

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO AERATION

(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 the aeration of liquids, such as sewage effluents in the so-called activated sludge treatment process for example, and more particularly an aeration tank of the kind (hereinafter termed of the kind referred to) of square or rectangular shape equipped with at least one rotary surface aerator.

During the aeration process the functions of the rotary surface aerator are, firstly the agitation of the contents of the tank to ensure thorough mixing thereof, and secondly the introduction of oxygen by way of atmospheric air into the liquid.

Aeration tanks of square or rectangular shape are generally preferred to those of circular or other shape on economic grounds. However, it will be appreciated that during aeration the pattern of circulation currents in a tank of square or rectangular shape will not be uniform. In effect, due to the centrifugal pumping action of the rotary surface aerator there will be down-currents in the corners of the tank of substantially greater volume than along the side walls of the tank. This leads to deposition of sediment on the floor of the tank at positions around the middles of the side walls of the tank. Attempts to overcome this problem have been made by providing tanks with sloping bottoms but this, of course, leads to additional costs in the construction of the tanks.

It is an object of the present invention to provide an aeration tank of simple and economic construction which overcomes the problem aforesaid.

According to the present invention, an aeration tank of the kind referred to is

characterised by the provision of a baffle plate on the base thereof adjacent each of its four corners, and so arranged as to divert a proportion of the down-currents in the corners of the tank along the length of the side walls of the tank, whereby to prevent the deposition of sedimentary material on the base of the tank along said side walls.

It will be understood that deposition in the central regions of the base of the tank is acceptable since such material will be gathered up by the aerator due to the suction effect occurring therebeneath.

The invention will be further apparent from the following description with reference to the figures of the accompanying drawing which show, by way of example only, one form of aeration tank embodying the invention.

Of the drawing:—

Fig. 1 shows a partially cut-away diagrammatic perspective view of the aeration tank;

and Fig. 2 shows a plan view of the aeration tank of Fig. 1.

Referring now to the drawing, it will be seen that the aeration tank is of square shape and comprised by a base 10 and four side walls 11 each having a length L. A rotary surface aerator 12 of any suitable kind, such as that described in British Patent No. 919467 for example, is mounted on a vertical driving shaft 13 at the centre of the tank and is arranged so as to be partially immersed within the liquid contained within the tank.

Since the rotary surface aerator 12 throws liquid outwardly along the surface of the contents of the tank due to its centrifugal pumping action, there will be substantially downwardly directed currents at the four corners of the tank. In accordance with the invention, a baffle plate 14 is provided on the base of the tank adjacent to each corner thereof and whose function is to divert a portion of the down-currents at that corner of the tank along one

of the adjacent side walls, thereby to prevent deposition of sedimentary materials on the base of the tank along the side walls thereof. Each of the baffle plates 14 is disposed in a vertical plane.

5 In a preferred arrangement each baffle plate 14 has a height of $D/4$ and a length of $L/6$, where D is the depth of liquid within the tank. Each plate 14 extends upwardly
10 from the base 10 of the tank and meets its associated side wall at a position $L/12$ from the corner of the tank. Preferably each baffle plate 14 makes an angle of 67° with its associated side wall 11.

15 Tests with an aerator tank equipped with baffles as described herein have shown that deposits on the base of the tank along the side walls at the central regions thereof are eliminated and whilst deposits occur in the
20 central regions of the tank after the aerator is stopped this is acceptable because on restarting the aerator such deposits are drawn up by the vortex created under the aerator.

25 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.

30 WHAT WE CLAIM IS:—

35 1. An aeration tank of the kind referred to characterised by the provision of a baffle plate on the base thereof adjacent each of its four corners, and so arranged as to divert a proportion of the down-currents in the corners of the tank along the length of the side walls of the tank, whereby to prevent

the deposition of sedimentary material on the base of the tank along said side walls. 40

2. An aeration tank according to claim 1 wherein said baffle plate is disposed in a vertical plane.

3. An aeration tank according to claim 2 wherein each said baffle plate extends
45 upwardly from the base of the tank with its outer edge meeting a side wall of the tank at a position spaced from the corner between two adjacent side walls.

4. An aeration tank according to claim 3 wherein each said baffle plate makes an acute angle with the side wall which it meets at its outer edge. 50

5. An aeration tank according to claim 4 wherein each said baffle plate is of rectangular shape and has a height which is one-quarter of the intended depth of liquid in the tank or thereabouts. 55

6. An aeration tank according to claim 5 wherein the tank is of square shape and wherein each said baffle plate has a length which is one-sixth of the length of the side wall of the tank or thereabouts and meets with a side wall at a position one-twelfth of the length of the side wall from the corner of the tank. 60

7. An aeration tank according to claim 6 wherein each baffle plate makes an angle of 67° with the side wall which it meets. 65

8. An aeration tank substantially as described herein with reference to, and as illustrated by, the figures of the accompanying drawing. 70

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In a preferred arrangement each baffle plate 14 has a height of $D/4$ and a length of $L/6$, where D is the depth of liquid within the tank. Each plate 14 extends upwardly from the base 10 of the tank and meets its associated side wall at a position $L/12$ from the corner of the tank. Preferably each baffle plate 14 makes an angle of 67° with its associated side wall 11.

Tests with an aerator tank equipped with baffles as described herein have shown that deposits on the base of the tank along the side walls at the central regions thereof are eliminated and whilst deposits occur in the central regions of the tank after the aerator is stopped this is acceptable because on restarting the aerator such deposits are drawn up by the vortex created under the aerator.

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.

WHAT WE CLAIM IS:—

1. An aeration tank of the kind referred to characterised by the provision of a baffle plate on the base thereof adjacent each of its four corners, and so arranged as to divert a proportion of the down-currents in the corners of the tank along the length of the side walls of the tank, whereby to prevent

the deposition of sedimentary material on the base of the tank along said side walls.

2. An aeration tank according to claim 1 wherein said baffle plate is disposed in a vertical plane.

3. An aeration tank according to claim 2 wherein each said baffle plate extends upwardly from the base of the tank with its outer edge meeting a side wall of the tank at a position spaced from the corner between two adjacent side walls.

4. An aeration tank according to claim 3 wherein each said baffle plate makes an acute angle with the side wall which it meets at its outer edge.

5. An aeration tank according to claim 4 wherein each said baffle plate is of rectangular shape and has a height which is one-quarter of the intended depth of liquid in the tank or thereabouts.

6. An aeration tank according to claim 5 wherein the tank is of square shape and wherein each said baffle plate has a length which is one-sixth of the length of the side wall of the tank or thereabouts and meets with a side wall at a position one-twelfth of the length of the side wall from the corner of the tank.

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8. An aeration tank substantially as described herein with reference to, and as illustrated by, the figures of the accompanying drawing.

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