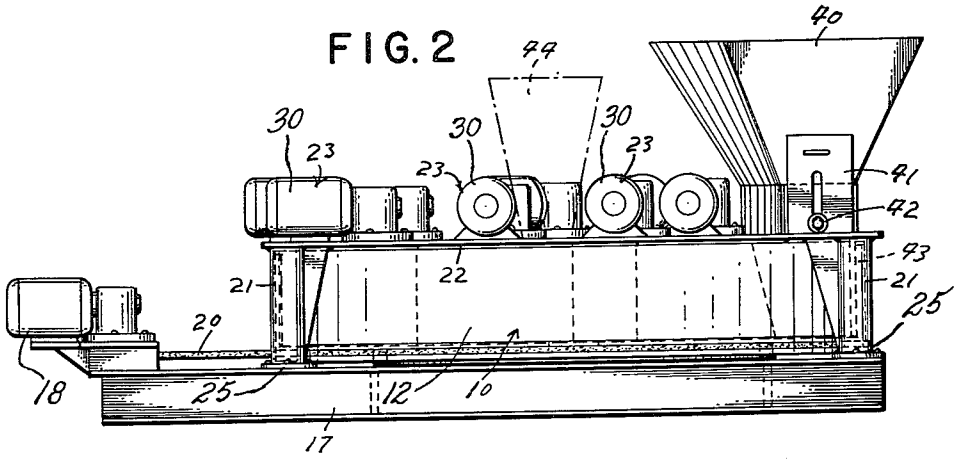


FIG. 2



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FIG. 3

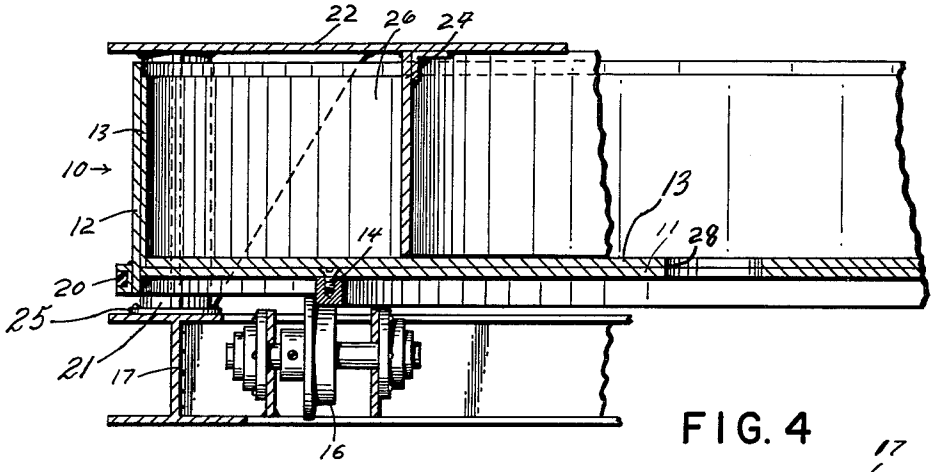
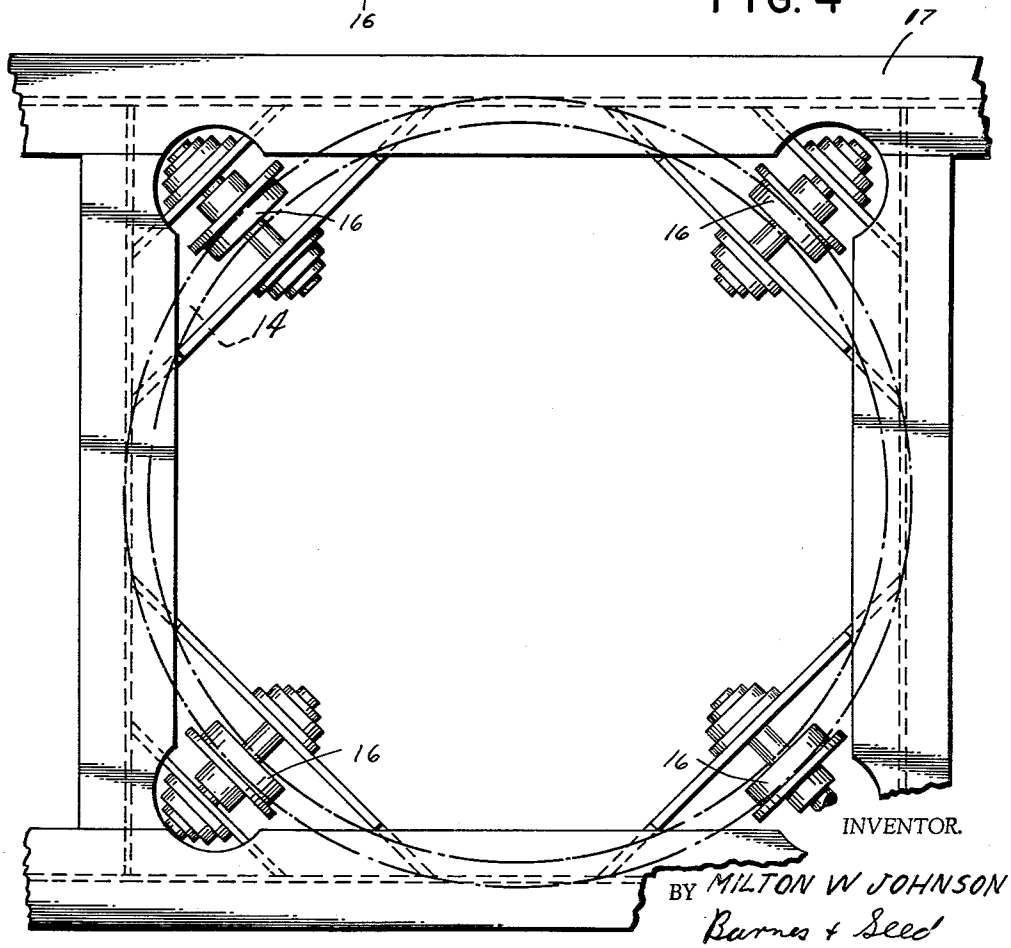


FIG. 4



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CEMENT MIXER

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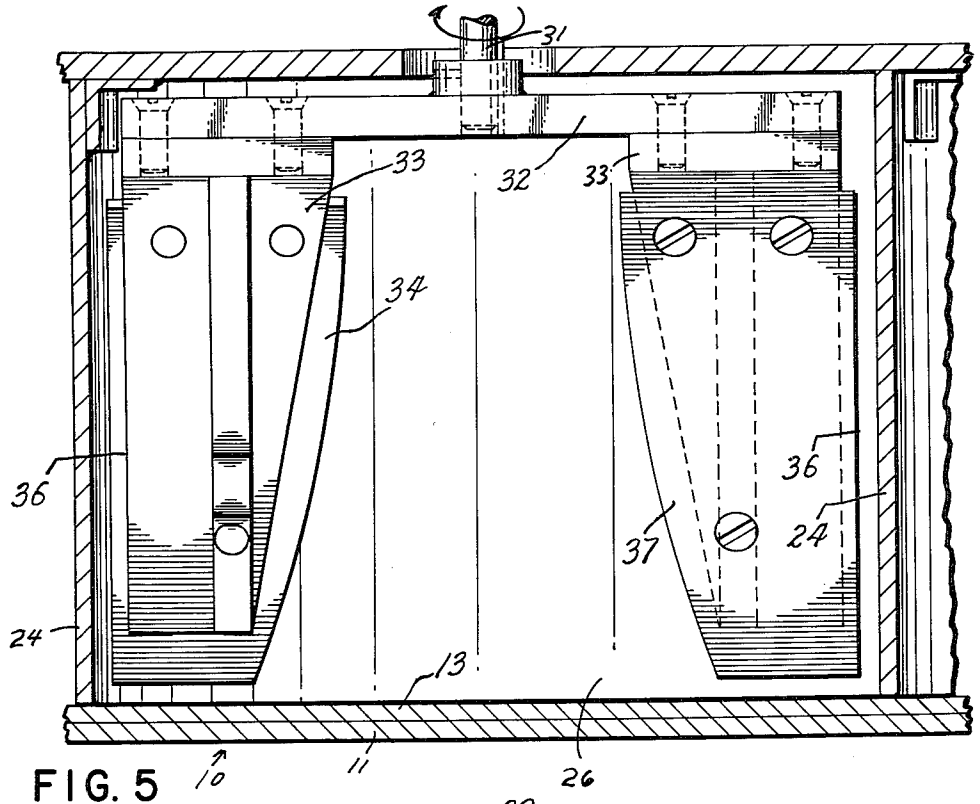


FIG. 5

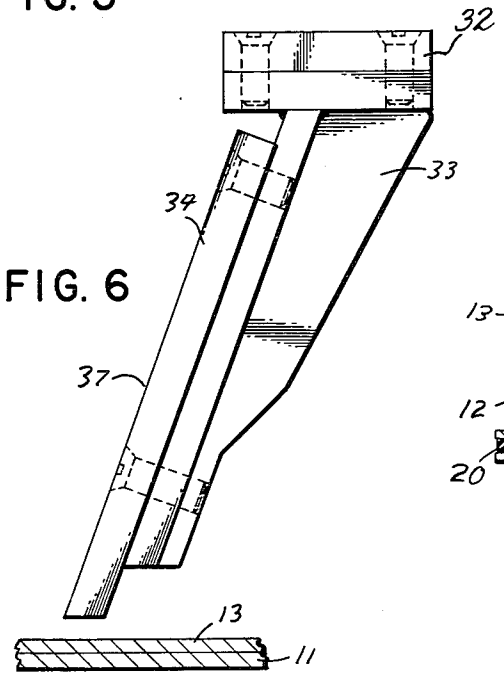
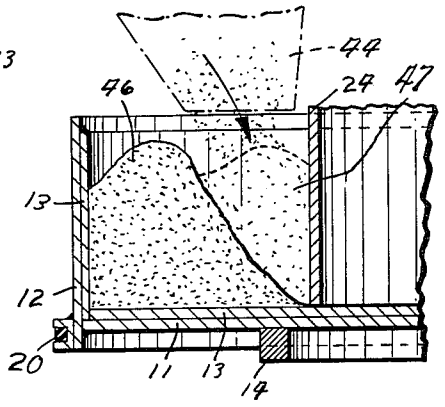


FIG. 6

FIG. 7



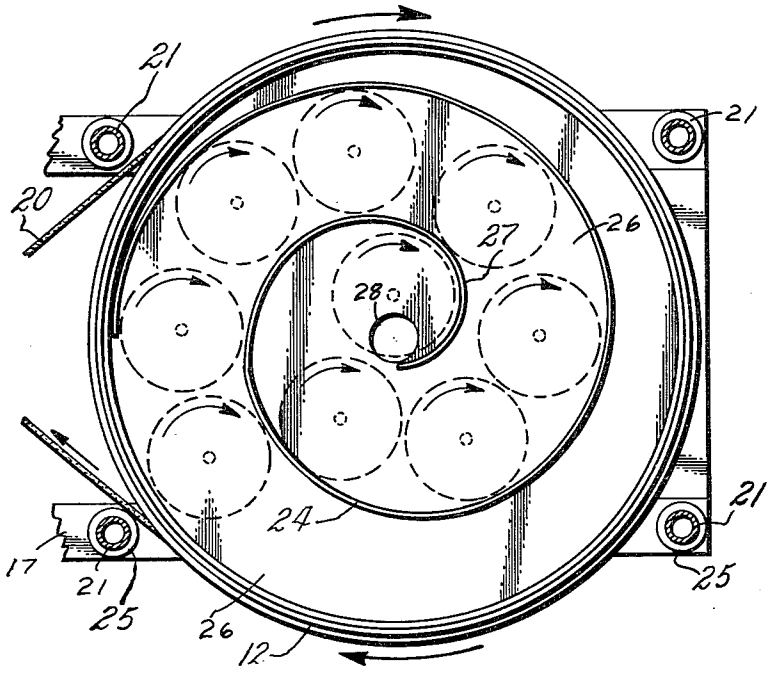
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CEMENT MIXER

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FIG. 8



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United States Patent Office 3,090,607 Patented May 21, 1963

3,090,607

CEMENT MIXER

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Filed Aug. 1, 1961, Ser. No. 128,464
11 Claims. (Cl. 259—175)

This invention relates to a cement mixer, more particularly to a constant flow cement mixer, and also to an improved process for mixing concrete.

It is the general object of this invention to provide an improved mixer which provides a continuous flow of properly mixed concrete, thus precluding any need of a loading, mixing, and dumping cycle. It is also a general object to provide a process to accomplish the results of the preceding object.

It is a further object of this invention to provide a cement mixer which is relatively compact and yet which produces a high per hour output of properly mixed concrete.

It is another object to so arrange the mixer with mixing means and conveyor means so that the degree of mixing per unit of consumed power is high, and also to provide a process in which the degree of mixing per unit of consumed power is high.

Yet another object is to so arrange the mixing means and conveying means that the material is uniformly mixed without concentration of types of material, and also to provide a process to accomplish this same result.

Other more particular objects and advantages of the invention will, with the foregoing, appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURE 1 is a top plan view of a mixer embodying preferred teachings of my invention;

FIG. 2 is an elevational view thereof;

FIG. 3 is a fragmentary vertical sectional view on line 3—3 of FIG. 1, with the individual mixing units not being shown;

FIG. 4 is a fragmentary top plan view of the mounting base for the rotating tub of the mixer;

FIG. 5 is a fragmentary vertical sectional view on line 5—5 of FIG. 1;

FIG. 6 is a side elevational view of a single mixing paddle;

FIG. 7 is a fragmentary vertical sectional view taken on line 7—7 of FIG. 1 and illustrating the manner in which cement is charged into the mixer to combine with rock aggregate; and

FIG. 8 is a top plan view of the mixer with the cover plate removed and with the working area of each mixing unit shown in broken lines.

Referring to the accompanying drawings, numeral 10 generally designates a cylindrical tub or pan, having a flat horizontal base 11 and an upstanding circumferential side wall 12. The inside surface of the tub is provided with a replaceable liner 13. Secured to the bottom face of the tub and concentric with the tub is a circular rail 14 which tracks to a plurality of evenly spaced supporting wheels 16 which are journal mounted on a base frame 17 in a circular pattern so that the tub is able to rotate about its longitudinal axis. To so rotate the tub a motor 18 is provided to drive a belt 20 which frictionally engages the circumference of the tub.

Rising from the corners of the base frame 17 are four columns 21 which support a cover plate 22 which reaches over the tub 10. Each of the columns rests on removable shims 25 so that the height of the plate 22 above the tub 10 may be adjusted by a proper selection of such

shims. This plate serves to support a plurality of mixing units 23, and to support a depending spiral-like baffle 24.

The baffle 24 is positioned vertically in the tub and curves in a horizontal plane, with its upper edge rigidly secured to the plate 22 and its lower edge adjacent the base 11 of the tub, thus defining with the tub a spiral-like passageway 26. The outside end of the baffle is adjacent and nearly tangent to the inside surface of the circumferential tub wall 12. The baffle describes a curve which, proceeding clockwise, bends with increasing sharpness toward the tub center to curve one and three quarters revolutions, and to terminate near the center portion of the tub. Thus at the initial portion of the passageway near the perimeter of the tub, the outer side of the passageway is defined by the tub wall 12, and the inner side by the baffle 24. The inner side formed by the baffle diverges from the tub wall inwardly so that this initial passageway portion is of progressively increasing width. Where the passageway reaches the outside end of the baffle, the baffle becomes the outer wall as well as the inner wall of the passageway. The curve of the baffle is such that the passageway portion whose side walls both are formed by the baffle is of substantially uniform width. At its inner end, the baffle is uniformly curved along an arc 27 of approximately 120°, and the end edge of this arc portion terminates at a location tangent to a discharge opening 28 located at the center of the tub base 11.

Each of the several mixing units 23 comprises a motor 30 which through a vertical drive shaft 31 turns a radial arm 32 in a horizontal plane. Screwed to opposite ends of the radial arm are two paddle mounts 33, each of which has screwed to its face a replaceable paddle plate 34. The outside edge 36 of each paddle plate is uniformly distant from the arm's axis of rotation and the working face 37 is tilted moderately from the vertical so that as the paddle face works against the material to be mixed, it exerts a moderate lifting force as well as a lateral thrust.

In the cement mixer as illustrated, nine mixing units 23 are spaced at intervals along the center axis of the passageway 26. The first unit is placed near the end of the initial diverging portion of the passageway, and the final unit is placed with its axis of rotation at the radial point of the arc portion 27 of the baffle. The distance between the outside edges 36 of the two paddle plates of any unit is just slightly less than the width of the passageway, the clearance between the paddle plate and the side walls of the passageway, and also the clearance between the paddle plate and the tub base, being sufficient to prevent the largest sized particle being mixed from becoming lodged between the paddle and the passageway sides or tub base. Thus the paddles of each mixing unit describes a circular horizontal path which sweeps the entire transverse section of the passageway. The radius of the arc 27 is slightly larger than the operating radius of the final mixing unit. Thus the paddles of the final mixing unit wipe the inside surface of the arc portion 27 so as to push the mixed concrete out the discharge opening 28.

A hopper 40 is placed over the passageway near the beginning of the divergent portion of the passageway. The front of the hopper is provided with a vertically adjustable plate 41 which by means of a lock nut 42 may be selectively placed at the desired height to determine the rate of feed from the hopper to the passageway. Depending from the hopper is a stationary vertical plate 43 which is positioned along the inside surface of the tub wall so as to prevent abrasion of the tub wall from the material being fed into the hopper.

A second hopper is shown schematically at 44 to indicate means to feed material at a location at the inside

edge of the passageway near the end of the divergent passageway portion.

In operation, the tub rotates clockwise at about one and one-half to two revolutions per minute. Wet concrete aggregate is charged into the hopper **40** to fall onto the tub base **11**. The rotation of the tub then carries the aggregate along the passageway **26**. When the aggregate has been carried through about 90° of travel, cement is added to the aggregate by the mixing means indicated at **44**.

Referring specifically to FIG. 7, it will be noted that the aggregate (indicated at **46**) remains piled against the tub side wall **12**. This is because the inside wall of the passageway formed by the baffle **24** diverges toward the tub center, while the aggregate is carried by the tub along an arc having the tub center as its radius. Thus the cement (indicated at **47**) when added at a point along the inside passageway wall, will be piled alongside the aggregate. This arrangement reduces the amount of vertical mixing movement required to thoroughly mix the cement and the aggregate.

The mixing units **23** rotate clockwise at about 57 to 60 revolutions per minute. Since the paddles of each mixing unit describe a horizontal circular path reaching to the passageway side walls, the paddles act on substantially all the material which is carried along the pssageway. As the material is carried to the end of the passageway the final mixing unit pushes the mixed material into the discharge hole **28**.

To obtain the proper moisture content, a moisture sensing device may be inserted at a convenient point along the passageway, and a water feeding mechanism, controlled by the sensing device, can be made to add water in the appropriate amounts.

The abrasive action of the material may be quite severe, and the lower edge of the baffle and the paddle edges will wear away. This may be compensated to some extent by inserting shallower shims **25** beneath the columns **21** to lower the cover plate **22** and thus bring the clearances between the tub and the baffle and paddles within proper tolerance.

By continuously charging the hopper with aggregate and continuously feeding cement, there will be an uninterrupted flow of concrete out the discharge opening **28**. Although this machine is especially adapted to function as a cement mixer, a machine embodying the broader aspects of this design could well be adapted to mix other materials as well.

It is believed that the invention will have been clearly understood from the foregoing detailed description of my now-preferred illustrated embodiment. Changes in the details of construction may be resorted to without departing from the spirit of the invention and it is accordingly my intention that no limitations be implied and that the hereto annexed clams be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. A constant flow cement mixer comprising a rotating pan having a surface to carry the material to be mixed, a stationary confining wall having an edge located adjacent said surface so as to form in conjunction with said pan a curved material carrying passageway, said pan surface forming the bottom portion of said passageway, said passageway having a beginning portion and an end portion, an exit opening at said passageway end portion, means to continuously feed material to the beginning portion of said passageway, a plurality of mixing units disposed in said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units and to the exit so as to effect a continuous discharge of mixed material out the exit opening of said passageway.

2. The mixer as recited in claim 1, wherein at least several of said mixing units each have paddles which rotate on an axis transverse to the passageway and on a path passing adjacent the containing sides of said passageway so that each of said several units act on substantially all the material which passes through each of said units.

3. A constant flow cement mixer comprising a rotating pan having a surface to carry the material to be mixed, a stationary confining wall having an edge located adjacent said surface so as to form in conjunction with said pan a curved material carrying passageway, said passageway having its beginning at the perimeter of said pan, and having its end portion at the center portion of said pan, said pan surface forming the bottom portion of said passageway, an exit opening at said passageway end portion, means to continuously feed material to the beginning portion of said passageway, a plurality of mixing units disposed in said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units and to the exit so as to effect a continuous discharge of mixed material out the exit opening of said passageway.

4. A constant flow cement mixer comprising a rotating pan having a surface to carry the material to be mixed, said surface being uniform with respect to sections taken on a plane passing through the axis of rotation of said pan, wall means located at a position upstanding from said surface with at least a portion of said wall means being stationary, said wall means being the confining sides of a curving passageway, said passageway beginning at the perimeter of said pan and ending at the center portion of said pan, said pan surface forming the bottom of said passageway, a discharge opening at the end portion of said passageway, means to continuously feed material to the beginning portion of said passageway, a plurality of mixing units disposed in said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units and to the exit so as to effect a continuous discharge of mixed material out the exit opening of said passageway.

5. A constant flow cement mixer comprising a rotating pan having a planar bottom, a circumferential upstanding side wall, and a center discharge opening, a stationary wall positioned so as to be upstanding from said pan bottom and curving in a horizontal plane, said stationary wall beginning adjacent said pan wall and curving in a generally spiral-like fashion and terminating at the center portion of said pan, said stationary wall cooperating with said pan to form a curving passageway, said passageway beginning adjacent said pan wall and bending in a progressively sharper curve to terminate at the center opening of the pan, means to continuously feed material to be mixed to the beginning portion of said passageway, a plurality of mixing units disposed in said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units so as to effect a continuous discharge of mixed material out the exit opening of the pan.

6. The mixer as recited in claim 5, wherein at least several of said mixing units each have paddles which rotate on an axis transverse to the passageway and on a path passing adjacent the containing sides of said passageway so that each of said several units act on substantially all the material which passes by each of said several units.

7. A constant flow cement mixer comprising a rotating pan having a planar bottom, a circumferential upstanding side wall, and a center opening, a stationary

wall positioned so as to be upstanding from said pan bottom and curving in a horizontal plane, said stationary wall beginning adjacent said pan wall and curving in a generally spiral-like fashion and terminating at the center portion of said pan, said stationary wall cooperating with said pan to form a curving passageway, said passageway beginning adjacent said pan wall and bending in a progressively sharper curve to terminate at the center opening of the pan, said pan wall forming the outer confining side of the beginning of said passageway, said stationary wall reaching to said pan wall so as to define the outer side of the passageway portion which bends in a progressively sharper curve, a portion of said stationary wall defining the inner confining side of said passageway, the passageway portion which has both its sides formed by said stationary wall being of substantially uniform width, a plurality of mixing units disposed in said passageway, means to continuously feed material to be mixed to the beginning portion of said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units to effect a continuous discharge of mixed material out the center opening of the pan.

8. A constant flow cement mixer comprising a rotating pan having a planar bottom, a circumferential upstanding side wall, and a center opening, a stationary wall positioned so as to be upstanding from said pan bottom and curving in a horizontal plane, said stationary wall beginning adjacent said pan wall and curving in a generally spiral-like fashion and terminating at the center portion of said pan, said stationary wall cooperating with said pan to form a curving passageway, said passageway beginning adjacent said pan wall and bending in a progressively sharper curve to terminate at the center portion of the pan, means to continuously feed material to be mixed to the beginning portion of said passageway, a plurality of mixing units disposed in said passageway, rotational movement of said pan causing a conveyor-like movement of the bottom portion of said passageway so as to move the material continuously through the passageway and thus through the mixing units and to the center opening to effect a continuous discharge of mixed material out the center opening, the beginning of said passageway having its inside wall diverging from the outer side wall and toward the center of said pan, means to feed a portion of said material to said passageway at the narrower part of said divergent portion, and means to feed another portion of said material to said passageway adjacent said inner wall near the end of said divergent portion so that said other portion of the material is positioned to one side of said first named portion of said material, thus enabling more uniform mixing of said two portions of the material.

9. A process for mixing and continuously discharging concrete, comprising the steps of continuously feeding material to be mixed onto a rotating pan, directing said material by a stationary wall structure so that said material flows along a predetermined path as it is carried by said pan, said wall structure with said pan defining a passageway, mixing said material at predetermined locations along its path of travel, and directing said material at the end of its said path toward a discharge opening, so that there is a continuous flow of mixed material out of said discharge opening.

10. A process for mixing and continuously discharging concrete, comprising the steps of continuously feeding material to be mixed onto a rotating pan, directing said material by a stationary wall structure so that said material follows a predetermined path as it is carried by said pan, said wall structure with said pan defining a passageway, mixing said material by rotating paddles in a plane parallel to the path of said material, at least several of said paddles reaching to the sides of said passageway so that substantially all the material is acted upon by said several paddles, said paddles being at predetermined locations along the passageway, and directing said material at the end of its said path toward a discharge opening, so that there is a continuous flow of mixed material out said discharge opening.

11. A process for mixing and continuously discharging concrete, comprising the steps of continuously feeding material to be mixed onto a rotating pan, directing said material by a stationary wall structure so that said material follows a predetermined path as it is carried by said pan, said path beginning at the perimeter of said pan and terminating at the middle portion of said pan, where there is a discharge opening, mixing said material at predetermined locations along its path of travel and directing said material at the end of its said path toward said discharge opening so that there is a continuous flow of mixed material out said discharge opening.

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