

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS IN OR RELATING TO AERATORS

(71) We, SIMON-HARTLEY LIMITED a British Company, of Etruria Works, Stoke-on-Trent, Staffordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns aerators of the kind (hereinafter termed "of the kind referred to") adapted to be rotated in the surface of a liquid for the purpose of agitating and aerating same and particularly, though by no means exclusively, suitable for use in the aeration of sewage liquors in the so called activated sludge process.

Many kinds of aerator are known, and such usually comprise a support member in the form of an inverted conical or generally conical shell which carries blades on its underside.

It is known that the rate of oxygen transfer can be varied at a given rotational speed by adjusting the depth of immersion of the aerator in the liquid to be aerated.

We have found by experimental work that there is a limit to the useful range of adjustment of depth of immersion of aerators of the kind referred to and having support members in the form of an inverted conical or generally conical shell.

It is an object of the present invention to provide an aerator of the kind referred to, of a construction permitting a greater range of useful adjustment of depth of immersion when in use and hence range of adjustment of oxygen transfer rate.

According to the present invention an aerator of the kind referred to, comprises a support member in the form of a circular disc which is adapted when the aerator is in use to lie in a horizontal plane and to be rotated about its central vertical axis, a plurality of angularly spaced blades secured to the underside of said member and extending from a central region towards its periphery characterized in that each said

blade has a plate secured to its lower edge and extending on both sides of the blade along at least a part of the length of the blade. 50

The invention will be further apparent from the following description with reference to the several figures of the accompanying drawing which shown, by way of example only, one form of aerator embodying the invention. 55

Of the drawing:—

Fig. 1 shows a side elevation of the aerator; 60

Fig. 2 shows a plan view of part of the aerator of Fig. 1;

and Fig. 3 shows a cross-section through the aerator on the line III of Fig. 2.

Referring now to the drawing it will be seen that the aerator includes a support member generally indicated at 10 and comprised by a circular disc which when in use lies in a horizontal plane and which can be rotated by means of a shaft 11 which is secured centrally to the disc 10. Extending downwardly from the underside of the disc 10 at its centre, is a circular boss 12 formed from tube and closed at its lower end by a circular plate 13. 70

Secured to the underside of the support member 10 are a plurality of angularly spaced blades 15 each disposed in a vertical plane. As best seen from Fig. 2, each of the blades 15 extends tangentially from the periphery of the circular boss 12 to the outer edge of the support member 10. Each blade 15 is profiled as best seen from Fig. 3 so as to have a maximum depth at a position intermediate the boss 12 and the outer periphery of the support member 10, the depth of the blade on either side of this position reducing gradually. As also best seen from Fig. 3 the upper edge of each blade 15 extends continuously from the periphery of the support member 10 in contact with the underside thereof to the circular boss 12. Likewise the inner edge of each blade 15 extends continuously 80 85 90

downwardly in contact with the periphery of the boss 12 for a distance not substantially less than the depth of the boss 12. The outermost edge of each blade 15 is of substantially less height than the inner edge of each blade.

Secured to the lower edge of each blade 15 between the position of maximum depth thereof and the outer end of the blade is a plate 16 which extends on both sides of the blade normal thereto as clearly seen from Figs. 1 and 2.

In use, the aerator is rotated in the surface of a liquid which is to be agitated and aerated. It will be understood that liquid is thrown outwardly by centrifugal action through the duct defined on the leading side of each blade with respect to the direction of rotation by the support member 10, blade 15 and plate 16 and that air is drawn down the duct on the trailing side of each blade with respect to the direction of rotation and defined by the same parts. This air is drawn down into the region of maximum turbulence and ensures a good transfer of oxygen to the liquid being aerated.

Tests with aerators having the construction described above, have shown that the rates of oxygen transfer achieved are comparable with those obtained with known aerators, such as those described in our prior British patents Nos. 919467 and 1263405 for example, and can be achieved at the same power consumption.

We have also observed that with aerators embodying the present invention, there is a lesser tendency for surging of the liquid being aerated to occur with a consequent tendency for the power input to remain constant during operation.

We have found that with aerators having the construction as described herein, the rate of oxygen transfer can be adjusted by varying the depth of immersion of the aerator in the liquid to be aerated over an extended range compared with conventional aerators.

We have also observed that aerators constructed as described herein, have a better agitating or mixing action than those of conventional construction.

Due to the fact that the blades 15 extend tangentially from the boss 12, different power consumptions and hence rates of oxygen transfer can be obtained by rotating

the aerator in opposite directions.

It will be appreciated that it is not intended to limit the invention to the above example only, many variations, such as might readily occur to one skilled in the art, being possible without departing from the scope thereof, as defined by the appended claims.

Thus, for example, the plates 16 need not extend to the outer ends of the blades, but to positions inwardly of the outer ends of the blades.

#### WHAT WE CLAIM IS:—

1. An aerator of the kind referred to comprising a support member in the form of a circular disc which is adapted when the aerator is in use to lie in a horizontal plane and to be rotated about its central vertical axis, a plurality of angularly spaced blades secured to the underside of said member and extending from a central region towards its periphery characterized in that each said blade has a plate secured to its lower edge extending on both sides of the blade along at least a part of the length of the blade.

2. An aerator according to claim 1 wherein each said plate extends from the outer end of its associated blade towards the centre of the aerator.

3. An aerator according to either claim 1 or claim 2 wherein a circular boss extends downwardly from the underside of said circular disc at the centre thereof.

4. An aerator according to claim 3 wherein each said blade extends tangentially from the periphery of the circular boss to the outer edge of the support member.

5. An aerator according to any preceding claim wherein each blade has a maximum depth at a position intermediate its inner and outer ends, the depth of the blade on either side of this position reducing gradually.

6. An aerator according to claim 5 wherein the plate on the lower edge of each said blade is provided on that part of the edge lying between the position of maximum depth and the outer end of the blade.

7. An aerator substantially as described herein with reference to and as illustrated by the figures of the accompanying drawing.

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