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(54) **A METHOD OF OPERATION FOR WASHING USING ULTRAVIOLET LIGHT**

(57) With the present invention, there is provided a method of operation for enhancing disinfection in washing devices that comprise at least one tub in which the washing process is carried out; at least one drum located inside the tub, which rotates in the tub, and into which the items to be washed are loaded; at least one door for allowing access to the drum; and at least one ultraviolet light source for transmitting ultraviolet light into the drum. Said method of operation comprises the steps of transmitting ultraviolet light into the drum by activating the ultraviolet light source; rotating the drum for a first period of time at a first rotational speed; stopping the drum for a second period of time following the first period of time; repeating the steps of rotating the drum for a first period of time and stopping it for a second period of time, for a third period of time wherein the ultraviolet light source is activated; rotating the drum for a fourth period of time at a second rotational speed following the third period of time; stopping the drum for a fifth period of time following the fourth period of time; repeating the steps of rotating the drum for a fourth period of time and stopping it for a fifth period of time, for a sixth period of time wherein the ultraviolet light source is activated.

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Description

Technical field

[0001] The present invention is related to a method of operation for washing devices that carry out disinfection process with ultraviolet light (UV).

Prior Art

[0002] In the washing devices, such as washing machines, which are generally used for washing textile products, the process of washing is carried out using washing liquids containing washing agents such as detergent. By using the washing agents such as detergent, it is aimed to dissolve foreign substances on the item to be washed on one hand and to destroy living things such as microbes and bacteria on the other hand. Although said washing agents are generally successful in dissolving the foreign substances, they are not successful enough to destroy living things such as microbes and bacteria. Therefore, washing processes in the traditional applications cannot ensure disinfection of the washed items.

[0003] In the state-of-the art, there are various applications for providing disinfection in washing devices in particular such as washing machines. One of the applications in the prior art is the use of ultraviolet light (UV). In this application, ultraviolet light is transmitted by an ultraviolet light source onto the items to be washed. The ultraviolet light sent onto the items enables to destroy the living things such as microbes and bacteria that are present on the items. However, since ultraviolet light is not be able to be sent to all surfaces of the washed item, disinfection cannot be achieved at the desired level.

Brief Description of the Invention

[0004] With the present invention, there is provided a method of operation for enhancing disinfection in washing devices that comprise at least one tub in which the washing process is carried out; at least one drum located inside the tub, which rotates in the tub, and into which the items to be washed are loaded; at least one door for allowing access to the drum; and at least one ultraviolet light source for transmitting ultraviolet light into the drum. Said method of operation comprises the steps of transmitting ultraviolet light into the drum by activating the ultraviolet light source; rotating the drum for a first period of time at a first rotational speed; stopping the drum for a second period of time following the first period of time; repeating the steps of rotating the drum for a first period of time and stopping it for a second period of time, for a third period of time wherein the ultraviolet light source is activated; rotating the drum for a fourth period of time at a second rotational speed following the third period of time; stopping the drum for a fifth period of time following the fourth period of time; repeating the steps of rotating the drum for a fourth period of time and stopping it for a fifth period of time, for a sixth period of time wherein the ultraviolet light source is activated.

[0005] According to the method of operation developed with the present invention, firstly, the items in the washing device are separated from the drum, and subsequently the said items are unfolded (overlapping folded / stuck surfaces are smoothed). Thus, better disinfection is able to be achieved by sending ultraviolet light to all surfaces of the washed item.

Object of the Invention

[0006] The object of the present invention is to provide a method of operation for enhancing disinfection in washing devices that carry out disinfection with ultraviolet light.

[0007] Another object of the present invention is to provide a method of operation that allows for sending ultraviolet light to different surfaces of the washed items.

[0008] Yet another object of the present invention is to provide a method of operation, which is fast, reliable and efficient.

Description of the Invention

[0009] In the washing devices, such as washing machines, an item (e.g. a textile product) is washed using washing liquid containing a washing agent such as detergent. However, washing agents cannot adequately provide a disinfection process, especially because of the fact that the washing agents are not sufficient to destroy living organisms. Ultraviolet light can be used in washing devices to provide disinfection. For this reason, with the present invention, there is developed a method of operation for enhancing disinfection in washing devices that carry out disinfection process with ultraviolet light.

[0010] The method of operation developed according to the present invention is suitable for use in washing devices that comprise at least one tub in which the washing process is carried out; at least one drum located inside the tub, which rotates in the tub, and into which the items to be washed are loaded; at least one door for allowing access to the drum; and at least one ultraviolet light source, which is preferably located on the door for transmitting ultraviolet light into the drum. Said method of operation comprises the steps of transmitting ultraviolet light into the drum by activating the ultraviolet light source; rotating the drum for a first period of time at a first rotational speed; stopping the drum for a second period of time following the first period of time; repeating the steps of rotating the drum for a first period of time and stopping it for a second period of time, for a third period of time wherein the ultraviolet light source is activated; rotating the drum for a fourth period of time at a second rotational speed following the third period of time; stopping the drum for a fifth period of time following the fourth period of time; repeating the steps of rotating the drum for a fourth period of time and stopping it for a fifth period of time, for a sixth period of time wherein the ultraviolet light source is acti-

vated.

[0011] In an exemplary embodiment of the present invention, the method of operation for disinfection is carried out as the last part of the operation of washing device (e. g. after the steps of washing, rinsing and spinning). Here, firstly, ultraviolet light source is activated so as to transmit ultraviolet light (e.g. UVC light) into the drum. Especially in the spinning step of the washing device, washed items can get stuck in the drum. In such a case, ultraviolet light cannot be sent to the surface, which is stuck in the drum, of the item. For this reason, in the method of operation according to the present invention, the operations of stop/start are respectively carried out on the drum for a third period of time. In other words, the items that get stuck in the drum are enabled to be separated from the drum by way of repeating the steps of rotating the drum for a first period of time and stopping the drum for a second period of time. By sending ultraviolet light into the drum during said third period of time, it is ensured that a large part of the washed items are exposed to the ultraviolet light. However, the ultraviolet light may not be sent to all the surfaces of the items within said third period of time. Therefore, after the third period of time, by way of rotating the drum at a different speed and stopping it during a sixth period of time, the washed items are unfolded so as to ensure that ultraviolet light is sent to all surfaces of these items. Thus, it is ensured that all the surfaces of the washed items are disinfected by means of ultraviolet light in an easy, practical and reliable manner.

[0012] In a preferred embodiment of the present invention, said first rotational speed is in the range of 50-70 rpm. Here, the first period of time is preferably in the range of 10-20 seconds, the second period of time is preferably in the range of 10-20 seconds, and the third period of time is preferably in the range of 1-2 minutes. In this embodiment, it is ensured that the items that get stuck in the drum are separated from the drum in an easy and practical manner.

[0013] In another preferred embodiment of the invention, the second rotational speed is in the range of 20-40 rpm. Here, the fourth period of time is preferably in the range of 5-10 seconds, the fifth period of time is preferably in the range of 180-300 seconds, and the sixth period of time is preferably in the range of 30-50 minutes. In this manner, all the surfaces of the item are unfolded so that ultraviolet light is adequately sent to each surface.

[0014] With the method of operation according to the present invention, firstly, the items in the washing device are separated from the drum, and subsequently the said items are unfolded (overlapping folded / stuck surfaces are smoothed). Thus, better disinfection is able to be achieved by sending ultraviolet light to all surfaces of the washed item.

Claims

1. A method of operation suitable for use in washing devices that comprise at least one tub in which the washing process is carried out; at least one drum located inside the tub, which rotates in the tub, and into which the items to be washed are loaded; at least one door for allowing access to the drum; and at least one ultraviolet light source for transmitting ultraviolet light into the drum, **characterized by** comprising the steps of:

- transmitting ultraviolet light into the drum by activating the ultraviolet light source;
- rotating the drum for a first period of time at a first rotational speed;
- stopping the drum for a second period of time following the first period of time;
- repeating the steps of rotating the drum for a first period of time and stopping it for a second period of time, for a third period of time wherein the ultraviolet light source is activated;
- rotating the drum for a fourth period of time at a second rotational speed following the third period of time;
- stopping the drum for a fifth period of time following the fourth period of time;
- repeating the steps of rotating the drum for a fourth period of time and stopping it for a fifth period of time, for a sixth period of time wherein the ultraviolet light source is activated.

2. A method of operation according to Claim 1, **characterized in that** said first rotational speed is in the range of 50-70 rpm.

3. A method of operation according to Claim 1, **characterized in that** the first period of time is in the range of 10-20 seconds.

4. A method of operation according to Claim 1, **characterized in that** the second period of time is in the range of 10-20 seconds.

5. A method of operation according to Claim 1, **characterized in that** the third period of time is in the range of 1-2 minutes.

6. A method of operation according to Claim 1, **characterized in that** the second rotational speed is in the range of 20-40 rpm.

7. A method of operation according to Claim 1, **characterized in that** the fourth period of time is in the range of 5-10 seconds.

8. A method of operation according to Claim 1, **characterized in that** the fifth period of time is in the range of 180-300 seconds.

9. A method of operation according to Claim 1, **char-**

acterized in that the sixth period of time is in the range of 30-50 minutes.

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EUROPEAN SEARCH REPORT

Application Number
EP 17 20 4114

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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