(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 381 635 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90850003.6**

(22) Date of filing: **03.01.90**

(51) Int. Cl.5: **B01F 3/04, B01F 7/00, C02F 3/20, A01C 3/02**

(30) Priority: **11.01.89 DE 3900630**

(43) Date of publication of application: **08.08.90 Bulletin 90/32**

(84) Designated Contracting States: **AT DK ES FR GB IT SE**

(71) Applicant: **Flygt AB**
Box 1309
S-171 25 Solna(SE)

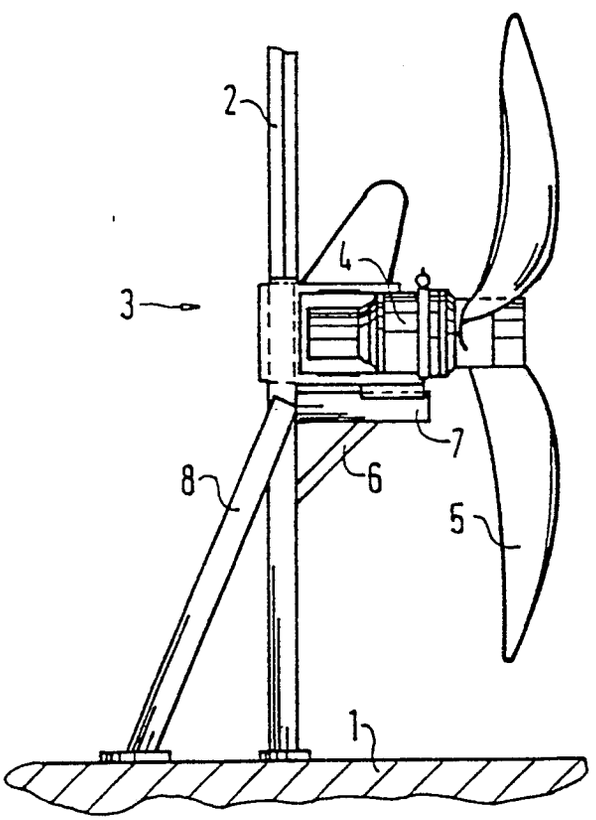
(72) Inventor: **Koch, Fred**
Hauptstrasse 16
D-3053 Hohnhorst(DE)

(74) Representative: **Larsson, Sten**
Flygt AB Box 1309
S-171 25 Solna(SE)

(54) Submersible mixer.

(57) Submersed-motor agitator for mixing and sludge activation vessels having a submersible-motor (4) driven propeller (5) that is mounted so as to be capable of being slid up and down on a guide tube (2) standing vertically to the bottom (1) of the vessel and resting form locking on a support arm (7) that is secured to the guide tube (2) whereby the guide tube (2) is only secured to the bottom (1) of the vessel and is provided with two struts (8, 9) to bear the reaction forces applied by the motor (4) and propeller (5), the said struts (8, 9) being secured at one end to the guide tube (2) beneath the agitator assembly (3) and at their opposite end to the bottom (1) of the vessel.

Fig.1



EP 0 381 635 A1

Submerged-motor agitator for mixing and sludge activation vessels

Agitators are used in process engineering and sewage treatment plant for the circulation and transport of bulk fluids and for for the mechanical agitation of sludge particles.

A particularly suitable means of circulating bulk fluids is the use of submerged-motor agitators that have a motor driven propeller and that work completely immmersed in the fluid. Submerged-motor agitators thoroughly distribute sludge particles, gases and other substances throughout the entire content of the vessel since the very considerable impulse forces transmitted with a low application of energy by the propeller hydraulics thoroughly intermix the suspension.

If optimal intermixture is to be effected, the agitator needs to be installed as nearly horizontal as possible and in order to achieve this, the submerged-motor agitator is mounted on a guide tube that is secured to the bottom of the vessel. Because of the considerable thrust generated by the propeller, it is necessary for the guide tube to be of very strong construction. Submerged-motor agitators of the prior art therefore have an additional guide tube secured to the upper edge of the vessel.

For certain applications, however, it may be necessary for the submerged-motor agitator to be located more towards the centre of the vessel in which case use is made of a bridge, stretching across the vessel, to which the upper end of the guide tube is secured. The disadvantage of such an arrangement is that either a bridge has to be provided solely for the purpose of securing the upper end of the guide tube, which adds considerably to the cost, or in the case of vessels already having a bridge provided for other purposes, that use of the submerged-motor agitator is severely limited if not impossible, and will at least be extremely complicated. Bridges of this nature are generally rotating bridges so that before they can be used for their original purpose the submerged-motor agitator has to be withdrawn from the vessel or at least be raised sufficiently from the bottom of the vessel for it to be possible to rotate the bridge.

The submerged-motor agitator for mixing and sludge activation vessels that is the subject of the invention, having the characterizing features detailed in the main claim, has the advantage over such units that the agitator can be located in any desired position within the vessel and at any desired height above the bottom of the vessel. Secure holding of the submerged-motor agitator is ensured by the special arrangement of the guide tube with its two supports directed downwards and secured to the bottom of the vessel. The design of the guide tube as covered by the invention has the additional advantage that the considerable reaction force transmitted from the submerged-motor agitator is absorbed by the two supports that are inclined downwards from the agitator towards the bottom of the vessel.

A further advantage is the simple and inexpensive design and mounting of the submerged-motor agitator in accordance with the invention with the guide tube being secured only to the bottom of the vessel.

A further advantage is that the submerged-motor agitator in accordance with the invention, with the guide tube fastened only to the bottom of the vessel, is that it can also be used in conjunction with a rotating bridge. There is no need for the submerged-motor agitator to be withdrawn from or lifted out of the vessel when the rotating bridge is in operation.

Raising or removing the agitator for servicing can be effected without difficulty by means of a conventional lifting derrick and thus use of a submerged-motor agitator in accordance with the invention is particularly advantageous in the case of vessels that are not only filled occasionally, such for example as sludge activation vessels, since such vessels cannot be entered for the performance of servicing operations.

Additional features and advantageous details of the design of the invention are to be found in the description that follows, in the drawings and in the claims.

Shown are:

Fig.1 A side view of a submerged-motor agitator in accordance with the invention, having the guide tube secured to the bottom of the vessel and

Fig.2 A view from above of the guide tube with its lateral supports and support for the agitator unit, each as simplified representations.

The side view of the submerged-motor agitator illustrated in Fig. 1 shows, secured to the bottom 1 of a vessel, a vertical guide tube 2 on which the agitator 3, comprising a motor 4 and propeller 5, is carried and can be slid.

The agitator rests form locking on a support arm 7 that is secured to the guide tube 2 and supported by a strut 6 at at least such a distance from the bottom 1 of the vessel that the propeller 5 is able to rotate freely. At about the same height as the support arm 7, two struts 8, 9 are similarly secured at one end to the guide tube 2. The two struts are set to slope downwards each at an acute angle relative to the guide tube 2 and approximately at a right angle to one another, to have their

oposite ends secured to the bottom 1 of the vessel. The mechanism for raising and lowering is not shown.

Fig. 2 illustrates the angular relationship between the two struts 8, 9 and the support arm 7 in a projection to a level vertical to the guide tube. The angle between the two struts 8, 9 should preferably be around 90° and that between the support arm 7 and each of the two struts 8, 9 should preferably be around 135°.

Any of the characteristic features in the claims that follow and that are shown in the drawing can be of importance to the invention either individually or in any combination one with another whatever.

Claims

1. A submerged-motor agitator for mixing and sludge-activation vessels comprising a propeller driven by an electric motor, designed as a submersible motor, mounted so as to be capable of being moved up and down on a guide tube directed at right angles to the bottom of the vessel and so as to rest, when in its working position, form locking on a support arm that is secured to the guide tube,
characterized by
the guide tube (2) only having provision for its being secured to bottom (1) of the vessel and by two struts (8, 9) being provided to bear the reaction forces applied by an agitator comprising a motor (4) and a propeller (5). Said struts being secured at one end to the guide tube (2) beneath the agitator and having provision at their opposite end for them to be fixed to the bottom (1) of the vessel.

Fig.1

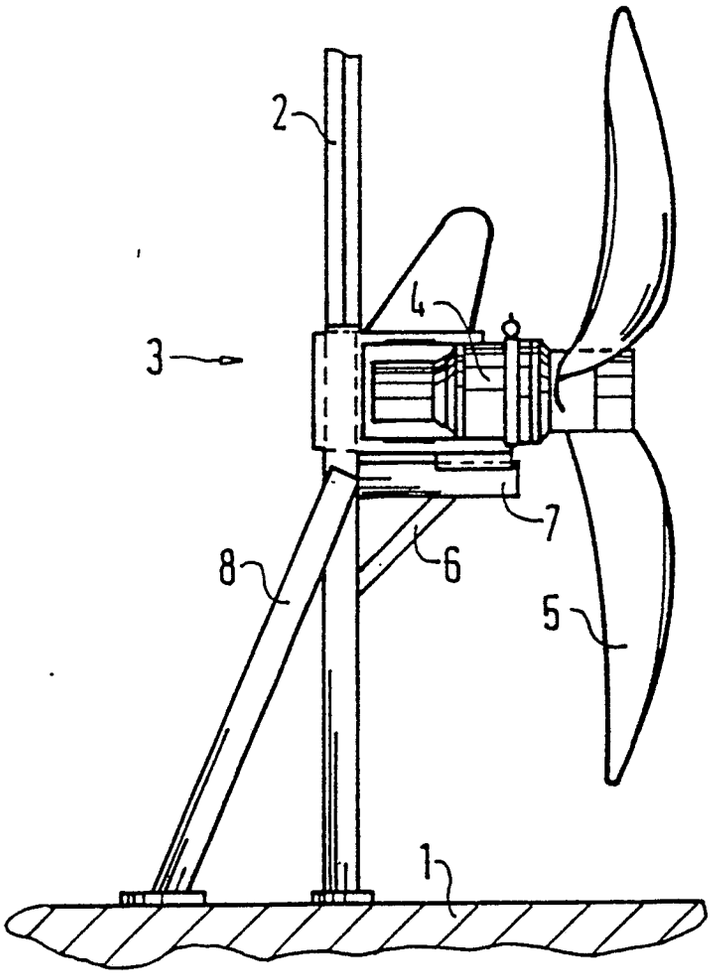
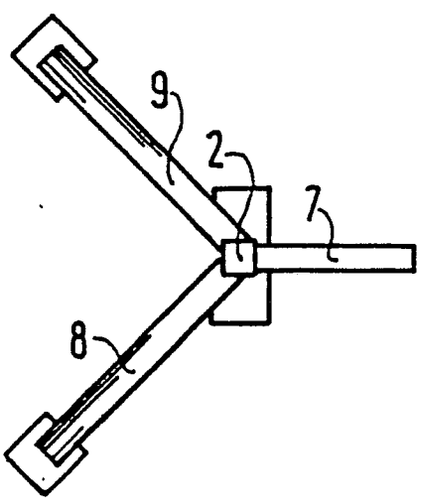


Fig.2



European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 85 0003

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.5)
Y	GB-A-2 110 550 (R.T. BEARDMORE AND SONS) * figure 1 *	1	B 01 F 3/04 B 01 F 7/00 C 02 F 3/20 A 01 C 3/02
Y	DE-A-3 427 584 (FRANZ EISELE & SOEHNE GMBH) * figure 1 *	1	
Y	DE-A-3 420 094 (SUEDSTALL GMBH) * figure 1; page 11, lines 7-9 *	1	
Y	US-A-4 581 182 (B.G. CRAMER et al.) * claims; figure 1 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 01 F 3/04
B 01 F 7/00
B 01 F 7/06
B 01 F 7/16
C 02 F 3/20
A 01 C 3/02

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	13-02-1990	CORDERO ALVAREZ M.

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

EPO FORM 1503 03.82 (P0401)