



- (51) International Patent Classification: Not classified
- (21) International Application Number: PCT/EP2012/070952
- (22) International Filing Date: 23 October 2012 (23.10.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: A 2011/10720 27 October 2011 (27.10.2011) TR
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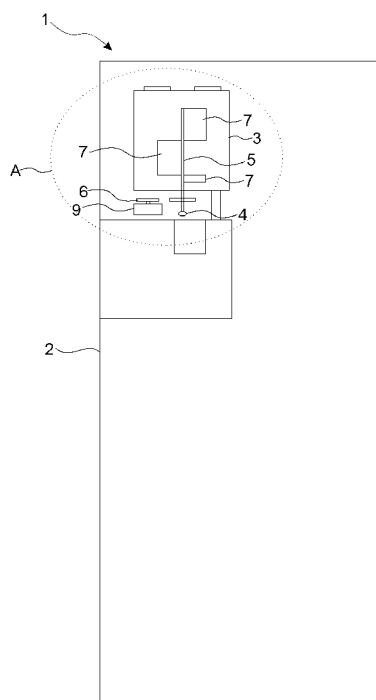
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

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(54) Title: A COOLING DEVICE COMPRISING A STORAGE TANK WHEREIN THE LIQUID STORED THEREIN IS STERILIZED

Figure 1



(57) Abstract: The present invention relates to a cooling device (1) having a body (2), a storage tank (3) wherein liquid is stored and at least one light source (4) that is disposed in the storage tank (3), providing the liquid to be sterilized, and wherein the liquid in the storage tank (3) is sterilized by using the light emitted from the light source (4).



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG). **Published:**

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Description**A COOLING DEVICE COMPRISING A STORAGE TANK WHEREIN THE LIQUID STORED THEREIN IS STERILIZED**

- [0001] The present invention relates to a cooling device comprising a storage tank wherein the liquid stored therein is sterilized.
- [0002] In cooling devices (refrigerator, water dispenser, etc.), storage tanks are disposed for storing liquids. However, pathogenic microorganisms may form in the liquids stored in the storage tank for a long time. For this reason, the liquid in the storage tank must be sterilized and cleared of microorganisms. Ultraviolet (UV) light is one of the widely-used sterilization techniques for liquids. However, UV light is a type of light with low penetration power. For this reason, the light cannot affect every point of the storage tank with the same power and a homogeneous liquid sterilization cannot be provided.
- [0003] In Japanese Patent Document No. JP200405003, a liquid dispenser is described, comprising a storage tank wherein water is stored, a UV lamp that allows the liquid in the storage tank to be sterilized and a wall that allows the light emanating from the UV lamp to pass into the water.
- [0004] In the Japanese Patent Document No. JP2005308283, a refrigerator is described, that has a water tank located in the cool storage area and produced from a light-permeable material, and a UV light source and that provides the water in the tank to be sterilized.
- [0005] The aim of the present invention is the realization of a cooling device comprising a liquid storage tank wherein the liquid stored therein is sterilized.
- [0006] The cooling device realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof comprises a storage tank wherein liquid is stored, at least one light source preventing the presence of microorganisms in the liquid in the storage tank and at least one guide that is produced from a light-conducting material, that spreads the light coming from the light source into the storage tank, one end of which extends into the storage tank and the other towards the light source.

- [0007] The guide extends from the light source towards the inner volume of the storage tank. Thus, the light coming from the UV light source spreads into the guide. By means of the light source extending into the storage tank, the UV light affects the liquid in the storage tank and provides the liquid to be sterilized.
- [0008] In an embodiment of the present invention, the cooling device comprises at least one flap that extends from the guide into the storage tank, conveying the light taken from the guide into the storage tank. By means of the guide, the area in the inner volume of the storage tank the light coming from the light source affects is expanded.
- [0009] In an embodiment of the present invention, the flap is produced from a light-conducting material. The light coming from the light source is conveyed to the flaps by means of the guide. The flap is located on the guide and provides the surface area of the guide to be increased.
- [0010] In an embodiment of the present invention, the guide extends along the storage tank.
- [0011] In an embodiment of the present invention, the cooling device comprises the light source disposed outside the storage tank and the guide extending from the light source towards the inside of the storage tank.
- [0012] In an embodiment of the present invention, the storage tank is of light-permeable type. Thus, the light emitted by the light source disposed outside the storage tank penetrates through the storage tank, affects the liquid in the storage tank and provides it to be sterilized.
- [0013] In an embodiment of the present invention, the guides are positioned so as not to be aligned with respect to each other from the light source towards the inside of the storage tank.
- [0014] In an embodiment of the present invention, the flaps are positioned on the guide so as not to be aligned with respect to each other.
- [0015] In an embodiment of the present invention, the cooling device comprises a motor and the guide that provides the liquid to be stirred in the storage tank with the energy generated by the motor. The guide rotates in the storage tank, providing the water to be propelled. Thus, the liquid in the storage tank moves around the guide, and the penetration efficiency of the

UV light into the liquid is increased.

- [0016] In an embodiment of the present invention, the cooling device comprises a light source disposed outside the storage tank and the storage tank having at least one hole allows the guide extending from the light source to pass into the storage tank. The guide extending from the front of the light source into the storage tank passes into the storage tank by means of the hole. The light emitted by the light source is conveyed to the liquid in the storage tank by means of the guide.
- [0017] In an embodiment of the present invention, the water storage tank is produced from semi-transparent or transparent material. The light coming from the light source spreads in the liquid by means of the storage tank. Thus, the light coming from the light source is provided to penetrate into the entire liquid in the storage tank by means of the storage tank.
- [0018] In an embodiment, the storage tank comprises a sealing element that fills in the gap between the hole and the guide.
- [0019] In an embodiment of the present invention, the cooling device comprises at least one sensor that detects the presence of liquid in the storage tank and a control unit that regulates the operation of the light source. Light is provided to spread in the liquid continuously or at certain time intervals by means of the control unit. In the case it is detected by means of the sensor that there is no liquid in the storage tank, the operation of the light source and unnecessary energy consumption are prevented.
- [0020] In an embodiment of the present invention, the guide provides the liquid in the storage tank to be stirred when the light source is on and does not move when the light source is off.
- [0021] In an embodiment of the present invention, the cooling device is a refrigerator.
- [0022] In another embodiment of the present invention, the cooling device is a water dispenser.
- [0023] By means of the present invention, a cooling device is realized, having a storage tank wherein the liquid therein is provided to be sterilized and thus stored for a longer time.
- [0024] The cooling device realized in order to attain the aim of the present

invention is illustrated in the attached figures, where:

[0025] Figure 1 – is the schematic view of a cooling device.

[0026] Figure 2 – is the view of detail A.

[0027] The elements illustrated in the figures are numbered as follows:

1. Cooling device
2. Body
3. Storage tank
4. Light source
5. Guide
6. Motor
7. Flap
8. Hole
9. Control unit
10. Sealing element
11. Sensor

[0028] The cooling device (1) comprises a body (2), a storage tank (3) disposed in the body (2), wherein liquid is stored, at least one light source (4) disposed in the storage tank (3), providing the liquid to be sterilized and at least one guide (5) that is produced from a light-conducting material (ASA, PMMA, PC, PET, SMMA, etc.), that is at least partially disposed in the storage tank (3), that spreads the light coming from the light source (4) in the storage tank (3), with one end extending towards the light source (4) and the other end at least partially extending into the inner volume of the storage tank (3).

[0029] In the cooling device (1) of the present invention, light is emitted from a light source (4) into the liquid in the storage tank (3) by means of the guide (5), thereby providing the liquid to be sterilized. The portion of the guide (5) that extends into the storage tank (3) at least partially contacts the liquid in the storage tank (3), thereby providing the light to effectively spread in the liquid and the sterilization to be effectively realized. Thus, the liquid is subject to light continuously or at certain time intervals and is sterilized. The liquid in the storage tank (3) does not directly contact the light source (4). The light source (4) emits UV light that allows various liquids to be

sterilized (Figure 1).

[0030] In an embodiment of the present invention, the cooling device (1) comprises at least one flap (7) that is disposed on the guide (5) and that provides the light to spread into the storage tank (3) by extending outwards from the guide (5). The light coming from the light source (4) is conveyed to the flaps (7) by means of the guide (5). By means of the flap (7), the surface area of the guide (5) is increased and the light is provided to spread in the storage tank (3).

[0031] In an embodiment of the present invention, the flap (7) is produced from light-conducting material and provides the light to spread in the storage tank (3). Thus, the light is provided to directly spread in the storage tank (3) by means of the flap (7).

[0032] In an embodiment of the present invention, the guide (5) extends along the storage tank (3). Thus, the volume is increased, wherein the light is conducted in the storage tank (3) by means of the guide (5).

[0033] In an embodiment of the present invention, the cooling device (1) comprises the light source (4) disposed outside the storage tank (3) and the guide (5) extending from the light source (4) towards the inside of the storage tank (3). Being outside the storage tank (3), the light source (4) is prevented from contacting the liquid in the storage tank (3), thus from being damaged.

[0034] In an embodiment of the present invention, the storage tank (3) is of light-permeable type. Thus, the light coming from the light source (4) is provided to penetrate into the storage tank (3) and to spread in the liquid in the storage tank (3), and the surface area where the light penetrates the liquid in the storage tank (3) is increased.

[0035] In an embodiment of the present invention, the cooling device (1) comprises more than one guide (5) disposed in the storage tank (3) in a staggered manner. The guide (5) extends into the storage tank (3) from more than one point and provides the light coming from the light source (4) to spread into the inner volume of the storage tank (3).

[0036] In an embodiment of the present invention, the cooling device (1) comprises more than one flap (7) disposed on the guide (5) in a staggered

manner. The flaps (7) provide the surface area of the guide (5) to be increased, thus provides the volume wherein the light coming from the light source (4) spreads in the storage tank (3) to increase (Figure 1).

- [0037] In an embodiment of the present invention, the cooling device (1) comprises a motor (6) and the guide (5) that is moved by the motor (6), thus providing the liquid to be stirred. The liquid in the storage tank (3) is continuously or at certain time intervals stirred by means of the guide (5) connected to the motor (6), thereby providing the sterilization effectiveness of the UV light in the liquid to be increased at every point. Moreover, the liquid is provided to displace by means of the guide (5) and thus liquids inclined to subside are prevented from subsiding (Figure 2).
- [0038] In an embodiment of the present invention, the storage tank (3) comprises at least one hole (8) that enables the guide (5) to reach the inside of the storage tank (3). The guide (5) that is taken out of the storage tank (3) by means of the hole (8) is provided to come to the front of the light source (4) (Figure 2).
- [0039] In an embodiment of the present invention, the storage tank (3) comprises at least one sealing element (10) that closes the gap between the hole (8) and the guide (5), preventing the liquid in the storage tank (3) from leaking out of the storage tank (3). In this embodiment, the sealing element (10) is preferably in ring form. The sealing element (10) prevents the liquid from leaking out of the storage tank (3) (Figure 2).
- [0040] In an embodiment of the present invention, the cooling device (1) comprises at least one sensor (11) disposed in the storage tank (3), detecting the presence of the liquid and at least one control unit (9) that controls the light source (4) according to the data received from the sensor (11). With the presence of liquid in the storage tank (3) being detected by the sensor (11), the light source (4) is provided to be turned on. The light emitted by the light source (4) is conveyed into the liquid in the storage tank (3) by means of the guide (5) and the liquid is provided to be sterilized. In case that there is no liquid in the storage tank (3), the light source (4) is turned off, thus preventing unnecessary energy consumption.
- [0041] In an embodiment of the present invention, the control unit (9) enables the

guide (5) to move when the light source (4) is on and enables the guide (5) to stop when the light source (4) is off. Thus, the guide (5) provides the liquid in the storage tank (3) only when the liquid is being sterilized by means of the light source (4).

[0042] In an embodiment of the present invention, the cooling device (1) is a refrigerator.

[0043] In another embodiment of the present invention, the cooling device (1) is a water dispenser.

[0044] In the cooling device (1) of the present invention, by means of the guide (5), the light providing the liquid in the storage tank (3) is emitted continuously or at certain time intervals and the penetration effectiveness of the UV light into the liquid is increased with the liquid being stirred.

[0045] It is to be understood that the present invention is not limited by the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A cooling device (1) **comprising** a body (2), a storage tank (3) disposed in the body (2), wherein liquid is stored, at least one light source (4) disposed in the storage tank (3), providing the liquid to be sterilized, **characterized by** at least one guide (5)
 - that is produced from a light-conducting material,
 - that is at least partially disposed in the storage tank (3), with one end extending towards the light source (4) and the other end at least partially extending into the inner volume of the storage tank (3),
 - that spreads the light coming from the light source (4) in the storage tank (3).
2. A cooling device (1) as in Claim 1, **characterized by** at least one flap (7) that is disposed on the guide (5) and that provides the light to spread into the storage tank (3) by extending outwards from the guide (5).
3. A cooling device (1) as in Claim 1 or 2, **characterized by** the flap (7) that is produced from a transparent material and that provides the light to spread in the storage tank (3).
4. A cooling device (1) as in any one of the Claims 1 to 3, **characterized by** the guide (5) that extends along the storage tank (3).
5. A cooling device (1) as in any one of the Claims 1 to 4, **characterized by** the light source (4) that is disposed outside the storage tank (3) and the guide (5) that extends from the light source (4) towards the inside of the storage tank (3).
6. A cooling device (1) as in any one of the above Claims, **characterized by** the storage tank (3) with light-conducting feature.
7. A cooling device (1) as in any one of the above claims, **characterized by** more than one guide (5) disposed in the storage tank (3) in a staggered manner.
8. A cooling device (1) as in any one of the Claims 2 to 8, **characterized by** more than one flap (7) disposed on the guide (5) in a staggered manner.
9. A cooling device (1) as in any one of the above claims, **characterized by** a motor (6) and the guide (5) that is moved by the motor (6), thus providing the liquid to be stirred.
10. A cooling device (1) as in any one of the above claims, **characterized by** at least one hole (8) arranged on the storage tank (3), enabling the guide (5) to reach the inside of the storage tank (3).

11. A cooling device (1) as in Claim 10, **characterized by** at least one sealing element (10) that closes the gap between the hole (8) and the guide (5), preventing the liquid in the storage tank (3) from leaking out of the storage tank (3).
12. A cooling device (1) as in any one of the above claims, **characterized by** at least one sensor (11) disposed in the storage tank (3), detecting the presence of the liquid and at least one control unit (9) that controls the light source (4) according to the data received from the sensor (11).
13. A cooling device (1) as in Claim 12, **characterized by** the control unit (9) that enables the guide (5) to move when the light source (4) is on and that enables the guide (5) to stop when the light source (4) is off.
14. A cooling device (1) as in any one of the above claims which is a refrigerator.
15. A cooling device (1) as in any one of the Claims 1 to 13, which is a water dispenser.

Figure 1

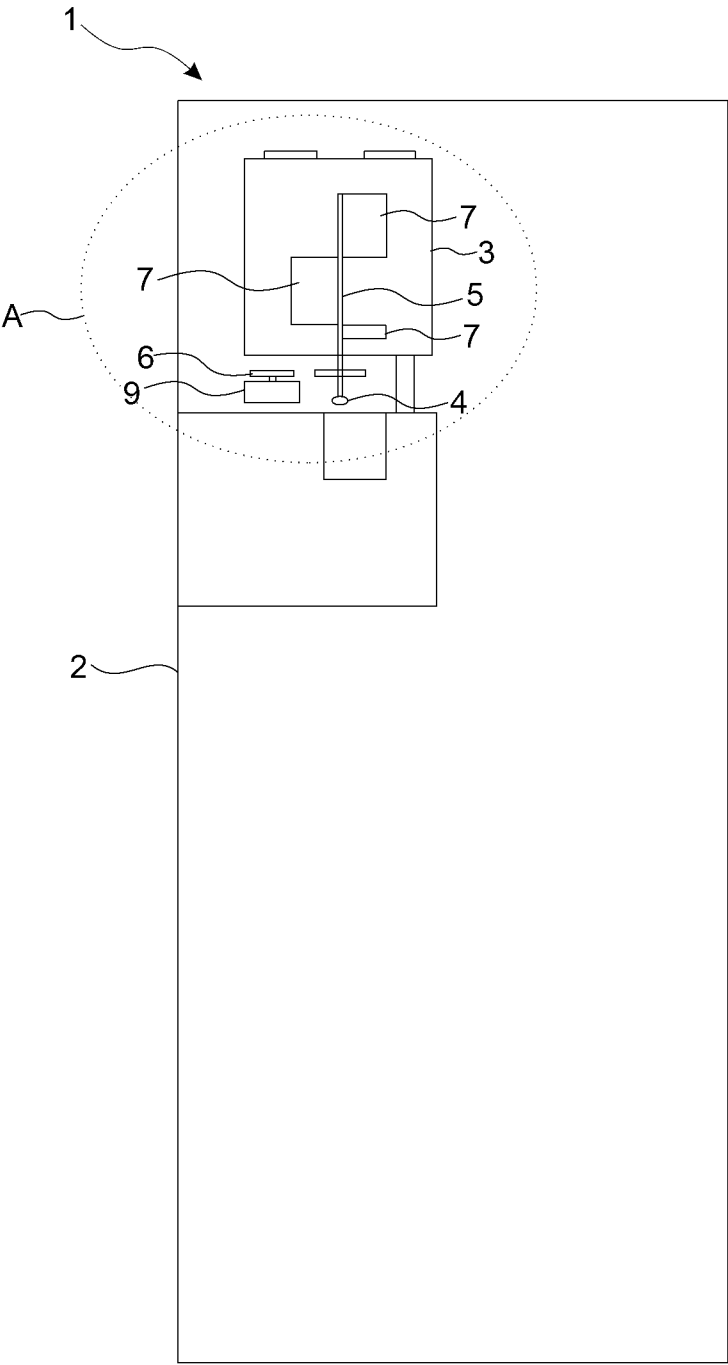


Figure 2

