Nov. 18, 1930. C. F. BALL 1,781,965

CONCRETE MIXER AND AGITATOR

Filed March 14, 1929 3 Sheets-Sheet 1

Fig. 1

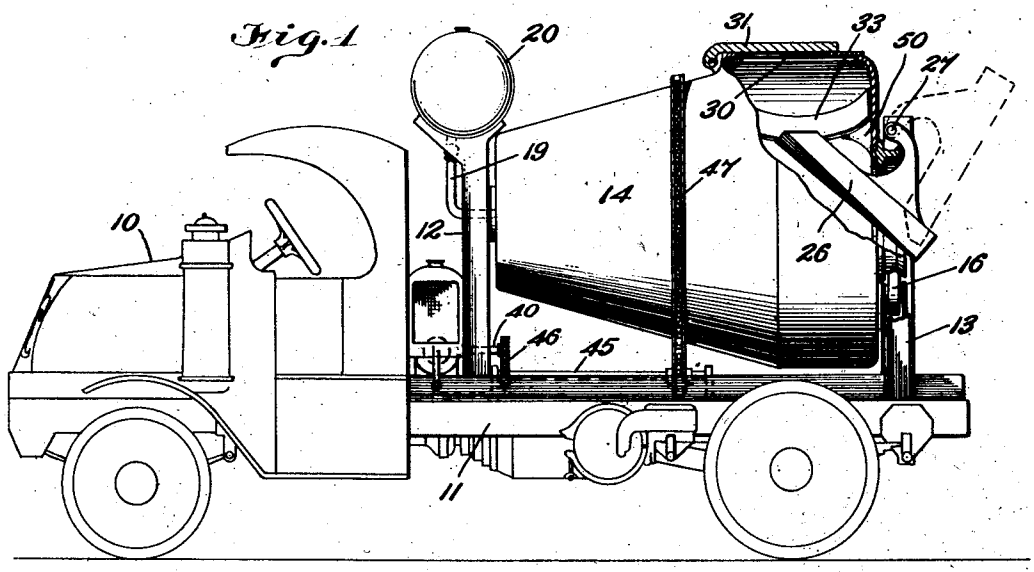
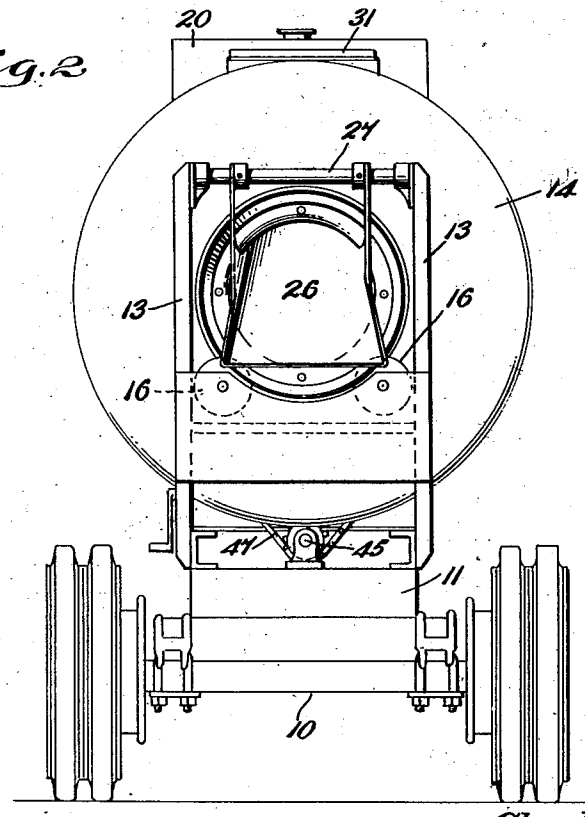


Fig. 2



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CONCRETE MIXER AND AGITATOR

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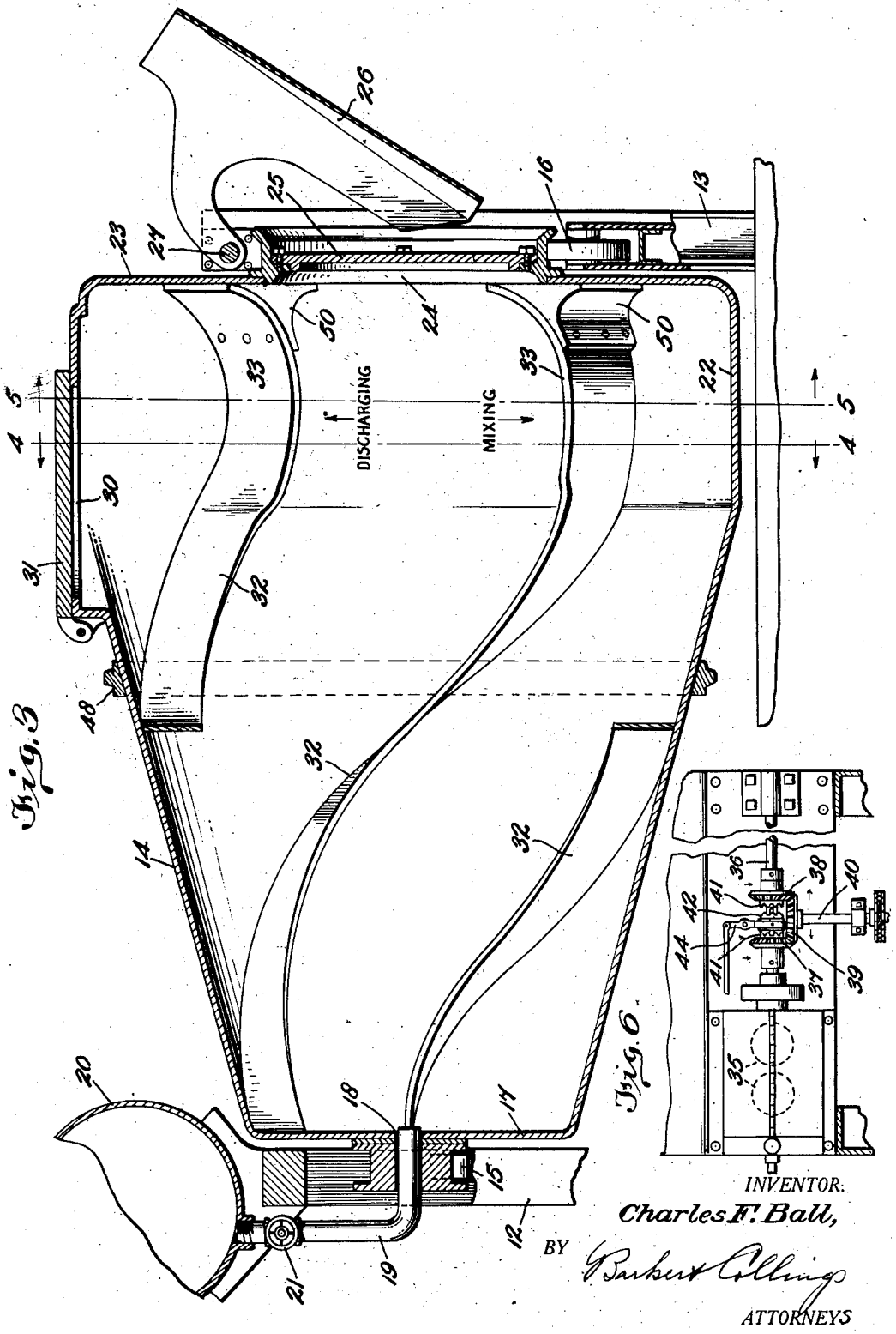


Fig. 3

Fig. 6.

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Fig. 5

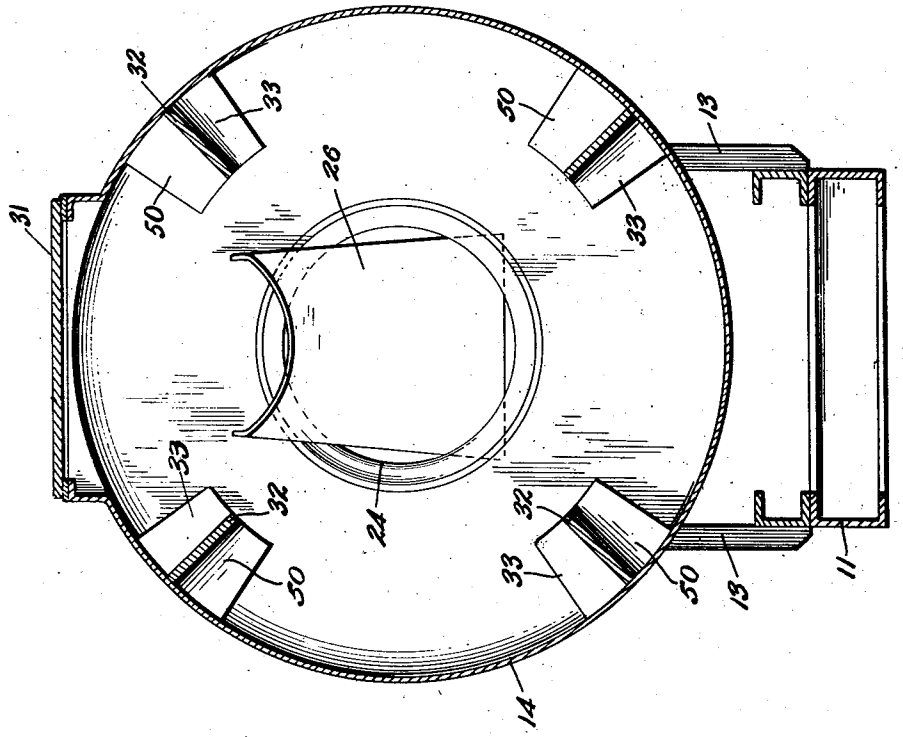
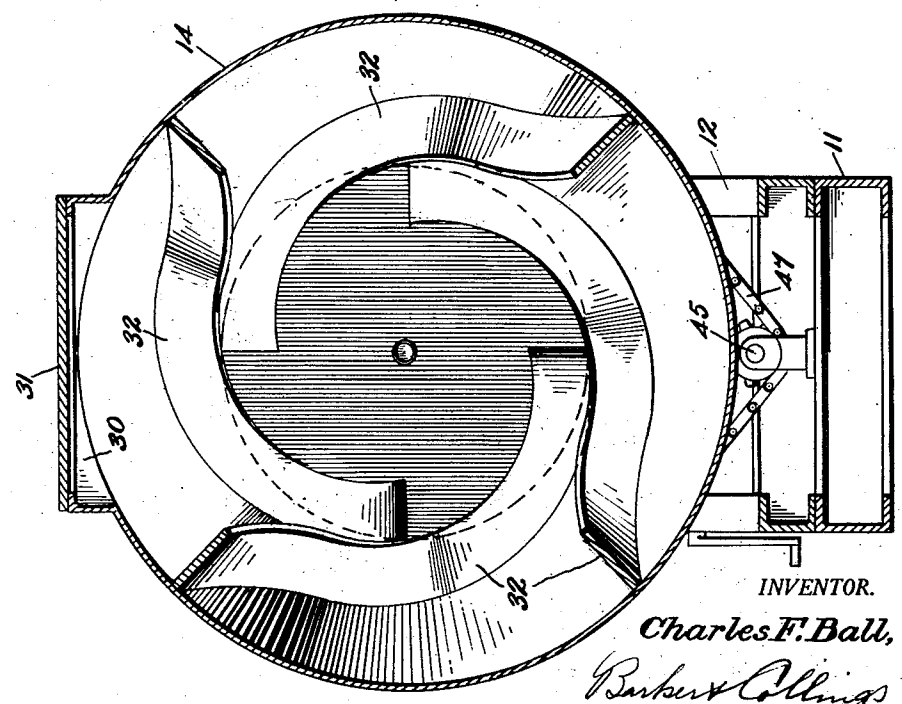


Fig. 4



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UNITED STATES PATENT OFFICE

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CONCRETE MIXER AND AGITATOR

Application filed March 14, 1929. Serial No. 346,988.

This invention relates to concrete mixers and agitators and has for one of its objects to provide an apparatus of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in use than those which have been heretofore proposed.

A further object of the invention is to provide a concrete mixer or agitator in which a very complete mixing of the constituent materials is obtained due to the fact that the said materials are simultaneously subjected to the mixing action of moving vanes or blades as well as to an end to end movement within the mixing receptacle.

With the above and other objects in view which will appear as this description proceeds the invention consists in the novel details of construction and combination of parts more fully hereinafter disclosed and particularly pointed out in the appended claims.

Referring to the accompanying drawings forming a part of this specification in which like reference characters designate like parts in all the views.

Fig. 1 is a side elevational view partly broken away of a concrete mixer or agitator constructed in accordance with the present invention.

Fig. 2 is an enlarged end elevational view of the parts shown in Fig. 1, as seen from the right of the said figure.

Fig. 3 is an enlarged vertical, longitudinal sectional view through the mixing receptacle.

Fig. 4 is a transverse sectional view taken approximately on the plane indicated by the line 4—4 of Fig. 3 looking in the direction of the arrows.

Fig. 5 is a similar view taken approximately on the line indicated by the line 5—5 of Fig. 3 looking in the direction of the arrows, and

Fig. 6 is a fragmentary detail plan view illustrating one means of supplying power to the mixer.

While the principles embodied in the invention are susceptible of wide use in the mixing of materials, for the purposes of illustration and description the invention has been shown in the form of a transit mixer, that is, one in which the mixing or agitating receptacle is mounted upon the chassis of the motor truck or other similar vehicle so that the mixing or agitation may take place during the transportation of the concrete materials from a central source of supply to the point of use.

In the said drawings 10 indicates generally a motor truck or other similar vehicle having a chassis frame 11 upon which there is provided front and rear upright members 12 and 13 respectively. A mixing or agitating receptacle 14 is mounted upon the truck, the forward end of the said receptacle being suitably journaled upon rollers 15 in the forward support 12 while the rear end of the said receptacle is journaled upon rollers 16 suitably supported by the rear uprights 13.

As clearly shown in Figures 1 and 3 the receptacle 14 is of a substantially frusto-conical shape with its larger end located toward the rear of the truck and its smaller end toward the front. The said smaller end is completely closed by the wall 17 except for a small opening 18 through which passes a pipe 19 leading from a water tank 20, the said pipe 19 being controlled by a suitable valve 21 all as is clearly shown in Figures 1 and 3.

The rearward end of the receptacle 14 may be formed with a short cylindrical portion 22 and the rear wall 23 of the said receptacle is provided with a centrally located opening 24 through which the receptacle may be charged and discharged. This rearward opening 24 is normally closed during transit or during the mixing operation by any suitable closure 25 which may be readily removed for charging and discharging. A discharge chute 26, which may be similar to those commonly employed upon mixing apparatuses of this character is pivotally mounted at 27 upon the upright members 13 and is adapted to be swung from the full line position shown in Figure 1 to the dotted line position shown therein by any suitable means not shown. The said receptacle 14 may also be provided, if desired with a hatch

opening 30 in its side wall through which material may be introduced if desired instead of through the rear opening 24. The said opening 30 is closed by a hatch cover 31 which may be secured in position by any suitable means not shown.

Upon the inner surafce of the frusto-conical receptacle there is provided a plurality of vanes or blades 32 which are spirally arranged around the inner circumference of the drum. The pitch of the spiral is relatively high so that the said blades will not only act to advance the material longitudinally of the drum when the latter is rotated but they will also serve to lift the material upwardly in the manner commonly employed in concrete mixers of the rotating drum type and deposit it back toward the center of the drum as the said blades progress in their travel. That is to say by giving the spiral a relatively high pitch the blades assume a substantially horizontal position to lift the material upwardly and then discharge it back towards the bottom of the drum as their rotation proceeds. At the same time owing to the spiral arrangement there is more or less of an endwise movement imparted to the material so that the blades perform a combined mixing action and endwise movement of the material.

The direction of such endwise movement of course depends upon the direction in which the drum and blades are rotated since if this rotation be in one direction the material will be moved from the large end to the small end of the drum while if the direction of rotation be reversed the material will be moved from the small toward the large end of the drum. In the present instance it is contemplated that the rotation of the drum during the mixing period will be in such direction, as for example that indicated by the lower arrow in Fig. 3, as to move the material from the large end toward the small end of the frusto-conical drum and were the drum truly cylindrical this would result in all of the material accumulating in the forward end where it would be merely revolved around continuously without any particular mixing action. However, by making the drum in the form of the frustum of a cone, as the material is advanced toward the smaller end, it will under the influence of gravity be returned down the sloping surface of the drum toward the larger end, as will be readily understood from reference to Fig. 3, thereby securing not only a mixing action by the blades 32 but also a continuous end to end movement of the material which accomplishes a much more complete mixing of the constituents than would be possible in a cylindrical drum.

For the purpose of discharging the material from the drum at the completion of the mixing period the direction of rotation of the drum is reversed so that the blades 32 act to assist in returning the material from the smaller end to the larger end. The end portions of the blades at the said larger end are preferably enlarged somewhat and are curved as clearly shown in the drawings to provide what may be termed buckets 33 which lift the mixing material upwardly during this reverse rotation and drop it into the discharge chute 26 when the latter is in the full line position shown in Figure 1.

The mixing receptacle may be rotated in any desired manner, as for example by means of a suitable power takeoff from the truck motor, or as is here illustrated, by means of an independent motor 35 mounted on the truck chassis behind the cab. The power shaft 36 of the said motor may be provided with any suitable reversing mechanism whereby the direction of rotation of the receptacle 14 may be controlled. The form here shown comprises a pair of bevel gears 37 and 38 loosely mounted upon the said shaft 36 and meshing with a companion gear 39 carried by a longitudinally extending jack shaft 40. The gears 37 and 38 are provided with suitable clutch elements 41 which are adapted to be engaged at will by companion clutch elements 42 splined to the shaft 36 and shiftable into and out of engagement with the respective element 41 by means of a suitable control lever 44, all as will be readily understood from Fig. 6. The jack shaft 40 drives a countershaft 45 by means of a sprocket chain 46 and the power is transmitted from the said shaft 45 to the drum 14 by means of a sprocket chain 47 which engages a sprocket 48 carried by the said drum all as is customary in this type of apparatus.

As above stated the end portions of the blades 32 are curved at the larger end of the drum to provide discharging buckets and the extreme ends of the said blades, of course, meet the end wall 23 of the drum at a substantial tangent. This forms a V-shaped pocket in back of the blades in which concrete material is apt to collect and in order to prevent this, filler pieces 50 are preferably secured to the blades 32 and to the end wall to exclude the concrete material therefrom.

The present invention is adapted for use either as a mixer or a transit agitator. That is to say the raw-material comprising cement, sand, gravel and water may be introduced into the drum and the latter rotated for suitable periods during transit to mix the said materials into concrete, or the concrete may be mixed at a central plant and be introduced into the drum for transportation to the point of use during which time the drum is rotated to agitate the mixed concrete and prevent the settling of the heavier constituents. In either event the drum is rotated during trans-

it in the direction indicated by the lower arrow in Fig. 3 whereby the above described mixing and endwise movement of the material is accomplished through the action of the spiral blades 32; and when the truck has reached the point of use and it is desired to discharge the concrete the direction of rotation of the drum is reversed to that indicated by the upper arrow in Fig. 3 so that the mixed concrete will be returned to the larger end of the drum and there lifted by the bucket portions 33 of the blades and dumped into the discharge chute 26 as will be readily understood.

While one form of the invention has been illustrated and described it is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts and therefore it is not wished to be limited to the above disclosures except as may be required by the claims.

What is claimed is:

1. In a transit concrete mixer and agitator, a receptacle having a discharge opening and a surface inclining downwardly toward said opening; and means for moving concrete material away from said opening and toward the upper portion of said surface from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material.

2. In a transit concrete mixer and agitator, a substantially frousto-conical receptacle having a discharge opening at its larger end; and means for moving concrete material within said receptacle from said larger end toward the smaller end from whence it may be returned by gravitational action toward said larger end, to effect agitation or mixing of said material.

3. In a transit concrete mixer and agitator, a rotatable drum having a discharge opening at one end, the peripheral walls of said drum providing a surface inclining downwardly toward said opening; and means for moving concrete material away from said opening and toward the upper portion of said surface from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material.

4. In a transit concrete mixer and agitator, a substantially frusto-conical receptacle, the axis of which is substantially horizontal, having a discharge opening at its larger end and being closed at its smaller end; and means within said receptacle for moving concrete material from said larger end toward said smaller end from whence it may be returned by gravitational action toward said larger end, to effect agitation or mixing of said material.

5. In a transit concrete mixer and agitator, a substantially frusto-conical rotatable drum, the axis of which is substantially horizontal, having a discharge opening at its larger end and being permanently closed at its smaller end; and means within said drum for moving concrete material from said larger end toward said smaller end, from whence it may be returned by gravitational action toward said larger end, to effect agitation or mixing of said material.

6. In a transit concrete mixer and agitator, a substantially frusto-conical rotatable drum, the axis of which is substantially horizontal, having a discharge opening at its larger end and being permanently closed at its smaller end; means within said drum adapted through movement in one direction to move concrete material from said larger end toward said smaller end, from whence it may be returned by gravitational action toward said larger end, to effect agitation or mixing of said material, said means also adapted upon movement in another direction to assist in moving said material from the smaller end toward the larger end and means whereby said drum may be moved in either direction at will.

7. In a transit concrete mixer and agitator, a receptacle having a discharge opening and a surface inclining downwardly toward said opening; means adapted through movement in one direction to move concrete material away from said opening and toward the upper portion of said surface, from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material, said means also adapted upon movement in another direction to assist in moving material from said upper portion toward said opening and means whereby said drum may be rotated in either direction at will.

8. In a transit concrete mixer and agitator, a rotatable drum having a discharge opening at one end, and a surface inclining downwardly toward said opening; spirally arranged blades within said drum adapted when said drum is rotated in a predetermined direction to simultaneously produce a mixing or agitation of concrete materials within said drum, and a constant end to end movement of said materials away from said opening to the upper portion of said surface, said materials returning toward the lower portion of said surface through gravitational action, said blades also serving upon reverse rotation of said drum to assist in movement of said materials downwardly upon said surface toward said opening and means whereby said drum may be rotated in either direction at will.

9. In a transit concrete mixer and agitator, a substantially frusto-conical rotatable drum the axis of which is substantially horizontal, having a discharge opening at its larger end and being permanently closed at its smaller end; spirally arranged blades within said

drum adapted when said drum is rotated in a predetermined direction to simultaneously produce a mixing or agitation of concrete materials within said drum, and a constant end to end movement of said materials from the larger end toward the smaller end of said drum, said materials returning toward said larger end through gravitational action, said blades also serving upon reverse rotation of said drum to assist in said last named movement of the materials toward the larger end and means whereby said drum may be rotated in either direction at will.

10. In a transit concrete mixer and agitator, a substantially frusto-conical rotatable drum the axis of which is substantially horizontal, having a discharge opening at its larger end and being permanently closed at its smaller end; spirally arranged blades within said drum adapted when said drum is rotated in a predetermined direction to simultaneously produce a mixing or agitation of concrete materials within said drum, and a constant end to end movement of said materials from the larger end toward the smaller end of said drum, said materials returning toward said larger end through gravitational action, said blades also serving upon reverse rotation of said drum to assist in said last named movement of the materials toward the larger end, the end portions of said blades at the larger end of the drum being curved to form buckets for assisting in the discharge of the mixed materials through said discharge opening and means whereby said drum may be rotated in either direction at will.

11. In a transit concrete mixer and agitator, a drum; mixing blades within said drum having curved end portions which meet the drum wall substantially tangentially; and filler members for excluding concrete materials from the pockets formed at the meeting points of said blades and walls.

12. In a transit concrete mixer and agitator, a rotatable drum having a discharge opening at one end and a surface inclining downwardly toward said opening; a discharge chute adapted to enter and to be withdrawn from said opening; blades within said drum adapted to perform a mixing and an endwise carrying action away from said opening when the drum is rotated in one direction, and a similar action toward said opening when the drum is rotated in the other direction, the portions of said blades at the discharge end of the drum being shaped to provide buckets adapted to raise and discharge the concrete into said chute when the latter is introduced into said opening and means whereby said drum may be rotated in either direction at will.

In testimony whereof I affix my signature.

CHARLES F. BALL.

DISCLAIMER

1,781,965.—*Charles F. Ball*, Milwaukee, Wis. CONCRETE MIXER AND AGITATOR. Patent dated November 18, 1930. Disclaimer filed January 3, 1934, by the assignee, *Chain Belt Company*.

Hereby enters this disclaimer to the said claims of the said Letters Patent which are in the following language, to wit:

"1. In a transit concrete mixer and agitator, a receptacle having a discharge opening and a surface inclining downwardly toward said opening; and means for moving concrete material away from said opening and toward the upper portion of said surface from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material."

"3. In a transit concrete mixer and agitator, a rotatable drum having a discharge opening at one end, the peripheral walls of said drum providing a surface inclining downwardly toward said opening; and means for moving concrete material away from said opening and toward the upper portion of said surface from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material."

"7. In a transit concrete mixer and agitator, a receptacle having a discharge opening and a surface inclining downwardly toward said opening; means adapted through movement in one direction to move concrete material away from said opening and toward the upper portion of said surface, from whence it may be returned by gravitational action toward said opening, to effect agitation or mixing of said material, said means also adapted upon movement in another direction to assist in moving material from said upper portion toward said opening and means whereby said drum may be rotated in either direction at will.

"8. In a transit concrete mixer and agitator, a rotatable drum having a discharge opening at one end, and a surface inclining downwardly toward said opening; spirally arranged blades within said drum adapted when said drum is rotated in a predetermined direction to simultaneously produce a mixing or agitation of concrete materials within said drum, and a constant end to end movement of said materials away from said opening to the upper portion of said surface, said materials returning toward the lower portion of said surface through gravitational action, said blades also serving upon reverse rotation of said drum to assist in movement of said materials downwardly upon said surface toward said opening and means whereby said drum may be rotated in either direction at will."

[*Official Gazette January 23, 1934.*]