Title: Method for the purification of waste water

Abstract: The present invention relates to a method for purifying used cleaning liquid resulting from washing a facade wall, comprising allowing said used cleaning liquid to pass at least one textile or fabric. Further, the present invention relates to a textile or fabric adapted for purifying used cleaning liquid resulting from washing a facade wall and the use of a textile or fabric for purifying used cleaning liquid resulting from washing a facade wall.
METHOD FOR THE PURIFICATION OF WASTE WATER

Technical Field of the Invention

The present invention relates to the field of purification of cleaning liquids. More specifically, the invention relates to purification of aqueous cleaning liquid resulting from the washing of a facade wall.

Background Art

Facade walls are washed to improve the esthetical appearance of the facade wall and/or to preserve the facade wall and/or to prepare the facade wall for painting or other surface treatments in order to achieve a satisfactory and sustainable result.

Conventionally, techniques for facade wall washing include applying water under high pressure and application of different types of cleaning liquids. Traditionally, the waste water resulting from such washings have been let out to the drainage system without purification. However, such waste water commonly contains contaminants which are harmful to the environment and to the operator performing the washing. For example, the waste water may contain dirt, particles, flakes and/or remnants of paint etc.

DE 3440461 discloses a device for collecting cleaning chemicals used to clean buildings. The device comprises a sheeting that is fastened on the building wall via a fastening element, and cleaning chemicals are allowed to flow from the wall, via the sheeting and down in a collecting trough. A problem with this device is that it requires a fastening element to fasten the sheeting against the wall. The fastening element may have to be different depending on the type of facade that is to be cleaned. Further, the sheeting is merely used to collect the cleaning liquid, i.e. further purification of the cleaning liquid is required.

Consequently, there is a need within the art for a convenient method for purifying waste water resulting from cleaning facade walls.
Summary of the Invention

It is an object of the present invention to provide a convenient method for purifying used aqueous cleaning liquid resulting from washing a facade wall. To meet this object, there is provided a method for purifying used cleaning liquid resulting from washing a facade wall, comprising allowing said used cleaning liquid to pass at least one textile or fabric.

Further, there is provided a textile or fabric adapted for purifying used cleaning liquid resulting from washing a facade wall and the use of a textile or fabric for purifying used cleaning liquid resulting from washing a facade wall.

Detailed description of the Invention

As a first aspect of the invention, there is provided a method for purifying used cleaning liquid resulting from washing a facade wall, comprising allowing said used cleaning liquid to pass at least one textile or fabric.

A used cleaning liquid refers to an aqueous liquid that has come into contact with a facade wall during cleaning of the facade wall. The used cleaning liquid may comprise contaminants, such as dirt, particles, algae, mould or mildew.

In embodiments of the invention, the cleaning liquid is an aqueous cleaning liquid.

Purifying refers to decreasing the amount dirt, or particles, such as flakes, remnants of paint, algae, mould or mildew, in the used cleaning liquid.

In the context of the present disclosure, a textile refers to a flexible material consisting of a network of interlacing fibers. The fibers may be natural or artificial. The fibers may be threads or yarns. Yarn refers to long strands produced by spinning threads of e.g. raw wool, linen or cotton.

Further, a fabric refers to any material made through weaving, knitting, crocheting or bonding.

"Allowing said used cleaning liquid to pass at least one textile or fabric" refers to allowing the used cleaning liquid to be passively transported, e.g. by the force of gravity through the textile or fabric.

In some embodiments, the used cleaning liquid is allowed to pass the at least one textile or fabric such that contaminants in the used -cleaning liquid is retained in the textile or fabric. The contaminants may be dirt, particles, algae, mould or mildew.
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The first aspect of the present invention is based on the surprising insight that a textile or fabric serves as excellent material for purifying used cleaning liquid resulting from cleaning a facade wall, i.e. dirt and particles are to some extent retained in the textile or fabric and thereby prevented from being released to e.g. the ground water. Further, a textile or fabric provides for easy handling and use during facade wall cleaning and a may prevent material, e.g. soil, from the ground to spatter up on the facade during cleaning.

In an embodiment of the first aspect of the invention, the textile or fabric is arranged on the ground beneath said facade wall.

"Arranged on the ground" refers to the textile or fabric being completely or mainly spread out on the ground beneath the wall. A textile or fabric being arranged on the ground may still contact the lower part of the wall. Further, a textile or fabric being arranged on the ground may be arranged such that substantially all used cleaning liquid on the facade wall may flow or trickle down to the textile or fabric by the force of gravity. This is advantageous in that it does not require any specific fastening means during cleaning of the wall. Thus, the person cleaning the wall only has to arrange the textile or fabric, e.g. by spreading out the textile or fabric, on the ground before cleaning. Consequently, the method of the first aspect of the invention is also applicable when the ground below the facade is irregular or tilting.

In embodiments of the first aspect, the textile is arranged to form a seal with said facade wall.

A seal refers to a seal that is substantially impermeable to the used aqueous cleaning liquid. The seal may be substantially parallel to the ground and may extend throughout the part of the facade wall that is cleaned.

Thus, if the textile or fabric is arranged to form a seal with the wall, used aqueous cleaning liquid is prevented from flowing between the wall and the textile or fabric, i.e. substantially all of the used cleaning liquid is caught or absorbed by the textile or fabric. The seal may be formed by e.g. applying an adhesive on the wall and/or the textile or fabric.

Further, a seal may be formed by anchoring the textile to the facade wall and/or the ground, e.g. by spikes or nails.

In an embodiment of the first aspect, the textile or fabric comprises at least one polymer. The polymer may be selected from polypropylene and polyester, or any combination thereof.

A textile or fabric comprising of polypropylene or polyester is tough and flexible and has good resistance to material fatigue. Further, such a textile or
fabric is usually moderately priced, thus making them suitable for a wider market.

In an embodiment of the first aspect, the textile is a geotextile.

A geotextile is a water permeable fabric with the ability to restrict the flow of particles above a certain size, such as soil particles, through the fabric. A geotextile is known to a person skilled in the art. The geotextile may comprise a polymer selected from polypropylene, polyester, polyamide and polyethylene, or any combination thereof. Further, the geotextile may comprise natural materials, such as jute, cottons and/or rayon. A geotextile is very adaptable and thus easy to handle and use. Therefore, a geotextile may easily be spread out or folded beneath the facade wall and is thus applicable under different conditions, such as when the ground beneath the facade wall is irregular or tilting.

In embodiments of the first aspect of the invention, the geotextile is in a non-woven form or a woven form.

As a further example, the geotextile may be in a form selected from a woven form, a needle-punched form and a heat bonded form, or any combination thereof.

A woven geotextile refers to a geotextile manufactured by weaving. A woven geotextile is stretchable and is thus able to adapt and take the shape of the adjacent ground if spread out beneath the facade wall.

A needle-punched geotextile refers to a non-woven geotextile manufactured by needle-punching, i.e. a manufacturing process where the fibers of the geotextile are laid into a web followed by penetration of needles, which penetrate and orient the fibers and thereby locking them with each other, and a heat bonded geotextile refers to a non-woven geotextile manufactured by heating together the fibers of the geotextile to form a continuous mat. Needle-punched and heat bonded geotextiles are strong and may therefore facilitate reuse of the geotextile throughout different facade cleaning sessions.

Further, the geotextile may have a weight that ranges from 50-2200 g/m², such as from 80-300 g/m², such as from 100-200 g/m².

Further, the pore size of textile or fabric of may be chosen depending on the contaminants on the facade wall. As an example, a textile or fabric having a pore size of at least 1 mm, such as at least 2 mm, such as at least 5 mm, may be advantageous to use when the contaminants comprises flakes or remnants of paint and a textile or fabric having a pore size of about 10-50 µm,
such as about 25 µηη may be advantageous if the contaminants comprise lead particles.

In embodiments of the invention, the at least one textile or fabric has an area of above 4 m², such as above 6 m², such as above 8 m², such as above 10 m², such as above 20 m².

In embodiments of the invention, the at least one textile or fabric has a length of above 1 m, such as above 2 m, such as above 5 m, such as above 10 m. The textile or fabric may be adapted to be rolled up on a roll.

In an embodiment of the first aspect of the invention, the at least one textile or fabric comprises at least one channel filled with a material having a higher density than the textile or fabric.

In embodiments, the material has a density that is at least two times higher, such as at least four times higher, such as at least six times higher, than the textile or fabric.

If the textile or fabric comprises a channel filled with a material with a higher density than the textile or fabric, it improves the rigidity of the textile or fabric, thus helping the textile or fabric to maintain its position on the ground during cleaning if the textile or fabric is arranged on the ground beneath the facade wall. Further, due to the filled channel, the textile or fabric is provided with an "internal" or "built-in" rigidity, thus decreasing the need for any "external" actions, such as placing heavy objects on the textile or fabric, in order to maintain the position of the textile or fabric on the ground during cleaning of the facade.

In embodiments, the at least one textile or fabric comprises at least one channel, such as at least two channels, such as at least four channels, such as at least five channels.

In further embodiments, the at least one textile or fabric comprises at least one channel, such as at least two channels, such as at least four channels, such as at least five channels per meter in a direction of the textile or fabric.

As an example, the at least one textile or fabric comprises one to three channels that are substantially parallel to the facade wall. The at least one textile or fabric may have three or more parallel channels such that when spread out on the ground, a first channel is tight against and substantially parallel to the facade wall, a second channel is at the far end of the textile or fabric as measured from the facade wall and parallel to the first channel, and one or more channels are in between the first and second channels.
The material may be selected from stone and expanded clay pellets or any combination thereof.

Expanded clay pellets refer to small globes of burnt and puffed clay, used in construction and farming, and especially in hydroponics. Expanded clay pellets are commonly known under the brand names LECA (light expanded clay aggregate) or Hydroton. Stone or expanded clay pellets or any combination between stone and expanded clay pellets having a higher density than the textile or fabric are easy to handle and therefore suitable for use in a channel of the textile or fabric.

In an embodiment of the first aspect of the invention, the method is further comprising allowing said used cleaning liquid to leave said textile or fabric and flow down in a storm drain located in the vicinity of said facade wall. Allowing the used cleaning liquid to leave the textile or fabric to flow down in a storm drain does not require any transportation of the purified cleaning liquid that has passes the textile or fabric. It is also very convenient, since water leaving the facade wall is usually naturally directed in the direction to the storm drain, thus it does not require any extra water directing means.

In further embodiments of the first aspect, the textile or fabric is regenerated and used for further cleaning of facade walls. As an example, the textile or fabric may comprise at least two layers, and at least one layer is regenerated. For example, the at least one textile or fabric may comprise at least two layers, wherein one layer has a larger pore size than the other layer(s). The layer having a larger pore size may serve as an outer protective layer that may be reused in further cleanings.

As a second aspect of the invention, there is provided a textile or fabric adapted for purifying used cleaning liquid resulting from washing a facade wall.

The terms and definitions used in the second aspect of the invention are as defined in connection with the first aspect of the invention described above. In embodiments, the cleaning liquid is an aqueous cleaning liquid.

A textile or fabric adapted for purifying used cleaning liquid is convenient to use during facade cleaning. The term "adapted for" may refer to having a size or length that, when spread out on the ground, covers the length of the facade wall that is about to be cleaned.

In an embodiment of the second aspect, the textile or fabric is a geotextile. A geotextile may be able to adapt and take the shape of the adjacent ground
if spread out beneath the facade wall, and is thus applicable to use in a variety of environments.

In embodiments of the second aspect, the textile or fabric comprises at least one channel filled with a material with a higher density than the textile or fabric, which is advantageous in that it may increase the rigidity and weight of the textile or fabric, thus facilitating the maintaining of the position of the textile or fabric during cleaning.

In embodiments, the at least one textile or fabric comprises at least one channel, such as at least two channels, such as at least four channels, such as at least five channels.

In further embodiments, the at least one textile or fabric comprises at least one channel, such as at least two channels, such as at least four channels, such as at least five channels per meter in a direction of the textile or fabric. As an example, the at least one textile or fabric comprises one to three channels that are substantially parallel to the facade wall. The at least one textile or fabric may have three or more parallel channels such that when spread out on the ground, a first channel is tight against and substantially parallel to the facade wall, a second channel is at the far end of the textile or fabric as measured from the facade wall and parallel to the first channel, and one or more channels are in between the first and second channels.

The material may be selected from stone and expanded clay pellets, or any combination thereof. Stone or clay pellets or a combination thereof having a higher density than the textile or fabric are easy to handle. Further, a channel filled with stone or clay pellet may provide rigidity and still maintain the flexibility of the textile or fabric, so that the textile or fabric may adapt to the shape and possible irregularities of the ground.

As a third aspect of the invention, there is provided the use of a textile or fabric for purifying used cleaning liquid resulting from washing a facade wall. The terms and definitions used in the third aspect of the invention are as defined in connection with the other aspects of the invention described above. In embodiments, the cleaning liquid is an aqueous cleaning liquid. The use of a textile or fabric for purifying used aqueous cleaning liquid resulting from washing a facade wall is a convenient way of reducing the concentration of chemicals that may be harmful to the environment. Further, if the textile or fabric is used on the ground, it may prevent e.g. soil from the ground to spatter up on the facade during cleaning.
Brief description of the drawing

Figure 1 shows a schematic view of purifying used aqueous cleaning liquid resulting from washing a facade wall according to an embodiment of the invention.

Exemplary embodiment of the invention

With reference to Fig. 1, an exemplary embodiment of the method according to the present invention is described in further detail.

A textile (1), in this case a needle-punched geotextile of 1.2 m × 25 m, having a weight of 130 g/m² and arranged on a roll, is rolled or spread out on the ground beneath a facade wall (2) before cleaning. The textile (1) is oriented on the ground so that the long side of the textile (1) is facing the facade wall (2). The textile (1) is further arranged on the ground so that the long side is pressed against the facade wall (2), thus forming a substantially tight seal (3) against the facade wall (2). The textile (1) further comprises three channels (1a-c) sewn into the textile (1) such that when the textile (1) is spread out on the ground, the three channels (1a-c) are substantially parallel to the faced wall (2). When spread out beneath the facade wall (2), a first channel (1a) is positioned tight against the facade wall (2), thus improving the seal (3) such that the amount of used cleaning liquid that can pass the between the facade wall (2) and the seal (3) is decreased. A second channel (1b) is positioned parallel to the first channel (1a) at the long side of the textile (1) that is not facing the facade wall (2). Further, a third channel (1c) is positioned in between the first (1a) and the second channel (1b). The channels (1a-c) are further filled with small stones, so that the textile (1) maintains its position tight against the facade wall (2) during cleaning. During cleaning of the facade wall (2), the textile (1) on the ground prevents soil from spattering up on the facade wall (2). After cleaning the facade wall (2), used cleaning liquid that flows or trickles down the facade wall by the force of gravity (2), indicated by the direction of the arrow (4), are absorbed into the textile (1). Due to the substantially tight seal (3), most of the used cleaning liquid is absorbed by the textile (1). Some of the dirt and particles in the used cleaning liquid are retained in the textile (1). Consequently, the used cleaning liquid is purified within the textile (1) and is further allowed to leave the textile (1). Purified cleaning liquid that leaves the textile (1) is naturally directed to a
nearby storm drain (6), as indicated by the arrow (5) in Fig. 1. After cleaning the facade wall (2), the textile (1) is rolled up again and may be further used during future cleaning of facade walls.
1. A method for purifying used cleaning liquid resulting from washing a facade wall, comprising allowing said used cleaning liquid to pass at least one textile or fabric such that contaminants in the used cleaning liquid is retained in the textile or fabric, wherein said textile or fabric is arranged on the ground beneath said facade wall.

2. A method according to claim 1, wherein said cleaning liquid is an aqueous cleaning liquid.

3. A method according to any previous claim, wherein said textile is arranged to form a seal with said facade wall.

4. A method according to any previous claim, wherein said textile or fabric comprises at least one polymer.

5. A method according to claim 4, wherein said at least one polymer is selected from polypropylene and polyester, or any combination thereof.

6. A method according to any previous claim, wherein said textile is a geotextile.

7. A method according to claim 6, wherein said geotextile is in a form selected from a woven form, a needle-punched form and a heat bonded form, or any combination thereof.

8. A method according to any previous claim, wherein said at least one textile or fabric comprises at least one channel filled with a material with a higher density than said at least one textile or fabric.

9. A method according to claim 8, wherein said material is selected from stone and expanded clay pellets or any combination thereof.

10. A method according to any previous claim, further comprising allowing said used cleaning liquid to leave said textile or fabric and flow down in a storm drain located in the vicinity of said facade wall.
11. A textile or fabric adapted for purifying used cleaning liquid resulting from washing a facade wall such that contaminants in the used cleaning liquid is retained in the textile or fabric, wherein said textile or fabric is adapted to be arranged on the ground beneath said facade wall.

12. A textile or fabric according to claim 11, wherein said textile or fabric is a geotextile.

13. A textile or fabric according to claim 11 or 12, wherein said at least one textile or fabric comprises at least one channel filled with a material with a higher density than the textile or fabric.

14. A textile or fabric according to any one of claims 11-13, wherein said material is selected from stone and expanded clay pellets, or any combination thereof.

15. Use of a textile or fabric for purifying used cleaning liquid resulting from washing a facade wall such that contaminants in the used cleaning liquid is retained in the textile or fabric, wherein said textile or fabric is arranged on the ground beneath said facade wall.
A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B08B, E04G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[ ] Further documents are listed in the continuation of Box C. [V] See patent family annex.

Date of the actual completion of the international search: 2 March 2011
Date of mailing of the international search report: 07-03-2011

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