Sept. 22, 1959 E. E. POURÉ 2,905,450

MIXERS

Filed June 21, 1957 3 Sheets-Sheet 1

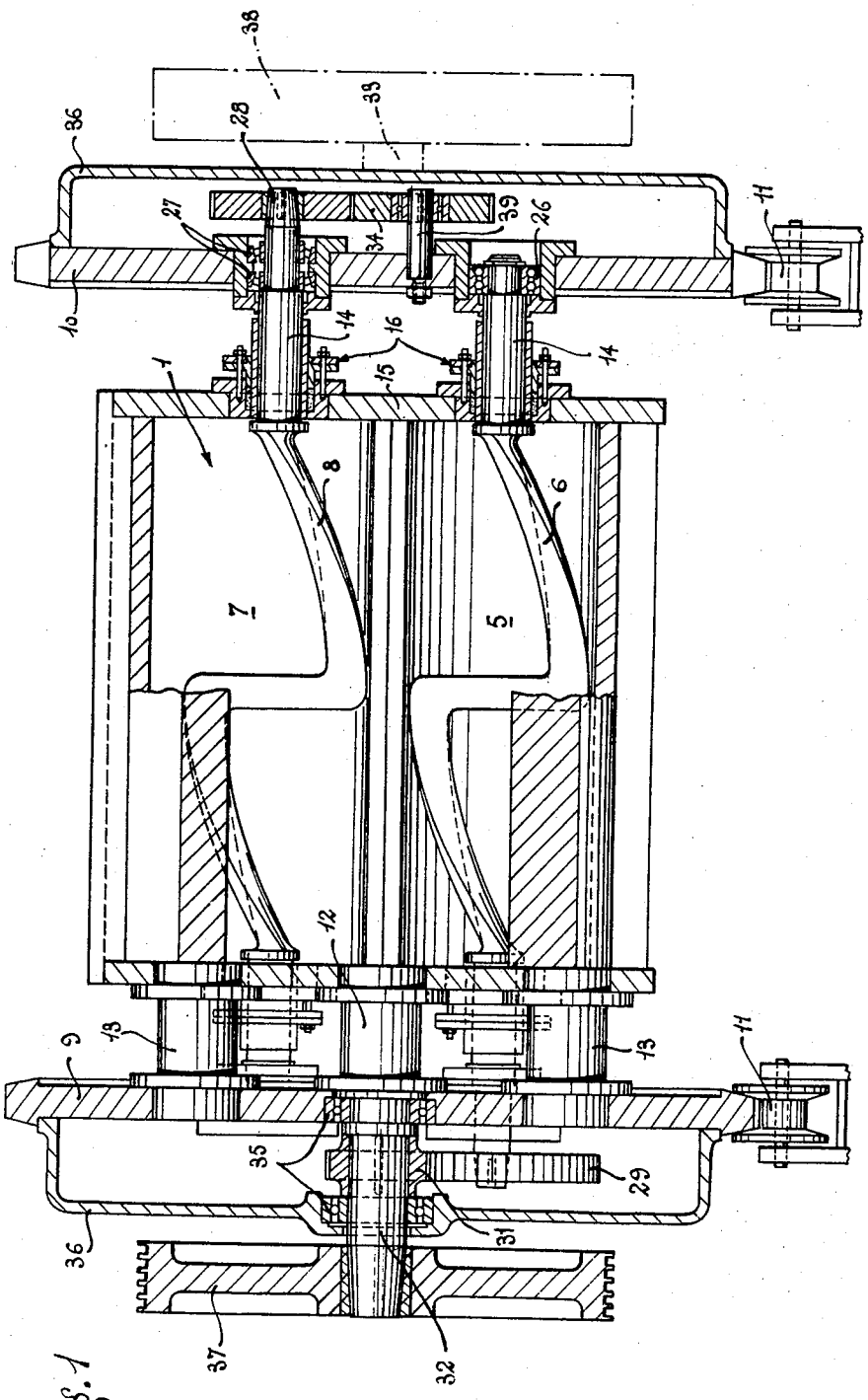


Fig. 1

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Fig. 2

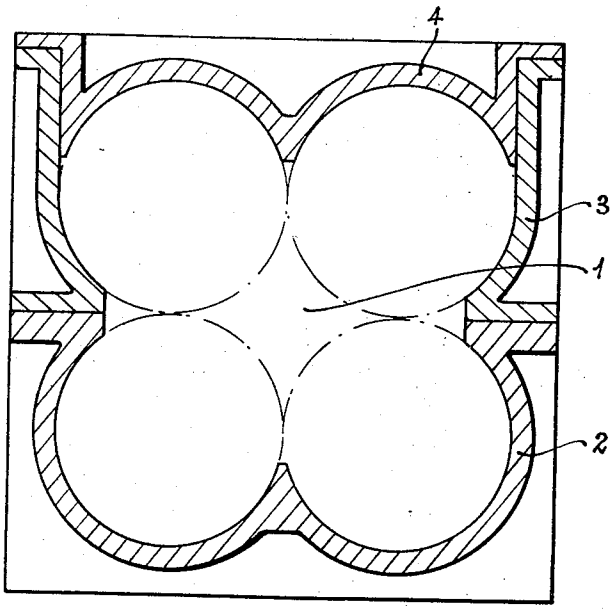


Fig. 3

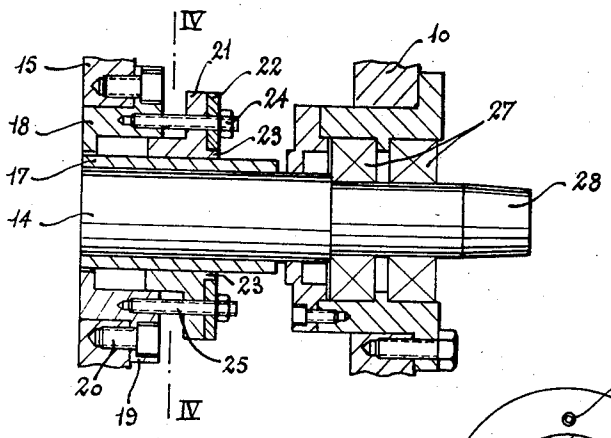


Fig. 4

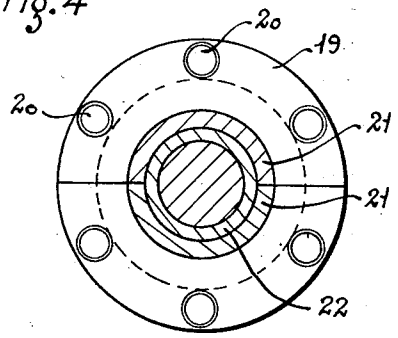
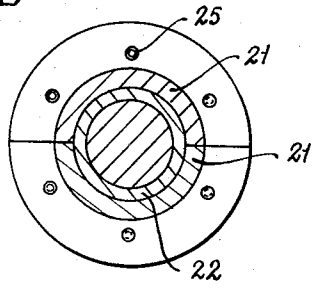


Fig. 5



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Fig. 6

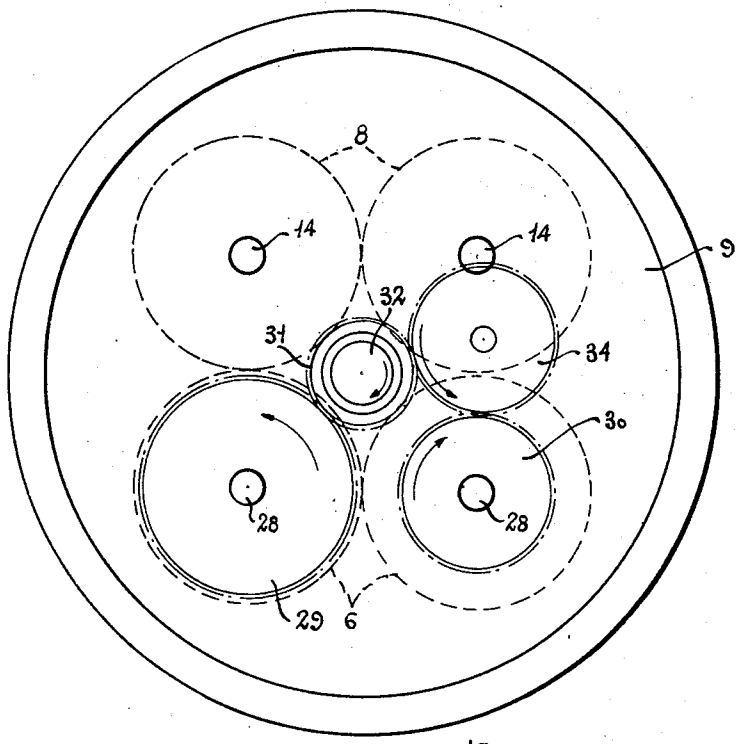
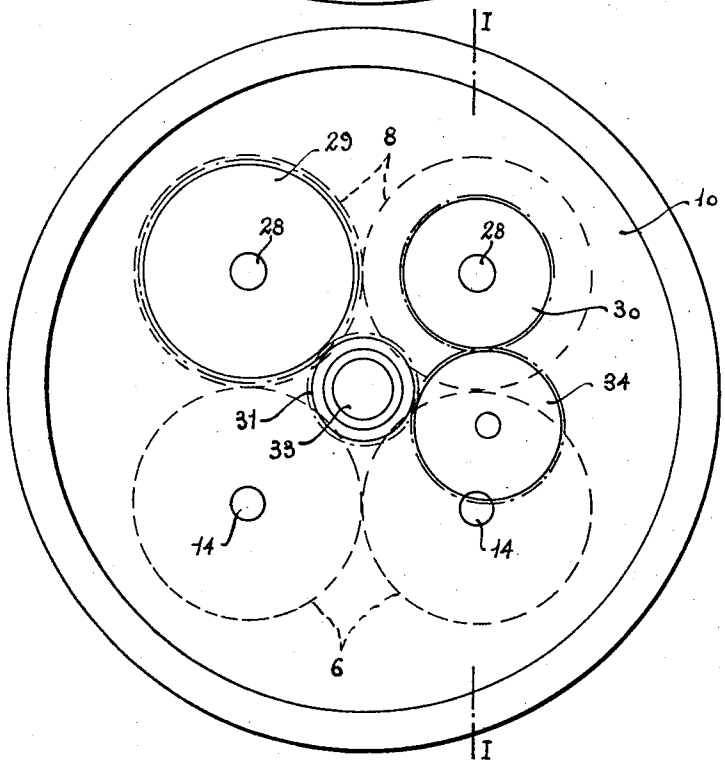


Fig. 7



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MIXERS

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Claims priority, application France June 26, 1956
6 Claims. (Cl. 259—84)

The present invention relates to the known type of mixer, the tank of which is supported between two vertical circular end-plates resting on rollers and is able to rotate about the common axis of the said end-plates, the mixing members inside the tank being formed by helical members parallel to the common axis and driven in rotation through the medium of gearing from a motor drive applied to a shaft which is arranged along the common axis. The mixers of this type constructed up to the present time comprise two mixing helixes which rotate in two cylindrical enclosing cavities, symmetrical with respect to the mean longitudinal plane of the tank containing the common shaft.

In accordance with the invention, the tank contains in one position of symmetry with respect to the helixes at the bottom of the tank around the common shaft, at least one helix for the top of the tank, rotating in a cylindrical enclosing cavity formed in the cover of the tank, the group of helixes at the bottom of he tank and the helix or group of helixes at the top of the tank being operated, through the medium of reduction gears mounted on the circular end-plates at the two extremities of the tank, respectively by separate driving shafts mounted along the extension of the common shaft at the two extremities of the mixer. These shafts are driven, either by two separate motors mounted on the circular end-plates, or by a fixed driving installation driving each of the shafts through a pulley and belt.

The mixer comprises an upper tank helix in the vertical plane of symmetry of the bottom tank helixes passing through the common axis, or alternatively it comprises two upper tank helixes in positions symmetrical with the bottom tank helixes, with respect to the common shaft.

The tank is held between the circular end-plates by three cross-stays arranged in the vertical plane of symmetry, one along the common shaft, at each extremity, and the shafts of the helixes pass through the wall of the tank with dismantlable packing glands in the space between the end wall of the tank and the adjacent end-plate.

The invention will be described by way of example with reference to the accompanying drawings which show one form of construction of a mixer in accordance with the invention, comprising four helixes, and in which:

Fig. 1 is a longitudinal vertical section of the machine, the left-hand half of the section being taken in a vertical plane which passes through the common axis, and the right-hand half being taken in a vertical plane parallel to the axis of the helixes of one side of the tank passing through the line I—I of Fig. 7;

Fig. 2 is a transverse cross-section of the tank provided with its cover, the helixes not being shown;

Fig. 3 is a detail view to a large scale of a packing gland for the shaft of a helix;

Fig. 4 is a cross-section along the line IV—IV of Fig. 3, looking towards the left of that figure;

Fig. 5 is a cross-section taken along the same line IV—IV of Fig. 3, looking towards the right of that figure;

Fig. 6 and Fig. 7 show in elevation from the exterior the circular end-plates, the first being the left-hand end-plate and the second the right-hand end-plate of the machine in Fig. 1.

In the embodiment shown, the tank in accordance with the invention and indicated as a unit by 1, is in transverse cross-section circumscribed by a square (see Fig. 2) and comprises a hollow body formed of two molded members 2 and 3 and a cover 4. The tank assembly 13 shaped internally to provide a plurality of intercommunicating substantially cylindrical recesses which in the plane of cross-section (Fig. 2) are defined by four circles symmetrically located with respect to two mutually perpendicular planes. In the two recesses 5 of the bottom of the tank, two helices 6 rotate, two further helices 8 being housed in the two recesses 7 of the top of the tank, these two groups of two helices being operated independently as will be seen below.

The tank is carried between two circular end-plates 9 and 10, resting on rollers 11, so that the tank can carry out a complete rotation about the intersection line of the two planes of symmetry, which is also the common axis of the end-plates 9 and 10. The tank is fixed to these end-plates at each side by three cross-stays, one of which 12 is on the common axis, the two others 13 being symmetrically located above and below said axis respectively in the mean vertical plane.

The helices are extended by end-shafts 14 which pass through the end walls 15 of the tank through packing glands indicated as a whole at 16, these glands being carried by the adjacent end-plates through the medium of bearings. In its passage through an end wall 15 of the tank, a shaft 14 is provided with a protecting sleeve 17 (see Figs. 3 to 5). The body 18 of the packing gland, in two parts, is centered in a hole drilled in the said wall and carries a flange 19 fixed by screws 20 against this wall. The cap of the packing gland is formed of two half-rings 21 which are coupled together by a ring 22 gripping two half-bosses 23, the half-rings 21 providing a support for the clamping nuts 24 which are screwed on threaded studs 25 fixed on the body 18.

By reason of this construction, it is easy to dismantle the packing glands in the fairly narrow space between the ends of the tank and the adjacent circular end-plate. When the nuts 24 are removed, the ring 22 can in fact be pulled off and each half-ring 21 is then removed so as to change the packing of the gland, after which the latter is re-assembled. After removing the cap and the packing, the body 18 of the packing gland can also be removed.

The groups 6 and 8 of two helices are operated from the opposite ends of the mixer. In the example shown, the helices 6 of the bottom of the tank are operated from the left-hand extremity of Fig. 1 and the helices 8 of the top of the tank from the right-hand extremity. The shafts 14 of the helices at the non-driving extremity are carried by the adjacent end-plate by ordinary bearings 26. The shafts 14 of the driven extremity are carried in the end-plate by thrust bearings 27 and extend beyond the end-plate by a coupling shaft end with a conical bearing surface 28 on which is keyed a gear 29 or 30. For one of the helices (see Figs. 6 and 7), this gear 29 is of large diameter and is directly engaged with a pinion 31 keyed on an end-shaft 32 or 33 mounted on the common axis in the line of extension of the central cross-stay 12. For the other helix, this gear 30 is of smaller diameter and is coupled to the said pinion 31 by an intermediate wheel 34. The two helices of the same set thus rotate in opposite directions at different speeds.

The arrangement of the driving members is the same at both extremities of the mixer. The driving shaft 32 or 33 is carried by bearings 35 between the end-plate

9 or 10 and a hood 36 fixed on the end-plate and covering the gears. It projects from the outside of this latter and carries a driving pulley 37 or 38 so that it can be driven by a belt from a separate fixed motor (not shown). The intermediate gears 34 of each extremity are mounted on bearings on shafts 39 fixed to the end-plate 9 or 10.

The drives of the two extremities of the mixer being independent can be carried out at different speeds, either by the motors rotating at different speeds or by the transmissions of their movement to the shafts 32 being effected through different reduction gearing. In addition, the couplings through gears of the two extremities may be in different ratios. The fixed driving source may be common and the transmissions may be provided with clutches. For the drive of each end-shaft, two motors could also be used and mounted on the end-plates, but it is more convenient for the motors to be fixed.

The mixer described enables mixing operations to be carried out in two stages, certain mixtures requiring first of all a slow rate of stirring and then a rapid stirring and this without there being any need to modify the reduction ratios of the drive of the two pairs of helices. In the first operating stage, the tank is placed in such manner that one of the pairs of helices is at the lower portion and the mixing operation is carried out with these helices. Then the motor drive of these helices being stopped and the tank having been rotated through 180° about the common axis, the other motor drive is started up so as to complete the mixing operation at a different mixing speed. The advantage is that the mixing in two stages is carried out in the same machine, the appropriate motor drives being put into operation in succession. They could also operate together since this does not prevent the rocking movement of the tank. If so desired, it is also possible to rotate the tank in a continuous manner during the mixing operation so as to ensure the alternate action of the helices which rotate at different speeds. The loading of the tank is normally effected in the position at which the cover is at its uppermost position and it is the helices of the bottom of the tank which carry out the mixing in the first stage, so that it is not necessary to rotate the tank in order to commence the operation. The tank can be emptied, after removal of the cover in its top position, by turning the tank around as in the case of known mixers of the type referred to.

The invention is of course in no way limited to the embodiment described by way of example. In particular, as the mixing member at the top of the tank, there could be a single helix located in the vertical plane of symmetry, the top of the tank and the cover then having a different shape from the bottom of the tank so as to de-limit around this helix the enclosing cylindrical cavity necessary.

What I claim is:

1. A mixer of the type described and comprising, in combination, a base member, rollers supported on said base, a pair of spaced vertical circular end plates rotatably supported on said rollers for rotation about a common axis, a tank supported between said end plates, said tank comprising a lower portion, an upper portion and a cover, detachably secured together, the assembly being shaped internally so as to define a plurality of substantially cylindrical recesses parallel to said axis, at least one rotatable lower mixer helix mounted in the lower portion of said tank, at least one rotatable upper mixer helix mounted in the upper portion of said tank, said upper and lower helices being disposed symmetrically with respect to a vertical plane passing through said common axis, each said helix being partially enclosed in one of said recesses, separate driving means for individually driving said upper and lower mixer helices, separate driving shafts for the upper and lower helices respectively, said shafts being mounted one in each of said end plates on the common axis, and reduction gears provided between said driving shafts and the driven helices, said gears being mounted on said end plates, whereby said upper and lower helices rotate independently at different relative speeds in opposite directions.

2. A mixer as claimed in claim 1, in which said separate driving means each comprise a motor actuating the corresponding driving shaft, said motor being mounted on the corresponding circular end plate.

3. A mixer as claimed in claim 1, and further comprising a pulley mounted on each said driving shaft and a belt coupling said pulleys each to a fixed driving installation.

4. A mixer as claimed in claim 1, and comprising two upper helices and two lower helices, said driving means comprising means for rotating said upper helices in opposite directions and at different relative speeds and means for rotating said lower helices in opposite directions and at different relative speeds.

5. A mixer as claimed in claim 1, and comprising two upper helices in symmetrical relation with two bottom helices with respect to said common axis.

6. A mixer as claimed in claim 1, and further comprising three cross-stays supporting said tank between the circular end plates, said cross-stays being disposed in the vertical plane of symmetry, one in said common axis, one above said axis and one below said axis.

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