W. H. LARKIN, JR.

MIXER.

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971,051.

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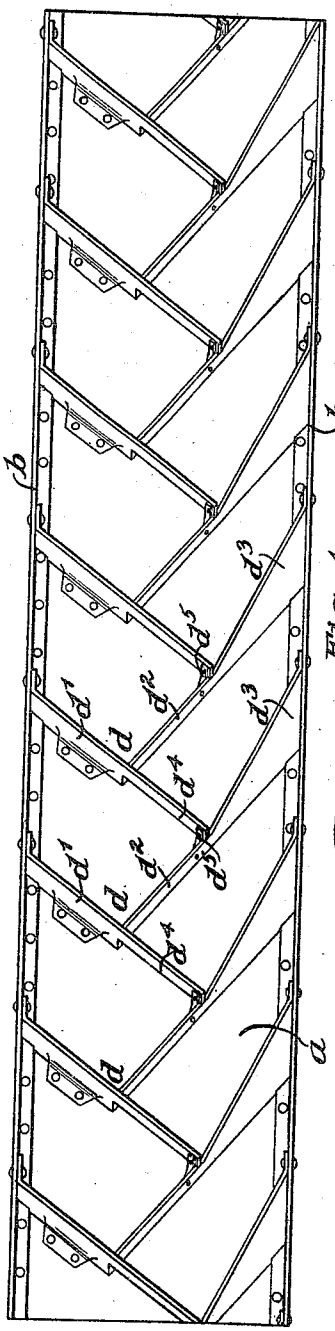

Fig. 1.

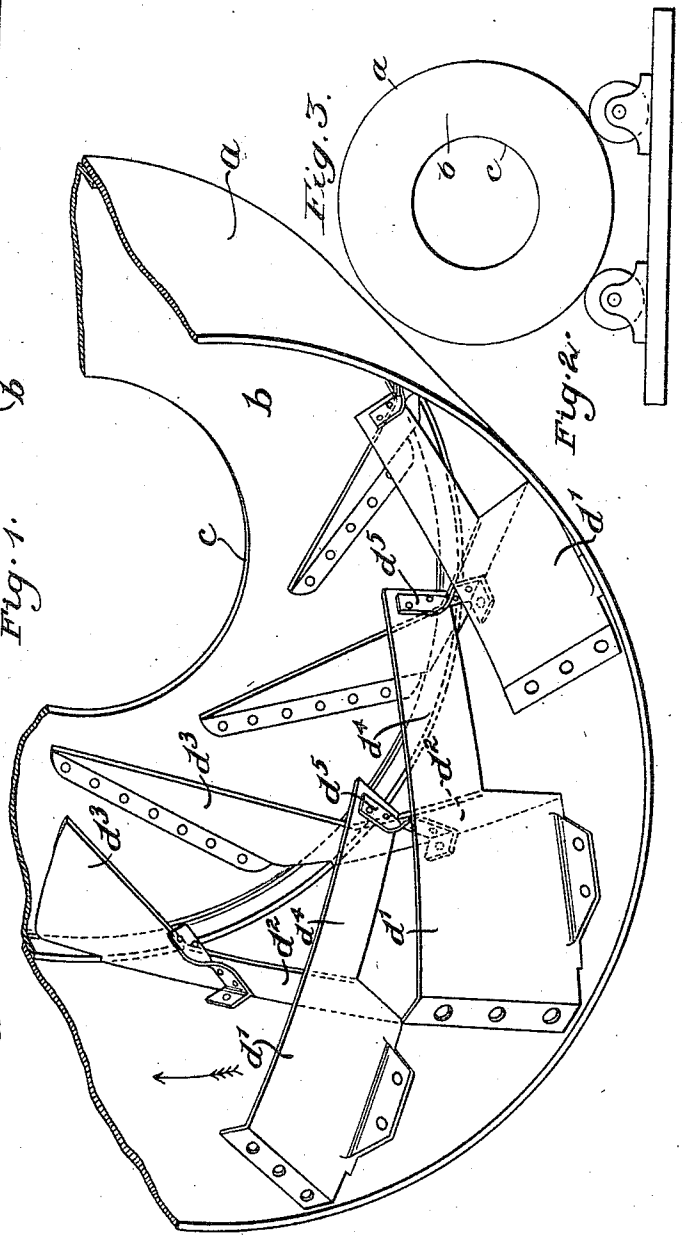

Fig. 2.

Fig. 3.

Witnesses:

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MIXER.

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To all whom it may concern:

Be it known that I, WILLIAM H. LARKIN, Jr., a citizen of the United States, and a resident of Somerville, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Mixers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to mixers, and more particularly though not exclusively, to apparatus intended for the mixing of concrete or the like.

In rotary mixers wherein the mixing action is assisted by the relative movement through the mixer contents of a series of mixing vanes to secure a thoroughly homogeneous mixture, it is desirable that the vanes shall act to move the ingredients progressively and systematically to and fro through the mixing receptacle, as well as to intermingle the various materials which are brought into close association with each other. For instance, in a concrete mixer, if the bulk of the cement has been thrown in on one side of the drum, it is necessary that that cement not only be intermingled with the sand and stone in close association with it, but that it shall be progressively moved toward the opposite end of the drum, back again, and so on, during the mixing operation; otherwise the final mixture at one end of the drum would be richer in cement than that at the opposite end thereof.

One object of my invention has been to effect this uniform and homogeneous mixture by a single construction of vanes or blades. This, as well as other objects of my invention, will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings,—Figure 1 shows a development in plan of the cylindrical drum of a rotary concrete mixer provided with a system of mixing vanes embodying one form of my invention, and Fig. 2 is a perspective of the mixing drum shown developed in Fig. 1, the said drum being partially broken away and having one of its ends removed with a particular view to showing the relation and construction of the mixing vanes. Fig. 3 is a diagrammatic representation of the mixing drum rotatably mounted.

In the drawings I have shown one form of my invention as applied to an ordinary type of rotary concrete mixer, such apparatus ordinarily comprising, as is well-known to those skilled in the art, a suitably supported and driven rotatable mixing receptacle, into which the concrete ingredients are entered and there mixed by the action of suitable mixing vanes secured to the interior of the receptacle and moving with the latter during rotation thereof. In the drawings such a receptacle is presented by the cylindrical drum *a* having an end closure *b*; at each end thereof said closures being provided with axial openings *c* through which the ingredients are entered or discharged. In Fig. 2, for the sake of clearness, but one of the said end closures is indicated, it being understood, however, that a similar closure is employed at the opposite end of the drum. In practice said drum is suitably supported upon roller bearings and is rotated through gearing, said supports and driven means being herein omitted inasmuch as they form no essential part of the present invention. The mixing vanes employed are designed especially with a view to obtaining a constant shifting of the materials back and forth lengthwise the drum, as well as their effective intermingling, and the principles of the vane construction are well illustrated by those shown in the drawings, although it is to be understood that wide departures therefrom, both as to details and relative arrangement of parts, may be made without departing from the spirit of the invention. Referring, however, to the specific details of the illustrated embodiment of my invention, there is provided a series of V-shaped vanes *d*, the individual members of which series are substantially similar. Each vane comprises a relatively broad portion *d'*, the flanged end of which is secured, as by riveting, to the end closure of the mixer, and the flanged bottom riveted to the interior of the mixer body. This broad vane portion is inclined to a plane taken transversely through the mixer and therefore on rotation of the mixer in the direction of the arrow shown in Fig. 2, tends to slide

the materials engaged thereby down the face of the vane toward the vertex of the V-angle, or at the junction of the broad vane with the relatively narrower vane d^2, the latter constituting the opposite side of the V. The vane d^2, which, at its junction with the vane d', is approximately half the width of the latter, extends to the opposite end of the drum on an inclination reverse from that of the broad vane d' and, terminates in a gradually broadened face d^3, which is flanged and riveted to the adjacent end closure of the mixer, the vane at its bottom being fixedly secured to the body of the mixer drum by flanged portions riveted thereto. The junctions of the several sets of V-shaped vanes, preferably but not necessarily, lie in a transverse plane at one side of the central transverse plane of the mixer, the vanes d^2 having the same inclination as the vanes d' and longer than the latter. As the drum rotates and the vanes ascend, the materials are caused to slide down the face of both vanes toward the junction, but the bulk of the materials upon the bottom of the mixer is caused to move in the general direction of the length of the longer vanes d^2. At the same time some of the materials slide over the edge of the vanes and into the compartment formed between the same and the next adjacent vanes, the amount of such material passing over the edges of the vanes increasing as the latter ascend. Finally, the last remnants of the materials elevated by the vanes will be discharged from the vertex. The general effect of these vanes, however, is to produce a plurality of streams of materials flowing down and across the body of the drum in the direction of the elongated vane.

In order to produce counter-flow of material the vane d', which extends above the other vane at the junction therewith, has an extension d^4 beyond the junction and above the bottom or body of the mixer, the said extension being of a width which is the difference between the width of the broad vane and the narrow vane, that is, approximately half the width of the broad vane and extending to the narrower side of the next adjacent V-shaped vane, to which its end is secured in any suitable way, as by the strap d^5. As the vanes ascend much of the material which lies against the broad vane d', whether such material is carried thereto by sliding along the vane d^2 or is dropped on to the said vane from the preceding vanes, will be slid along the vane extension d^4 over and above the material moving transversely thereto in the next adjacent compartment and delivered in part against the opposing face of the next adjacent oppositely inclined narrower vane, but in greater part against the broadened face d^3 of the second adjacent narrower vane and close to that end of the mixer. There is thus produced a flow of material having a general direction from one end of the mixer toward the opposite end thereof lengthwise the longer and narrower vane and a counter-flow toward the opposite end of the mixer in the general direction of the broad faced vane, the former flow being along or adjacent the body of the mixer and the latter over and above the same. This is what I have found occurs in practice and, in fact, during normal operation of a mixer constructed according to the illustrated embodiment of my invention there are produced three or more streams of materials flowing down and obliquely across the mixer body in one direction, and three or more streams flowing transversely the same in an oppositely inclined direction.

The broadened face d^3 of the mixer vane d^2 fulfils a double function in that it prevents the materials which are thrown toward it by the action of the vane extensions d^4 from escaping from the drum through the opening c and also presents in effect a baffle plate to the materials causing the sand and cement which are thrown vigorously thereagainst to be ground together and more effectively intermingled by their very impact against its face.

This mixer is found to be very effective in combining the shoveling action which results from elevating material and then dropping it, the compound shifting action which results from giving the materials the several progressive movements described, and the mixing action which results from the violent meeting of the ingredients with each other and with the various vanes.

When the materials have been sufficiently mixed they are withdrawn from the mixer in the usual way by inserting an inclined chute into the open end of the mixer and allowing the material carried up by the vanes to be dropped on to the same, all of which is well understood by those familiar with the art.

It is to be understood that my invention is not limited to the details or dimensions of the blades which for illustrative purposes have been described or to the construction or relative arrangement of parts or to the application thereof to a mixer of the type or construction shown, but that my invention may be applied to other forms of mixers without departing from the spirit thereof.

The term "drum" is used generically with reference to any form of mixing receptacle and without reference to its geometrical shape.

Claim:

1. A concrete mixer having a rotatable mixing drum and a series of V-shaped mixing vanes therein, each vane having one side of the V higher than the other at the apex

and the other side having a vane extension in line therewith beyond the apex and lying above the peripheral wall of the mixer.

2. A concrete mixer having a rotatable mixing drum, a series of V-shaped mixing vanes therein, one side of the V being higher than the other at the apex and having a vane extension beyond the apex above the bottom of the mixer and extending and secured to the narrower side of the next adjacent set of V-shaped vanes.

3. A concrete mixer having a rotatable mixing receptacle and mixing means secured to the interior thereof to rotate therewith, said means comprising pairs of angularly inclined vanes joined at an angle, one member of each pair being broader than the other at its junction therewith and extending to substantially one end of the mixing receptacle, and the other, narrower member of the pair extending from the junction to substantially the opposite end of the mixing receptacle but terminating in a relatively broader end portion.

4. A concrete mixer comprising a rotatable mixing drum having an axial end opening, mixing vanes secured to the interior of the body of said receptacle and inclined to cause travel of the ingredients contacting therewith toward one end of said receptacle, other vanes inclined transversely of said first mentioned vanes and having each a broadened face opposed to the said vanes near the end opening to prevent escape of the material deflected by said first vanes through said opening.

5. In a rotary concrete mixer, the combination with pairs of annularly inclined mixing vanes, of other vanes each forming an extension of one member of each of said pairs and passing between adjacent pairs but raised above the peripheral wall of the mixer to permit the flow of material beneath the same and serving as baffle plates for the materials moving from one pair of vanes to the next, thereby assisting in the mixing.

6. A rotary concrete mixer having pairs of V-shaped vanes. each pair extending from one end to the other of the mixer, and baffle plates each forming an extension of one of each of said pairs of vanes and connecting these with a vane of an adjacent pair for conveying material from the compartment formed by the former pair to the compartment formed by the latter pair.

7. A concrete mixer having a cylindrical, rotatable drum provided with an axial end opening for the entrance or discharge of materials, mixing means within said drum comprising pairs of V-shaped mixing vanes fixedly secured to the drum to rotate therewith, each pair comprising a relatively broad vane inclined to the axis of the mixer and extending from one end of the mixer to the junction of said vane with the remaining one of the pair, the said remaining one being narrower than said first vane at its junction therewith and extending to the opposite end of the mixer on a reverse inclination, a vane extending from the junction of said two vanes to the narrower one of the next adjacent pair, said V-shaped vanes being secured to the bottom of the mixer, and said extension being separated from said bottom, and the second member of said V-shaped extension being provided with a broadened face lying in the path of the material moved by the preceding vane extension.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

WILLIAM H. LARKIN, JR.

Witnesses:
THOMAS B. BOOTH,
FRANKLIN E. LOW.