
(12) PATENT ABRIDGMENT (11) Document No. AU-B-45494/89
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 619625

(54) Title
SUBMERGED-MOTOR AGITATOR FOR MIXING AND SLUDGE ACTIVATION VESSELS

International Patent Classification(s)

(51)⁴ **B01F 007/06**

(21) Application No. : **45494/89**

(22) Application Date : **23.11.89**

(30) Priority Data

(31) Number	(32) Date	(33) Country
3990630	11.01.89	DE FEDERAL REPUBLIC OF GERMANY

(43) Publication Date : **19.07.90**

(44) Publication Date of Accepted Application : **30.01.92**

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(56) Prior Art Documents
DE 3420094
US 4581182
GB 2110550

(57) Claim

1. A submerged-motor agitator comprising:
 - a vertical guide tube adapted to be connected at a lower end thereof to a vessel floor,
 - a support arm secured to the guide tube at an intermediate position thereof,
 - an electric submersible motor adapted to slide between an upper end of the guide tube and a rest position upon said support arm,
 - a propeller adapted to be turned by said motor, and
 - a pair of struts, each adapted to extend between the vessel floor and a location of the guide tube not above said intermediate position so as to counteract thrust forces generated by said propeller.

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COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

COMPLETE SPECIFICATION

619625

(ORIGINAL)

FOR OFFICE USE:

Class Int Class

Complete Specification Lodged:
Accepted:
Published:

Priority:

Related Art:

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Complete Specification for the invention entitled:

Submerged-Motor Agitator for Mixing and Sludge Activation
Vessels

The following statement is a full description of this invention, including the
best method of performing it known to me/us

Submerged-motor agitator for mixing and sludge
activation vessels

- Agitators are used in process engineering and sewage treatment plants to affect circulation and transport of bulk fluids and for the mechanical agitation of sludge particles. A particularly suitable means of circulating bulk fluids is by use of submerged-motor agitators having a motor driven propeller and which operates completely immersed 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.



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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.

There is disclosed herein a submerged-motor agitator comprising:
a vertical guide tube adapted to be connected at a lower end
thereof to a vessel floor,

5 a support arm secured to the guide tube at an intermediate position
thereof,

an electric submersible motor adapted to slide between an upper end
of the guide tube and a rest position upon said support arm,

a propeller adapted to be turned by said motor, and

10 a pair of struts, each adapted to extend between the vessel floor
and a location of the guide tube not above said intermediate position so
as to counteract thrust forces generated by said propeller.

Advantageously, 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 may be ensured by
15 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 may be absorbed by the two supports that are inclined downwards
20 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 with the guide tube being
secured only to the bottom of the vessel.

A further advantage is that the submerged-motor agitator with the
25 guide tube fastened only to the bottom of the vessel 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
30 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 as for example sludge activation vessels, since such
vessels cannot be entered for the performance of servicing operations.

35 A preferred form of the present invention will now be described by
way of example with reference to the accompanying drawings, wherein:



Fig. 1 is a schematic side view of a submerged-motor agitator having the guide tube secured to the bottom of the vessel, and

Fig. 2 is a schematic plan view of the guide tube with its lateral supports and support for the agitator unit.

- 5 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.

- 10 The agitator 3 rests on a support arm 7 that is secured to the guide tube 2 and supported by a strut 6 at least at 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 15 2 and approximately at a right angle to one another, to have their opposite ends secured to the bottom 1 of the vessel. The mechanism for raising and lowering is not shown.

- 20 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°.



PMS/29301

The claims defining the invention are as follows:

1. A submerged-motor agitator comprising:

a vertical guide tube adapted to be connected at a lower end thereof to a vessel floor,

5 a support arm secured to the guide tube at an intermediate position thereof,

an electric submersible motor adapted to slide between an upper end of the guide tube and a rest position upon said support arm,

a propeller adapted to be turned by said motor, and

10 a pair of struts, each adapted to extend between the vessel floor and a location of the guide tube not above said intermediate position so as to counteract thrust forces generated by said propeller.

2. The agitator of claim 1 wherein at a point of interconnection of said struts and said guide tube, the angle between said struts is
15 approximately 90 degrees.

3. A submerged-motor agitator substantially as hereinbefore described with reference to the accompanying drawings.

DATED this THIRTEENTH day of NOVEMBER 1991

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Fig.1

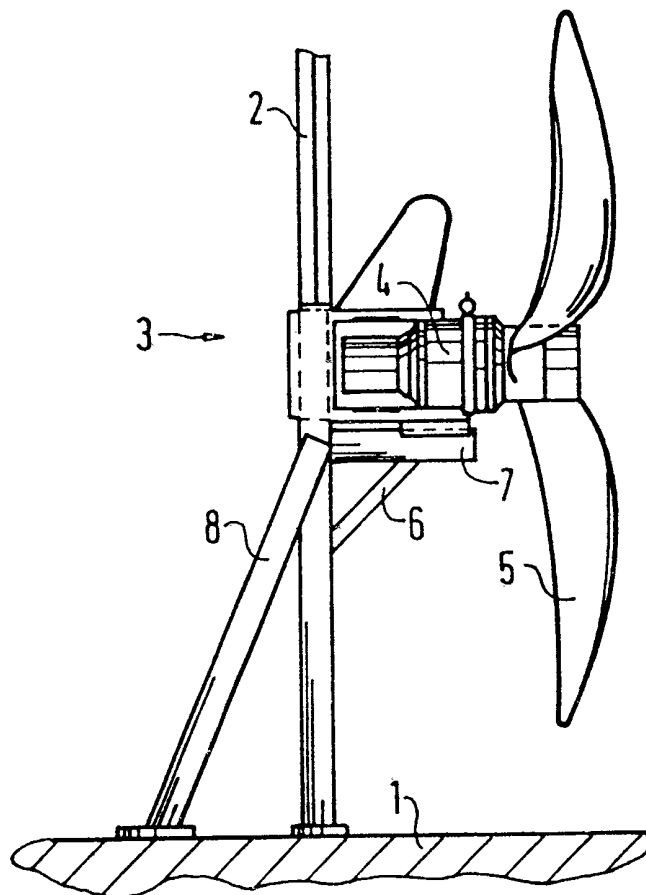


Fig.2

