

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) INSTALLATION FOR THE PURIFICATION OF SEWAGE

(71) We, INGENIEURSBUREAU DWARS, HEEDERIK EN VERHEY N.V., of Tessel-schadelaan, 4, Amersfoort, Netherlands, a Dutch Company, do hereby declare the in-
 5 vention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particu-
 larly described in and by the following statement:—

10 THIS INVENTION relates to an instal-
 lation for the purification of sewage by
 means of the activated sludge method,
 wherein the sewage flows in a closed circuit,
 15 and wherein oxygen is added to the sewage
 by means of an aerator which also circulates
 the sewage.

An installation of this kind has been dis-
 closed in Dutch Patent 87,500. In this prior
 20 installation the aerator is in the form of a
 brush-shaped rotor adapted to rotate about
 a horizontal axis.

There has recently been developed a so-
 called surface aerator adapted to rotate
 about a vertical axis. Such aerators have a
 25 better efficiency than aerators rotating about
 a horizontal axis; so that the amount of
 oxygen added per kWh to the sewage can be
 substantially larger for a surface aerator.
 Further advantages of surface aerators are
 30 the dry arrangement of the mechanical parts
 and the lower costs of the installation per
 unit of oxygen added to the sewage. Up to
 now surface aerators were only used in
 activated sludge installations with large
 35 aerating tanks.

It is an object of the invention to provide
 means, whereby a surface aerator may be
 used in an installation with a closed circuit.

The invention consists in an installation
 40 for the purification of sewage by means of
 the activated sludge method, wherein the
 sewage is adapted to flow in a closed circuit,
 the installation including a surface aerator
 adapted to rotate about a vertical axis for
 45 circulating the sewage in said circuit and

adding oxygen thereto, and a partition form-
 ing separating means between portions of the
 circuit upstream and downstream of the
 aerator.

Preferably the aerator is arranged in a 50
 communication section between two linear
 parallel sections of the circuit.

In a preferred embodiment of the instal-
 lation according to the invention the section
 of the circuit which contains the aerator 55
 has a depth adapted to the aerator and the
 base of this section merges fluently into the
 base of adjoining sections of the circuit.
 Preferably the aerator section has a rectan-
 gular plan shape, of which the length and 60
 the width are adapted to the aerator and the
 walls of this section merge fluently into the
 walls of the adjoining circuit sections.

In some cases the circulation of the sew-
 age in the installation according to the in- 65
 vention may be enhanced by deflecting the
 partition in the vicinity of the aerator to the
 side of the circuit in which the sewage flows
 towards the aerator.

In order to obtain a uniform flow of sew- 70
 age one or more guide baffles may be pro-
 vided in the circuit in the vicinity of the
 aerator; and if desired, these baffles may
 be curved and they need not extend above
 the water level. 75

The invention will now be described by
 way of example with reference to the ac-
 companying drawings which show a pre-
 ferred embodiment of the invention and in
 which:— 80

Figure 1 is a top view of an installation
 according to the invention.

Figure 2 shows a portion of the installa-
 tion shown in Figure 1 on an enlarged scale.

Figure 3 is a section along line III-III of 85
 Figure 2.

The installation shown in the drawings
 comprises a closed circuit which consists of
 two straight canal portions 1 and 2 com- 90
 municating at their ends by means of sec-

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tions 3 and 4 and separated from each other by a partition 5. The communication section 3 comprises a plurality of curved guiding baffles 6 in order to obtain a uniform flow of the sewage.

In accordance with the invention a surface aerator 7 is arranged in the communication section 4 near the partition 5.

As shown in Figure 3 the aerator may comprise a conical body adapted to rotate about a vertical axis, and driven by a motor 9. The diameter of the conical body 8 as indicated by an arrow may vary according to circumstances. With the above-described arrangement of the aerator 7 the sewage in the circuit can be circulated in the closed circuit by the aerator, so that no additional means are required for this purpose. A satisfactory operation is obtained when the communication section 4 has a rectangular plan shape.

It has been found to be useful for efficient operation of the aerator to adapt the depth and the width of the communication section 4 to the aerator. For this purpose the base 11 of the communication section is connected with the base 13 of the straight canal portions by means of an inclined surface 12. If desired, the width of the communication section 4 may be different from the total width of the straight canal portions 1 and 2; in this case the walls of the communication section merge fluently into the walls of the straight canal portions. The arrow 14 indicates the normal water depth.

In order to obtain a uniform flow, curved guide baffles 10 are provided in the straight canal portions 1 and 2 near the aerator 7. The baffles 10 are partially supported by the inclined surfaces 12, and are bent upwards as indicated in Figure 3. The direction of rotation of the aerator and the direction of flow of the sewage are indicated by arrows.

The invention in its preferred form is thought to increase the maximum capacity of installations of the present kind with respect to known installations with horizontal aerators. The capacity is usually expressed in the number of inhabitants for which the sewage may be treated. The maximum capa-

city of installations of the present kind is thought to be increased by the use of the invention in the ratio of about 15,000 inhabitants to 25,000 inhabitants or more.

WHAT WE CLAIM IS:—

1. An installation for the purification of sewage by means of the activated sludge method, wherein the sewage is adapted to flow in a closed circuit, the installation including a surface aerator adapted to rotate about a vertical axis for circulating the sewage in said circuit and adding oxygen thereto, and a partition forming separating means between portions of the circuit upstream and downstream of the aerator.

2. An installation as claimed in claim 1, wherein the aerator is positioned in a communication section between two linear parallel portions of the circuit.

3. An installation as claimed in claim 1 or 2, *characterized* in that a section of the circuit containing the aerator, has a depth adapted to the aerator, and the base of this section merges fluently into the base of other sections of the circuit.

4. An installation as claimed in claim 1, 2 or 3, wherein a section of the circuit containing the aerator, has a rectangular plan shape the length and width of which are adapted to the aerator, and walls of this section merge fluently into walls of other sections of the circuit.

5. An installation as claimed in any one of the preceding claims, wherein the partition is deflected in the vicinity of the aerator to one side of the circuit in which the sewage flows towards the aerator.

6. An installation as claimed in any one of the preceding claims, wherein the circuit includes one or more guide baffles in the vicinity of the aerator.

7. An installation for the purification of sewage substantially as herein described with reference to the accompanying drawings.

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Agents for the Applicants.

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In order to obtain a uniform flow, curved guide baffles 10 are provided in the straight canal portions 1 and 2 near the aerator 7. The baffles 10 are partially supported by the inclined surfaces 12, and are bent upwards as indicated in Figure 3. The direction of rotation of the aerator and the direction of flow of the sewage are indicated by arrows.

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2. An installation as claimed in claim 1, wherein the aerator is positioned in a communication section between two linear parallel portions of the circuit.

3. An installation as claimed in claim 1 or 2, characterized in that a section of the circuit containing the aerator, has a depth adapted to the aerator, and the base of this section merges fluently into the base of other sections of the circuit.

4. An installation as claimed in claim 1, 2 or 3, wherein a section of the circuit containing the aerator, has a rectangular plan shape the length and width of which are adapted to the aerator, and walls of this section merge fluently into walls of other sections of the circuit.

5. An installation as claimed in any one of the preceding claims, wherein the partition is deflected in the vicinity of the aerator to one side of the circuit in which the sewage flows towards the aerator.

6. An installation as claimed in any one of the preceding claims, wherein the circuit includes one or more guide baffles in the vicinity of the aerator.

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