SURFACE VENTILATION ROTOR

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ABSTRACT
A surface ventilation rotor is provided for circulating and introducing air into liquid in a clarification plant. The inside of the rotor is sub-divided by means of blades into a number of channels. The blades are provided with corrugated cutting edges co-operating with a stationary cutting blade.

1 Claim, 7 Drawing Figures
SURFACE VENTILATION ROTOR

The present invention relates to a surface ventilation rotor for circulating and introducing oxygen or an oxygen mixture into a liquid in particular into a liquid located in an activation tank of a clarification plant, the inside of which is subdivided by means of blades into a plurality of liquid conveying channels.

It is already known to reduce or remove coarse and fibrous materials prior to entry into the activation tank so that there are no complications in the activation tank and in particular in the surface ventilation rotor used therein. This means that additional driving units are required, and this is complicated and relatively expensive.

It has further been shown that by using normal cutting blades hairs or nylon threads for example are not cut and this leads to blockages despite the presence of a reduction device.

The invention aims to provide a surface ventilation rotor which does not have the disadvantages, previously referred to, of the solutions known thus far.

According to the invention there is provided a surface ventilation rotor for circulating and introducing oxygen or an oxygen mixture into a liquid located in an activation tank of a clarification plant, the inside of which rotor is subdivided by means of blades into a plurality of liquid conveying channels, the said blades being provided at their leading edges with cutting blades located in a plane extending perpendicular to the axis of rotation of the rotor, these blades cooperating, with a view to achieving a shearing effect, with at least one stationary cutting blade housed in the axis of rotation of rotor, the co-operating cutting edges of the cutting blades being so shaped that the shearing angle increases and decreases several times along the cutting edges.

It is expedient if at least the cutting edge of the stationary cutting blade has a zig-zag or corrugated shape.

It is advantageous if the stationary cutting blade is embodied in a plane containing the axis of rotation of the rotor body, adapted to be displaced relative to the cutting blades which are firmly connected to the rotor body and that clamping means, housed on a stationary securing member, are provided to clamp the same in a set position.

In order to be able to use the surface ventilation rotor in both directions of rotation it is expedient if the cutting blades are each provided with two cutting edges lying one above the other, so as to achieve a shearing effect in both directions of rotation of the rotor body.

The invention is further explained below by way of example with the help of the drawings, in which:

FIG. 1 is a side view, partially in section, of a surface ventilation rotor according to the invention;
FIG. 2 is a section along line II—II in FIG. 1;
FIG. 3 is a view along the line III—III in FIG. 1 looking towards the suction aperture of the rotor;
FIG. 4 is a section along line IV—IV in FIG. 1 through a cutting blade;
FIG. 5 is a view along the direction of arrow A in FIG. 4;
FIG. 6 is an analogous view to that in FIG. 5 to illustrate another cutting edge configuration; and
FIG. 7 is a diagrammatic representation intended to explain the shearing angle.

The surface ventilation rotor shown in the drawing serves to circulate and introduce oxygen or an oxygen mixture into a liquid contained in an activation tank of a clarification plant, the inside of the surface ventilation rotor being subdivided, as can be seen from FIG. 3, by means of blades 1 into a plurality of liquid conveying channels 2.

As fibrous foreign bodies in particular tend to remain suspended at the leading edges of blades 1 and in time cause a blockage of the liquid conveying channels 2, the blades 1 are provided at the leading edges with cutting blades 3 located in a plane running parallel to the axis of rotation of the rotor, these co-operating, in order to achieve a shearing effect, with a stationary cutting blade 4 which is housed by means of ball-bearings in the axis of rotation of the rotor. In this way the stationary cutting blade 4 is always kept in exact alignment with the cutting blade 3 attached to the rotor body 5, and independently of the position of the rotor body 5 even if the position of the latter should change during operation or oscillations occur in the ventilation rotor system. It is possible by this means to align the stationary cutting blade 4 to the rotating cutting blades 3 with a very narrow gap, without the fear that in the event of a very slight change in the position of the rotor body 5 during operation the cutting blades 3 and 4 will be disturbed.

In order to achieve exact alignment of the stationary cutting blade 4 to the cutting blade 3 which is adapted to rotate with the rotor body 5 the stationary cutting blade 4 lies in a plane containing the axis of rotation of the surface ventilation rotor, that is to say in the present case in a vertical plane, in the stationary securing member 6 and adapted to be displaced relative to the cutting blades 3 which are firmly connected to the rotor body 5. Adjusting screws 7 and 8, screwed into the securing member 6, may be used for example to achieve vertical adjustment of the stationary cutting blade 4, and these abut against the stationary cutting blade 4 from below. If the stationary cutting blade 4 is brought into exact alignment with the cutting blades 3 by means of the adjusting screws 7 and 8, it is clamped fast by means of the clamping screws 9 and 10 screwed into the securing member 6.

The projecting part 11 of securing member 6 serves to lock the latter, with the result that the cutting blade 4 similarly remains stationary during one rotation of the rotor body 5.

It is of course also possible to supply several stationary cutting blades 4 instead of one. However, as several stationary cutting blades reduce the suction aperture of the surface ventilation rotor and therefore the conveying capacity of the same, only one stationary cutting blade 4 is provided in most cases.

In order to achieve trouble-free cutting of fibrous foreign bodies such as for example hairs or nylon threads, the co-operating cutting edges of the cutting blades 3 and 4 are configured in such a way that the shearing angle increases and decreases several times in the shearing process. As can be seen from FIG. 7 with the help of two cutting blades 12 and 13 with straight cutting edges the shearing angle is the angle between the two co-operating cutting edges, at the intersection 14. The reduction in the cutting angle at several places along the cutting edge means that the tendency
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ited by the material which is to be cut to become radially displaced outwards while still uncut is reduced to a pronounced degree or even avoided altogether, depending on the reduction in the cutting angle $\phi$.

For reasons of cost it is advantageous if the numerous rotating cutting blades 3 are provided only with straight cutting edges. In order to achieve a particularly effective cutting effect the stationary cutting blade 4 which is used with the surface ventilation rotor according to FIGS. 1 to 3 is designed in the manner shown in FIGS. 4 and 5. The corrugated configuration of the cutting edge 15 of the stationary cutting blade 4 has the effect of as it were encircling threads suspended against the rotating cutting blades 3 by means of the corrugated parts of the cutting edge 15, and this means that they can no longer escape during the shearing process.

FIG. 6 shows a similar view to that of FIG. 5 to illustrate another cutting edge configuration, the cutting edge 16 having a zig-zag shape.

I claim:

1. A surface ventilation rotor having an axis of rotation and being adapted for circulating and introducing oxygen or an oxygen mixture into a liquid located in an activation tank of a clarification plant, the inside of which rotor is subdivided by means of blades into a plurality of liquid conveying channels having an inlet side,

a first cutting member located on the inlet edges of said blades, said first cutting member having at least one cutting edge extending perpendicular to said rotational axis;

a second cutting member comprising at least one cutting edge fixed with respect to said first cutting member and cooperating therewith to obtain a changing shearing angle as said first cutting member rotates, at least one of said cutting edges being fluted as seen from an axial direction; and

adjusting means provided for adjusting the position of the cutting edges of said second cutting member relative to the cutting edge of said first cutting member.

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