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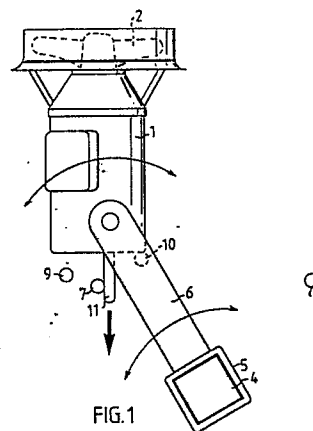
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54 **A submersible mixer with oscillating device.**

57 The invention concerns a submersible mixer for mixing fluids being directed along a vertical guide.

The mixer is so arranged that the reaction force from its propeller causes the mixer to oscillate between two extreme positions, thus obtaining a more sufficient mixing of the liquid.



Description

A SUBMERSIBLE MIXER WITH OSCILLATING DEVICE

This invention concerns a device for a mixer for mixing liquids, which device automatically changes the direction of the mixer to increase the liquid volume operated by the mixer making the mixing more effective. Such mixers are used for mixing liquids and suspensions of different kinds and may be placed in tanks in water courses etc.

A submersible mixer comprises a driving unit such as an electric motor and a propeller built together into a unit which is normally arranged to be lowered into the liquid along a vertical guide. By help of this it is simple to hoist the mixer for service work. In order to be able to guide the mixing in different directions the mixer is normally turnable in the horizontal as well in the vertical plane and sometimes even the vertical guide is turnable. The guiding or controlling is carried out manually, but an automatic adjustment by help of an external driving source could occur. A manual guiding can of course not be continuous and a separate driving source means a considerable additional cost, especially at outdoor installations such as purification plants and means for preventing formation of ice.

In order to obtain an automatically varying direction of a mixer without any need for an external energy source, the force created by the mixer itself is used.

The invention is described more closely below with reference to the enclosed drawings which show two different embodiments.

Fig 1 shows a vertical view of a device according to the invention, where the oscillation is obtained by help of an asymmetric arrangement of the mixer, while Figs 2 and 3 show a horizontal and a vertical view of a mixer provided with rudders.

In the drawings 1 stands for a mixer with a propeller 2 and a rack 3. 4 stands for a guide and 5 sliding means. 6 stands for a connection arm, 7, 8, 9 and 10 stopping means, 11 actuating means, 12 rudders, 13 spring means and 14 and 15 actuating means. F stands for the reaction force.

In the embodiment shown in Fig 1 the mixer 1 is arranged on and may be slidable along a vertical guide 4, the arm 6 attaching the mixer to the guide being inclined with regard to the longitudinal axis of the mixer. This causes the reaction force F from the propeller 2, to be directed at the side of the guide 4. The arm 6, is pivotally attached to the mixer which means that the latter will turn around that joint during operation.

The arm 6 may also within limits be pivoted around the guide 4 or, as in the drawing, the whole guide 4 may be turnable. By suitably arranged stopping means 7 and 8 for the arm 6 and 9 and 10 for the mixer 1 and an actuating means 11, the mixer will then oscillate automatically between two decided positions without any need for external energy. In this way may, as mentioned above, a more efficient mixing be obtained with an unchanged energy consumption.

According to the embodiment shown in Fig 2 the

mixer 1 is pivotally attached to the vertical guide 4. In addition the mixer is provided with one or several rudders 12, placed in the current created by the mixer. The rudder or rudders are provided with springs 13, which direct them in two alternative inclinations. The function is described below.

When the rudder 12 takes its one position, which deviates from the direction of the current created by the mixer, the reaction force F from the propeller will act on the rudder and turn the mixer to bring the jet away from the rudder surface. During the turning the rudder, which is mounted on the mixer, accompanies said turning movement and after a certain angle it contacts a fixed stopping means 8. The mixer continues its turning movement further until the rudder 12, influenced by the stopping means 8, changes its angle with regard to the current direction. At first it takes a position in parallel with the current and then a certain angle in the opposite direction. The change-over is facilitated by a spring 13, which is stretched when the rudder takes its middle position in parallel with the current.

When the rudder 12 has taken its opposite angle position with regard to the current direction, the reaction force F from the propeller will act upon the rudder in the opposite direction. This turning will continue until the rudder, after a certain angle, comes into contact with another stopping means 7. Further turning means finally that the rudder changes its position again and a turning of the mixer in the opposite direction starts again. In this way an oscillating movement of the mixer is obtained, which movement takes place automatically and without the need of any external energy source.

In order to secure the function and diminish the risk for disturbance in the current, there are preferably two rudders provided, one at each side of the propeller circumference. The two rudders will then alternatively be present within the current. They are, however, linked to each other such that they always turn in uniform.

It is also possible to arrange one or several rigid rudders having directions such that the mixer always turn in one and the same direction thus obtaining a full rotary movement. This means, however, that the electric current to the motor must be fed in a special way. It might then be preferable to attach the mixer rigidly to the guide and let the latter be rotary.

In order to secure a suitable turning speed for the mixer, a dampening means is arranged which prevents the mixer from jittering without control. This can be obtained by help of hydraulic dampeners having link arms.

Claims

1 A submersible mixer for liquids having an automatically changing of its direction, compris-

ing a mainly vertically oriented guide the lower end of which being attached to the bottom of a tank containing the liquid and a mixer slidably arranged on said guide, characterized in that the mixer (1) during operation automatically changes its direction horizontally and/or vertically influenced by the reaction force (F) from its own jet, without any adding of external energy, the movement of the mixer being limited by stopping means (7, 8).

2 A submersible mixer according to claim 1, characterized in that the mixer (1) is allowed to turn partly or entirely around its guide (4).

3 A submersible mixer according to claim 1, characterized that the mixer (1) is rigidly attached to the guide, while the latter is rotary.

4 A submersible mixer according to claim 1, characterized in that the mixer (1) is arranged to oscillate horizontally or vertically between two extreme positions.

5 A submersible mixer according to claim 1, characterized in that the mixer (1) is arranged to rotate around a vertical axis.

6 A submersible mixer according to claim 1, characterized in that the mixer (1) is provided with at least one rudder (12), arranged in the current created by the mixer, said rudder or rudders being turnable around an axis, axes, in parallel with the guide (4) around which the mixer may turn and being arranged to automatically turn between two inclined positions with relation to the direction of the flow from the mixer.

7 A submersible mixer according to claim 6, characterized in that the mixer (1) is provided with two rudders (12) in parallel being alternatively present in the current from the mixer.

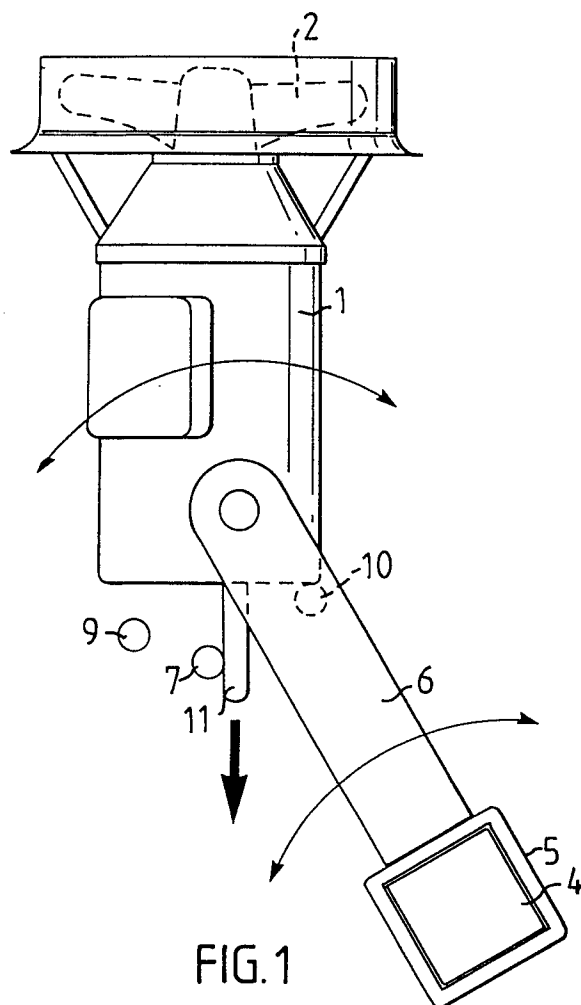
8 A submersible mixer according to claim 6, characterized in that the rudder, or rudders (12) are provided with spring means (13), which act upon the rudder or rudders to take two alternative inclined positions with relation to the current from the mixer.

9 A submersible mixer according to claim 1, characterized in that the mixer (1) is so directed with relation to the guide (4), that the reaction force from the mixer is directed at the side of the guide, the force then created causing the mixer to turn, the turning being controlled by stopping means (7, 8, 9 and 10) and actuating means (11).

10 A submersible mixer according to claim 1, characterized in that a dampening means is arranged which limits the speed of the turning movement and/or its frequency.

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EUROPEAN SEARCH REPORT

Application Number

EP 88 85 0102

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-3 136 345 (RIEBI) * claims 1-4; figure * ---	1-3	B 01 F 11/00 B 01 F 15/00
A	US-A-2 233 588 (J.D. CROOK) * claim 1; figures 1,3,5 * ---	1-5	
A	EP-A-0 107 406 (AIR-O-LATOR CORP.) * claim 4; figure 1 * ---	1	
A	EP-A-0 197 903 (FLYGT AB) * claim 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 01 F 7/00 B 01 F 11/00 B 01 F 13/00 B 01 F 15/00 F 04 D 19/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 28-06-1988	Examiner KESTEN W.G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			