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(54) **WASHING DEVICE AND METHOD OF WASHING OBJECTS**

WASCHVORRICHTUNG UND VERFAHREN ZUM WASCHEN VON GEGENSTÄNDEN

DISPOSITIF DE LAVAGE ET PROCÉDÉ DE LAVAGE D'OBJETS

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## Description

**[0001]** The present invention relates to a washing device for washing objects, more specifically for washing especially hands.

**[0002]** Known washing devices are provided with a washbasin wherein hands are washed with water from a tap. Soap can be used here if desired. In use hands are often washed in a manner which is not wholly hygienic. This includes, among others, washing too briefly, using too much soap or, conversely, using no soap and shaking washed hands dry and then drying the hands. This happens in homes but also at central locations such as in catering establishments, theatres, football stadiums and temporary facilities such as festivals, fairs and campsites.

**[0003]** US 3 918 987 discloses a washing device according to the preamble of claim 1 for cleaning the hands and forearms of medical personnel.

**[0004]** The present invention has for its object to obviate or at least reduce the above stated problems with washing devices.

**[0005]** The present invention provides for this purpose a washing device for washing objects according to claim 1.

**[0006]** The liquid used is preferably water, or water is the main constituent of the liquid.

**[0007]** By providing a washbasin which at least partially forms, defines and encloses a washing space, wherein a liquid outlet is provided on or close to the wall, objects, in particular hands, can be washed without excessive splashing. This already improves the hygiene of washing hands. The liquid outlet is preferably oriented here in a direction substantially parallel to the plane defined by the opening in the washbasin. This means for instance that, if the conventional arrangement of the washbasin is opted for, wherein the opening is situated substantially in the horizontal plane, during use the liquid outlet realizes a horizontal or substantially horizontal outflow, or an outflow at a limited angle to the horizontal plane. This achieves that the liquid remains substantially within the washing space.

**[0008]** At least one air opening arranged on or close to the wall is also provided. In a currently preferred embodiment this air opening is an air outlet.

**[0009]** The air outlet and/or air extractor can be positioned a smaller or greater distance from the opening relative to the liquid outlet. The air outlet and/or the air extractor can also be provided spread over different distances.

**[0010]** In a currently most preferred embodiment the device comprises an air outlet situated a shorter distance from the opening than the liquid outlet. By positioning the air outlet closer to the opening than the liquid outlet an air screen is as it were realized. During use the air outlet preferably blows out air in a direction substantially parallel to the plane formed by the opening of the washing device or at a limited angle thereto.

**[0011]** Positioning the air outlet closer to the opening

achieves that, after washing of the objects, they are withdrawn from the washing device through the blown-out air of preferably an air screen. Washing itself therefore takes place below the airflow, substantially in the liquid flow coming from the liquid outlet. This further limits splashing.

**[0012]** An air extractor is preferably additionally arranged on or close to the wall for extracting air. The extractor is preferably disposed relative to the air outlet such that they together form an air screen, for instance substantially opposite the air outlet. Splashing is hereby prevented.

**[0013]** An additional advantage of such an extractor is that it can optionally also extract in any case a part of the liquid, for instance splashed droplets. A hygienic device is hereby obtained.

**[0014]** The air extractor can also serve as liquid discharge means, i.e. the liquid discharge means and the air extractor are optionally integrated into one element.

**[0015]** In another embodiment according to the invention the device comprises an air extractor instead of an air outlet. Extraction of air and optionally in any case a part of the liquid counteracts splashing of droplets. The air extractor is preferably adjusted such that during use air is suctioned into the washbasin via the opening. This airflow suctions liquid droplets along with it, thereby making hygienic washing possible.

**[0016]** Airflow means, embodied for instance as air feed means, and liquid feed means provide for respectively the supply of air and liquid to the associated openings, for instance outlets. These feed means comprise for instance pipes and a pump. Used liquid is discharged from the washing space with the liquid discharge means.

**[0017]** In an advantageous embodiment of the washing device according to the invention water without additives is used. Such additives are for instance soap, alcohol, solid particles etc. Not using additives has a number of advantages, including that no dispensing unit is required in the hand washer. This makes the construction simpler, less expensive and less susceptible to malfunction. The additives do not run out and do not have to be replenished. This increases operational reliability. The additives need not be removed during a treatment process. Users will not have allergic reactions to substances.

**[0018]** A support can optionally be provided in the washbasin on which hands, an object or feet can be placed, for instance a rack which allows passage of water.

**[0019]** In an advantageous embodiment according to the invention use is made of an extractor for extracting liquid. The used liquid is hereby discharged completely from the washing space and hygiene is hereby further enhanced. It is moreover possible for the extractor to also extract air as well as liquid.

**[0020]** By providing an extractor is moreover possible that the washbasin can be placed at an angle relative to the gravitational force. The opening plane of the washbasin is for instance situated parallel to the direction of

the gravitational force. This means that the washbasin is rotated 90° relative to conventional washbasins. An embodiment can further be envisaged in which the washbasin is provided upside down.

**[0021]** The air outlet and/or air extractor preferably provides an airflow during use which substantially covers the washing space as a kind of air screen, or in any case covers the opening thereof. This achieves that a more or less closed washing space is created inside which the liquid remains substantially enclosed. This prevents splashing. In addition, this achieves that a kind of pre-drying effect is realized so as to avoid the above stated shaking dry of the hands.

**[0022]** The air outlet comprises for instance air blades or is embodied as a blower in combination with an extractor positioned opposite. The air outlet is preferably directed away from the opening so that the liquid is blown into the washbasin.

**[0023]** The device further comprises for instance a condenser for the production of water.

**[0024]** According to the invention the liquid outlet comprises atomizing means. The liquid flow is hereby atomized in use in order to increase contact between the cleaning liquid flow and the objects. Hygiene can hereby be further improved. Owing to atomization relatively little liquid is moreover necessary for the purpose of wetting objects. This is efficient and moreover environmentally-friendly.

**[0025]** The average droplet diameter is preferably smaller than 100 µm, more preferably smaller than 50 µm, and the droplet diameter is most preferably about 1-10 µm.

**[0026]** The atomizing means preferably comprise an intermediate chamber and a compressed air supply. Using the compressed air water droplets sprayed under water supply pressure are further atomized in the intermediate chamber to form extremely small droplets. The droplets in this way acquire a very high speed.

**[0027]** The small dimensions of the droplets achieve that they can penetrate into small pores. The atomized liquid has an improved cleaning action due to the high speed of the droplets. Owing to the small water volume and the airflow a film of water does not occur, or hardly so, on the surface of the object for washing, so preventing that such a film of water decelerates arriving water droplets.

**[0028]** In a further preferred embodiment the liquid feed means comprise heating means for the purpose of realizing a warm atomized liquid.

**[0029]** According to the invention the heating means are adjusted to heat the liquid to a temperature above 80°C, preferably above 90°C and more preferably above 100°C.

**[0030]** The heating means are for instance connected to the atomizing means.

**[0031]** The cleaning action of the liquid is increased by supplying a warm liquid, and preferably a hot liquid. The liquid with high temperature causes fats to melt. Fats are

hereby effectively removed from the object for washing. The temperature of the liquid is preferably such that fats melt.

**[0032]** The use of a warm atomized liquid is particularly advantageous for washing hands. Owing to the high temperature the pores of the skin open, whereby the skin is cleaned intensively. Surprisingly, it has moreover been found that the warm or hot mist does not feel too hot. Although a non-atomized jet of water with a temperature of about 50° is perceived as unbearably hot and can even result in burns, it has been found that an atomized liquid with a droplet temperature of at least 80°C is not perceived as too hot. This is caused by the small droplets of the atomized liquid having a low heat capacity. The number of warm particles is also limited. The airflow which is preferably present at the same time also has a cooling effect on the hands. The temperature of the atomized liquid even feels pleasant.

**[0033]** Providing means for realizing a warm mist moreover has the advantage that the object is warmed to a certain extent after washing, whereby the object dries more quickly.

**[0034]** The heating means comprise for instance a spiral filament or solar water heater.

**[0035]** The device is preferably further provided with an insulated liquid storage. The stored water can hereby be kept at a high temperature for a long period. This is preferably a temperature of 70-100°C. The liquid is in any case partially disinfected as a result. In addition, growth of bacteria, viruses and other micro-organisms is counteracted or inhibited. A device is hereby obtained for hygienic cleaning of objects. The water can be kept at temperature for a long time with only a small supply of energy.

**[0036]** The insulated liquid storage is preferably suitable for storing the liquid under a pressure so that the temperature of the liquid can be increased to above the boiling point at normal pressure (atmospheric pressure). Water is for instance stored under pressure at a temperature of 70-130°C, preferably at 70-110°C.

**[0037]** The temperature of the droplets forming the final mist is preferably about 70-100°C, more preferably about 70°C to about 95°C, and most preferably about 80°C to about 90°C.

**[0038]** The washing device according to the invention is preferably embodied such that the flow of water droplets never continues longer than the airflow, this in order to prevent burns. This avoids the user burning his/her hands when only hot water comes out in large droplets. An example of such a preventive measure is to generate the required water pressure with the air pressure. If the air pressure is then lost, the water pressure falls away automatically as well, also in the case of power failure. This results in a safe washing device.

**[0039]** In an advantageous preferred embodiment according to the present invention the washing device comprises means for reusing liquid.

**[0040]** Providing means for reusing liquid achieves that

a type of mobile washing device is obtained. Such mobile washing devices are easy to place, for instance at temporary facilities such as campsites, festivals and fairs. Owing to the reuse of liquid no separate conduit such as a water pipe need be provided to the washing device. In addition, it is the case that a more durable washing device is hereby provided with which more efficient use is made of the liquid without thereby detracting from the importance of hygiene in for instance washing the hands.

**[0041]** Use is preferably made of a filter for separating liquid and soap and/or dirt. Through separation of the liquid-dirt-soap mixture the liquid can be reused. The soap and/or dirt can be stored separately or discharged. The amount of residual flow or waste flow is significantly limited due to reuse of liquid. An additional advantage is that there is no fixed sewer connection, thereby further adding to the mobile character of the washing device. The washing device can in principle be placed anywhere as a result, such as at the above stated temporary facilities as well as in catering establishments such as snack bars, and optionally at animal accommodation in the case of an outbreak of disease.

**[0042]** In a first possible embodiment the soap and the dirt are separated from the liquid together. The liquid is then reused and the soap and dirt are stored separately in order to be discharged. In a second embodiment the dirt is separated from the liquid and soap, and the liquid and soap are reused. The individually separated dirt is stored for further discharge. The washing device preferably comprises a liquid reservoir here for storing liquid, a soap reservoir and/or dirt reservoir. Depending on the chosen embodiment, the dirt reservoir has to be emptied occasionally and the liquid reservoir and optionally the soap reservoir have to be checked occasionally and, if necessary, replenished. It is possible here to provide for instance level sensors or weight indicators at these reservoirs in order to enable an autonomous signal to for instance a maintenance service.

**[0043]** In the context of the present application soap is broadly understood to include any substance which has a cleaning action on objects or hands.

**[0044]** In an advantageous embodiment of the present invention the separation of liquid from soap and/or dirt is performed in a kind of cassette in which for instance a microfiltration UV light treatment, carbon filtration, cleaning with chlorine or other cleaning method is performed. A filter cassette can be easily replaced, including water and collected dirt.

**[0045]** In an advantageous preferred embodiment according to the present invention the liquid feed means comprise means for feeding liquid provided with a non-soluble substance.

**[0046]** Feeding liquid having a non-soluble substance therein makes it possible to obtain a good cleaning action and simultaneously realize a good separability of the substances used.

**[0047]** Water with sand, plastic globules or magnesium oxide particles is preferably applied. The cleaning effect

is for instance obtained by a non-soluble substance with a light abrasive action such as sand.

**[0048]** In addition or in combination herewith, liquid feed means for feeding demineralized water are provided in a possible embodiment according to the invention. Such demineralized water is for instance obtained by making use of reverse osmosis or a de-ionizing device, for instance using reusable resin ampoules. Through use of this water the amount of soap can be limited to a minimum, while a good cleaning function is nevertheless obtained wherein the hygiene remains optimal. It is preferably possible to wholly dispense with soap such that a soap dispenser or soap pump is not necessary either.

**[0049]** When objects with smooth surfaces are cleaned, such as glasses or mugs, this moreover avoids stains occurring after drying due to salts being left behind.

**[0050]** Also as alternative or in combination with the above stated measure, an alcohol suitable for the purpose can also be added to the liquid in order to thereby enhance the cleaning action of the liquid. Because alcohol evaporates, this moreover achieves that the objects dry more quickly. It is noted that alcohol can be added to demineralized water or tap water, or that alcohol can be the main constituent of the liquid supplied by the liquid feed.

**[0051]** The washing device preferably comprises an outlet for such a stated disinfectant. It is likewise possible to provide the washing device with a separate or combined outlet for a fragrance means. This further enhances the overall washing experience.

**[0052]** In an advantageous preferred embodiment according to the present invention the washing device comprises a second air outlet arranged on or close to the wall, wherein the second air outlet is positioned between the first air outlet and the liquid outlet.

**[0053]** On the one hand the effect of the anti-splash screen obtained with the first air outlet is enhanced by providing a second air outlet. In addition, the stated pre-drying effect is further enhanced with the second air outlet, whereby shaking the hands dry is no longer relevant. By preferably separating the anti-splash effect and the drying effect, to the extent this is possible at least, a laminar flow can be preserved as far as possible for the first air outlet so as to thereby obtain a good coverage. A turbulent flow can preferably be obtained for the second air outlet in order to thereby increase the drying effect. This further enhances the hygienic effect. A fully drying effect can be realized through the use of the second air outlet. The use of towels and blowers is no longer required here. This means that the quantity of towels, particularly in publicly accessible washing areas, is hereby limited or even wholly dispensed with. This has the additional advantage that the maintenance of a washing area can be greatly reduced. The use of blowers can also be greatly reduced. Such blowers are used frequently in practice in publicly accessible washing areas and have the significant drawback of reducing hygiene because the blow air causes spread of liquid droplets over the

whole space. It is also the case that the energy consumption can be greatly reduced by dispensing with such blowers. This contributes toward the overall durability of the washing device according to the invention. A further additional advantage of using the second air outlet with the enhanced drying effect is that this drying takes place in automatic manner and users of the washing device do not therefore leave with wet hands. Wet hands pass on up to 1000 times as many bacteria as dry hands. After washing the hands must be moved through the air layers. This drying integrated with the washing device according to the present invention therefore achieves an enhanced hygienic effect.

**[0054]** In order to strengthen the drying effect, a heating element is preferably provided in the air feed means. Such a heating element can be provided for the first air outlet and/or second air outlet.

**[0055]** During use the heating element preferably switches on simultaneously with the liquid feed means. This achieves that the outflowing air is heated during washing of an object such as hands. The air functions as splash screen during washing. The then heated air subsequently serves to dry the object.

**[0056]** In a preferred embodiment the washing device comprises an air extractor and an air cleaner coupled thereto.

**[0057]** The air extractor is for instance combined with an extractor for extracting liquid. Such a combined extractor is preferably adjusted to separate air from liquid.

**[0058]** Coupling of the air extractor to an air cleaner achieves that extracted air is cleaned. The air cleaner comprises for instance a device for ionizing air. The air preferably has the water removed, is disinfected and/or heated. Because the air is cleaned a hygienic device for washing hands is obtained.

**[0059]** In an advantageous preferred embodiment according to the present invention the washing device comprises sensors for detecting the humidity of the object.

**[0060]** By providing sensors it is possible to adjust the amount of drying air to the requirement. A dehydrating effect on the hands is hereby counteracted. In addition, the use of energy in all its forms is further reduced.

**[0061]** Sensors are preferably also provided for detecting the degree of cleaning or degree of contamination of the objects. It is hereby possible here using a control system coupled to the relevant sensors to adjust the quantity of liquid and/or cleaning agent to the requirement. The use of liquid and/or cleaning agents can hereby be limited. This has the effect of saving costs in respect of the cleaning agent. In respect of the liquid, for instance water, this particularly has a durability effect.

**[0062]** In a further advantageous preferred embodiment according to the present invention the washing device comprises a compressed air unit coupled to the air feed means and/or liquid feed means.

**[0063]** Owing to the use of the compressed air unit as primary energy source or power source no great energy conversions are required for the washing device in re-

spect of washing and drying. A compressor motor preferably provides sufficient air pressure in the pressure vessel with the compressed air. This pressure vessel is connected to the air outlets, air blades or air nozzles for drying purposes.

**[0064]** The waste products or residues can likewise be dried with the used air in for instance the return flow. The waste flow can hereby be converted to a wholly or partially concentrated mass which can be periodically removed. This achieves that no fixed sewer connection is necessary and that the periodic maintenance for discharge of this concentrated mass can remain very limited.

**[0065]** It is otherwise also possible to use a central compressed air provision for different washing devices. Costs associated with such a compressed air unit can hereby be reduced. In an embodiment of the present invention the energy required is supplied with batteries and/or solar cells. Energy required, for instance for the compressor, is hereby supplied in renewable manner and no fixed electricity connection need be provided. This latter aspect is particularly important in the case of temporary facilities at for instance festivals. It is also possible to obtain the necessary energy using a pump, for instance a foot pump, which can be operated manually or in other manner by a user. This further enhances the durable character of the washing device, and a cost-effective embodiment is obtained which, if desired, can also be utilized at several locations.

**[0066]** The present invention further relates to a method for washing objects with the washing device as described above.

**[0067]** Such a method provides the same effects and advantages as described in respect of the device.

**[0068]** Further advantages, features and details of the invention are elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

- figure 1 shows a washing device and a user;
- figure 2 shows in partial cross-section a washing device as according to figure 1;
- figure 3 shows a second embodiment of a washing device;
- figure 4 shows a third embodiment of a washing device;
- figure 5 shows a fourth embodiment of a washing device; and
- figure 6 shows a cross-section of a fifth embodiment of a washing device.

**[0069]** Washing device 2 comprises a washbasin 4 on pedestal 6. Washbasin 4 comprises opening 8 in which objects can be placed. In the shown situation hand 10 of user 12 is being washed with washing device 2. Washbasin 4 and pedestal 6 are manufactured from stainless steel (SS).

**[0070]** Washbasin 4 has on the inner side holes 14

from which water flows, whereby a water surface 16 is formed. User 12 places his/her hand 10 in water surface 16 in order to wash it. Air blades 18 are provided above holes 14 on the wall of washbasin 4. Air 20 flows out of these. The air 20 forms an air screen which substantially closes opening 8 so that upward splashing water from water surface 16 does not splash outside opening 8 but is held back by airflow 20.

[0071] The water of water surface 16 comes from water reservoir 22. Water reservoir 22 is connected by means of pipe 24 to compressor 26. Owing to the pressure of compressor 26 water flows from water reservoir 22 via pipe 28 to soap reservoir 30. The water and soap mixture then flows via pipe 32 to outflow openings 14. Another agent can also be provided in soap reservoir 30 instead of soap, for instance alcohol or a non-soluble substance. An embodiment can also be envisaged in which soap reservoir 30 is omitted.

[0072] Compressor 26 is connected via pipe 34 to air blades 18 so that air blades 18 form an air screen using airflow 20.

[0073] Washbasin 4 comprises an outlet 36 through which used water is guided to reservoir 38. Outlet 36 holds back solid substances such as cigarettes and chewing gum. An airflow 42, 44 is created by means of extractor 40 which extracts the water in the direction of reservoir 38.

[0074] Washing device 46 (figure 3) comprises a housing 48 of polypropylene. It is possible to manufacture housing 48 from a transparent or partly transparent material. Housing 48 comprises a washing space 50 for washing objects such as hands 10. Provided on housing 52 is a water outflow from which during use flows water which forms water screen 54. Further provided in housing 48 is a blower 56 which in use creates an air screen 58. Air screen 58 closes off washing space 50 so the water splashing off water screen 54 is held back by air screen 58. Arranged opposite blower 56 is an extractor 59 for extracting air. An air screen is created herewith in combination with blower 56. Liquid droplets are moreover extracted.

[0075] Housing 48 moreover comprises an outlet 60 for discharge of dirty water and air. In addition, LED lighting 61 is also provided which provides for illumination of the interior of washing space 50 and creates an overall pleasing appearance. LED lighting 61 is provided below water screen 54 so that specifically this screen is illuminated. It is hereby readily possible to discern the water screen.

[0076] Washing device 62 (figure 4) comprises pedestal 64 and washbasin 66. Washbasin 66 is provided with two openings 68, 70 in which objects such as hands 10 can be placed for washing thereof. Washbasin 66 thus forms as it were a washing tunnel.

[0077] Washing device 72 comprises three washbasins (figure 5). The washbasins correspond to the washbasin as shown in figure 2. By providing several washbasins on a single pedestal the provisions for three wash-

basins can be integrated in one pedestal. There is for instance only one compressed air unit necessary to supply compressed air for three washbasins. This is cost-effective and energy-efficient.

5 [0078] In a washing device 74 (figure 6) according to a fifth embodiment of the invention air outlets 76, 78 are provided around the opening of the washbasin. Air extractors 80, 82 are positioned under the air pipe.

10 [0079] During use the outlets 76, 78 and extractors 80, 82 create airflows as indicated with arrows 84, 86 and 88. Airflows 84 and 86 substantially cover the washbasin. Because extractors 80, 82 extract a greater volume of air per unit time than blowers 76, 78, air is drawn in via the opening of the washbasins as according to arrow 88. 15 This effect can also be achieved or enhanced by extraction of liquid by extractor 90 which extracts air as well as liquid.

[0080] For the purpose of washing an object 10 such as hands, object 10 is placed in a washbasin 4 (figure 2). A sensor detects the presence of the object in the washbasin 4. An air screen is formed by means of air blades 18. Water is atomized and introduced into washbasin 4 by means of liquid feed 14. Warm or hot water is provided with a temperature above 80°C, preferably with a temperature above 90°C, more preferably with a temperature above 100°C. The water reservoir is provided for this purpose with heating means. The water is preferably atomized by means of an intermediate chamber in which droplets sprayed under water pressure are additionally atomized using compressed air. 30

[0081] The present invention is by no means limited to the above described preferred embodiments thereof. The rights sought are defined by the following claims. Although particular reference is made in the foregoing to a washing device intended for hands, it is also possible to wash other objects. The use of demineralized water is for instance favourable in preventing stains on glasses and the like. The washing device can be embodied for the purpose of washing a maximum of one object, but also to wash a complete dishwasher load. The washbasin is for instance manufactured from a plastic, stainless steel, a ceramic material, carbon fibre or glass. The washing device according to the invention is preferably self-cleaning and self-drying. 45

## Claims

1. Washing device (2, 46, 62, 72, 74) for washing objects (10), comprising:

- a washbasin (4) provided with a wall at least partially enclosing a washing space (50), and an opening for inserting an object for washing;
- at least one liquid outlet (14) arranged on or close to the wall;
- at least one air opening (18) arranged on or close to the wall for extracting and/or supplying

air, and airflow means connected to the at least one air opening for discharging and/or supplying air;  
 - liquid feed means (32) connected to the at least one liquid outlet for supplying liquid to the at least one liquid outlet; and  
 - liquid discharge means (36) for discharging liquid,

**characterized in that** the at least one liquid outlet (14) comprises atomizing means, wherein the liquid feed means (32) comprise heating means for the purpose of realizing a warm atomized liquid, wherein the heating means are adjusted to heat the liquid to a temperature above 80°C.

2. Washing device (2, 46, 62, 72, 74) as claimed in claim 1, wherein the liquid discharge means comprise an extractor (40) for extracting liquid.
3. Washing device (2, 46, 62, 72, 74) as claimed in claim 1 or 2, wherein the at least one air opening (18) is formed by an air outlet (56) and/or an air extractor (59) which provides an airflow during use which substantially covers the washing space (50).
4. Washing device (2, 46, 62, 72, 74) as claimed in claim 1, 2 or 3, wherein the heating means are adjusted to heat the liquid to a temperature above 90°C and more preferably above 100°C.
5. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-4, comprising means for reusing liquid and/or comprising a filter for separating liquid and soap and/or dirt, further preferably comprising a liquid reservoir (22), soap reservoir (30) and/or dirt reservoir.
6. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-5, wherein the liquid feed means comprise means for feeding liquid provided with a non-soluble substance.
7. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-6, wherein the liquid feed means comprise means for feeding demineralized water.
8. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-7, comprising an outlet for a disinfectant and/or a fragrance means.
9. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-8, wherein a second air opening is arranged on or close to the wall, wherein the second air opening is positioned between the first air opening and the at least one liquid outlet (14).

10. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-9, wherein the airflow means comprise a heating element.
11. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-10, comprising an air extractor and an air cleaner coupled thereto.
12. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-11, comprising sensors for detecting the humidity of the object.
13. Washing device (2, 46, 62, 72, 74) as claimed in at least one of the claims 1-12, comprising a compressed air unit coupled to the air feed means and/or liquid feed means.
14. Method for washing objects (10) with the washing device (2, 46, 62, 72, 74) as claimed in at least one of the foregoing claims.
15. Method as claimed in claim 14, wherein during use the heating element of the air feed means switches on simultaneously with the liquid feed means.

#### Patentansprüche

1. Waschvorrichtung (2, 46, 62, 72, 74) zum Waschen von Gegenständen (10), die Folgendes umfasst:
  - ein Waschbecken (4), das mit einer Wand, die mindestens teilweise einen Waschraum (50) einschließt, und einer Öffnung zum Einführen eines Gegenstands zum Waschen versehen ist;
  - mindestens einen Flüssigkeitsauslass (14), der an oder nahe der Wand angeordnet ist;
  - mindestens eine Luftöffnung (18), die an oder nahe der Wand angeordnet ist, zum Abziehen und/oder Zuführen von Luft, und Luftstrommittel, die mit der mindestens einen Luftöffnung verbunden sind, um Luft abzuführen und/oder zuzuführen;
  - Flüssigkeitszufuhrmittel (32), die mit dem mindestens einen Flüssigkeitsauslass verbunden sind, um dem mindestens einen Flüssigkeitsauslass Flüssigkeit zuzuführen; und
  - Flüssigkeitsablassmittel (36) zum Ablassen von Flüssigkeit,

**dadurch gekennzeichnet, dass** der mindestens eine Flüssigkeitsauslass (14) Zerstäubungsmittel umfasst, wobei das Flüssigkeitszufuhrmittel (32) Heizmittel zum Zwecke der Erzeugung einer warmen zerstäubten Flüssigkeit umfasst, wobei die Heizmittel eingestellt sind, die Flüssigkeit auf eine Temperatur über 80 °C zu erhitzen.

2. Waschvorrichtung (2, 46, 62, 72, 74) gemäß Anspruch 1, wobei das Flüssigkeitsablassmittel eine Abzugsvorrichtung (40) zum Abziehen von Flüssigkeit umfasst.
3. Waschvorrichtung (2, 46, 62, 72, 74) gemäß Anspruch 1 oder 2, wobei die mindestens eine Luftöffnung (18) durch einen Luftauslass (56) und/oder eine Luftabzugsvorrichtung (59) gebildet ist, die einen Luftstrom während der Verwendung bereitstellt, der im Wesentlichen den Waschraum (50) abdeckt.
4. Waschvorrichtung (2, 46, 62, 72, 74) gemäß Anspruch 1, 2 oder 3, wobei das Heizmittel zum Erhitzen der Flüssigkeit auf eine Temperatur über 90 °C und stärker bevorzugt über 100 °C eingestellt ist.
5. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 4, die Mittel zum Wiederverwenden der Flüssigkeit und/oder ein Filter zum Trennen von Flüssigkeit und Seife und/oder Schmutz umfasst, weiter bevorzugt einen Flüssigkeitsbehälter (22), einen Seifenbehälter (30) und/oder einen Schmutzbehälter umfasst.
6. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 5, wobei das Flüssigkeitszufuhrmittel Mittel zum Zuführen von Flüssigkeit, die mit einer nicht löslichen Substanz versehen ist, umfasst.
7. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 6, wobei das Flüssigkeitszufuhrmittel Mittel zum Zuführen von demineralisiertem Wasser umfasst.
8. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 7, die einen Auslass für ein Desinfektionsmittel und/oder ein Duftmittel umfasst.
9. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 8, wobei eine zweite Luftöffnung an oder nahe der Wand angeordnet ist, wobei die zweite Luftöffnung zwischen der ersten Luftöffnung und dem mindestens einen Flüssigkeitsauslass (14) positioniert ist.
10. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 9, wobei das Luftstrommittel ein Heizelement umfasst.
11. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 10, die eine Luftabzugsvorrichtung und einen daran gekoppelten Luftreiniger umfasst.
12. Waschvorrichtung (2, 46, 62, 72, 74) gemäß min-

destens einem der Ansprüche 1 bis 11, die Sensoren zum Erfassen der Feuchtigkeit des Gegenstands umfasst.

- 5 13. Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der Ansprüche 1 bis 12, die eine Drucklufteinheit umfasst, die an das Luftzufuhrmittel und/oder Flüssigkeitszufuhrmittel gekoppelt ist.
- 10 14. Verfahren zum Waschen von Gegenständen (10) mit der Waschvorrichtung (2, 46, 62, 72, 74) gemäß mindestens einem der vorhergehenden Ansprüche.
- 15 15. Verfahren gemäß Anspruch 14, wobei während Verwendung das Heizelement des Luftzufuhrmittels gleichzeitig mit dem Flüssigkeitszufuhrmittel einschaltet.

## 20 Revendications

1. Dispositif de lavage (2, 46, 62, 72, 74) destiné à laver des objets (10), comprenant :

- 25 - un lavabo (4) muni d'une paroi entourant au moins partiellement un espace de lavage (50), et d'une ouverture permettant d'insérer un objet à laver ;
- 30 - au moins une évacuation de liquide (14) placée sur ou à proximité de la paroi ;
- au moins une ouverture d'air (18) placée sur ou à proximité de la paroi afin d'extraire et/ou de fournir de l'air, et un moyen d'écoulement d'air relié à l'ouverture d'air au moins afin d'évacuer et/ou fournir de l'air ;
- 35 - un moyen d'alimentation en liquide (32) relié à l'évacuation de liquide au moins, et destiné à fournir du liquide à l'évacuation de liquide au moins ; et
- 40 - un moyen d'évacuation de liquide (36) destiné à évacuer le liquide,

**caractérisé en ce que** l'évacuation de liquide au moins (14) comprend un moyen d'atomisation, le moyen d'alimentation en liquide (32) comprenant un moyen de chauffage destiné à obtenir un liquide atomisé chaud, le moyen de chauffage étant réglé de façon à chauffer le liquide à une température supérieure à 80°C.

2. Dispositif de lavage (2, 46, 62, 72, 74) selon la revendication 1, dans lequel le moyen d'évacuation de liquide comprend un extracteur (40) destiné à extraire le liquide.
3. Dispositif de lavage (2, 46, 62, 72, 74) selon la revendication 1 ou 2, dans lequel l'ouverture d'air au moins (18) est formée par une évacuation d'air (56)

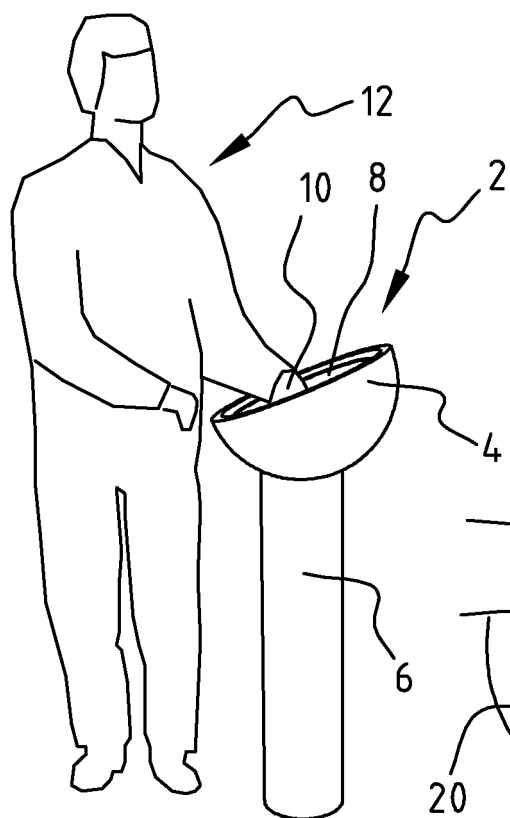


et/ou un extracteur d'air (59) qui permet un écoulement d'air pendant l'utilisation, qui protège sensiblement l'espace de lavage (50).

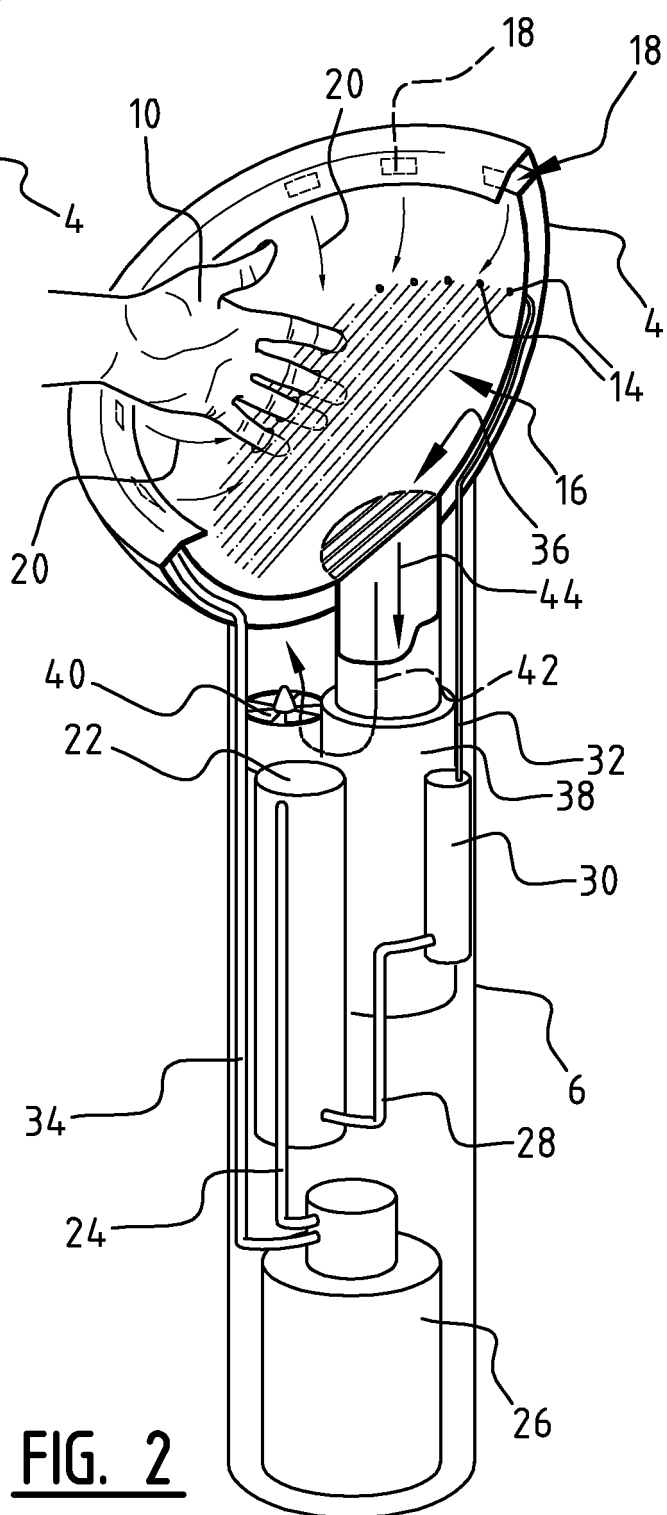
4. Dispositif de lavage (2, 46, 62, 72, 74) selon la revendication 1, 2 ou 3, dans lequel le moyen de chauffage est réglé de façon à chauffer le liquide à une température supérieure à 90°C, et de préférence supérieure à 100°C. 5
5. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 4, comprenant un moyen de réutilisation du liquide et/ou comprenant un filtre destiné à séparer le liquide et le savon et/ou les saletés, comprenant en outre de préférence un réservoir de liquide (22), un réservoir à savon (30) et/ou un réservoir à saletés. 10
6. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 5, dans lequel le moyen d'alimentation en liquide comprend un moyen destiné à fournir un liquide qui contient une substance non soluble. 15
7. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 6, dans lequel le moyen d'alimentation en liquide comprend un moyen destiné à fournir de l'eau déminéralisée. 20
8. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 7, comprenant une évacuation destinée à un désinfectant et/ou un parfum. 25
9. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 8, dans lequel une seconde ouverture d'air est placée sur ou à proximité de la paroi, la seconde ouverture d'air étant positionnée entre la première ouverture d'air et l'évacuation de liquide au moins (14). 30
10. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 9, dans lequel l'écoulement d'air comprend un élément de chauffage. 35
11. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 10, comprenant un extracteur d'air et un épurateur d'air relié à ce dernier. 40
12. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 11, comprenant des capteurs destinés à détecter l'humidité de l'objet. 45
13. Dispositif de lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications 1 à 12, comprenant une unité d'air comprimé reliée au moyen d'alimentation en air et/ou au moyen d'alimentation en liquide. 50
14. Procédé de lavage d'objets (10) avec le dispositif de 55

lavage (2, 46, 62, 72, 74) selon au moins l'une des revendications précédentes.

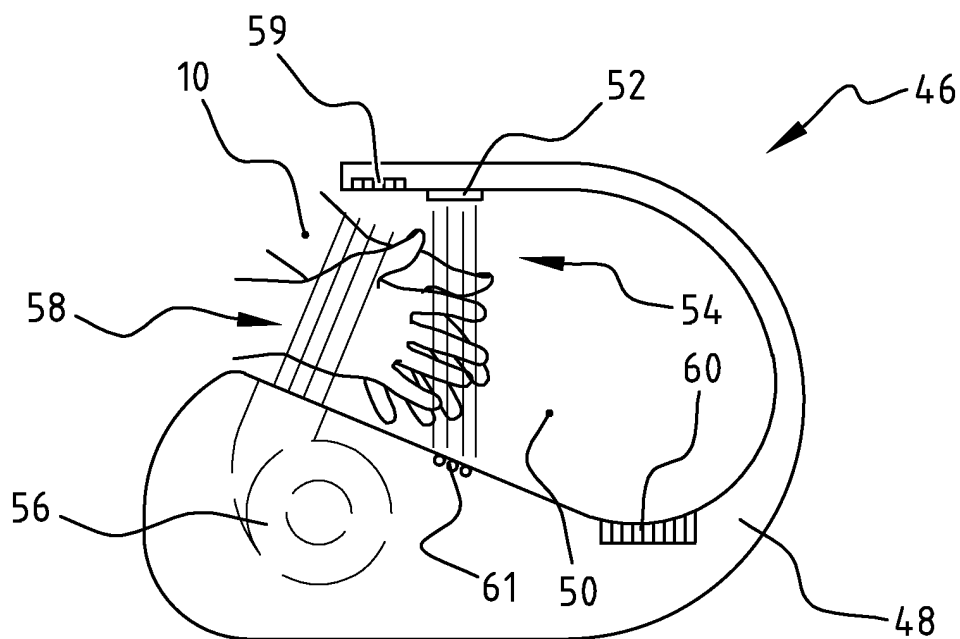
15. Procédé selon la revendication 14, dans lequel, pendant l'utilisation, l'élément de chauffage du moyen d'alimentation en air s'allume en même temps que le moyen d'alimentation en liquide.



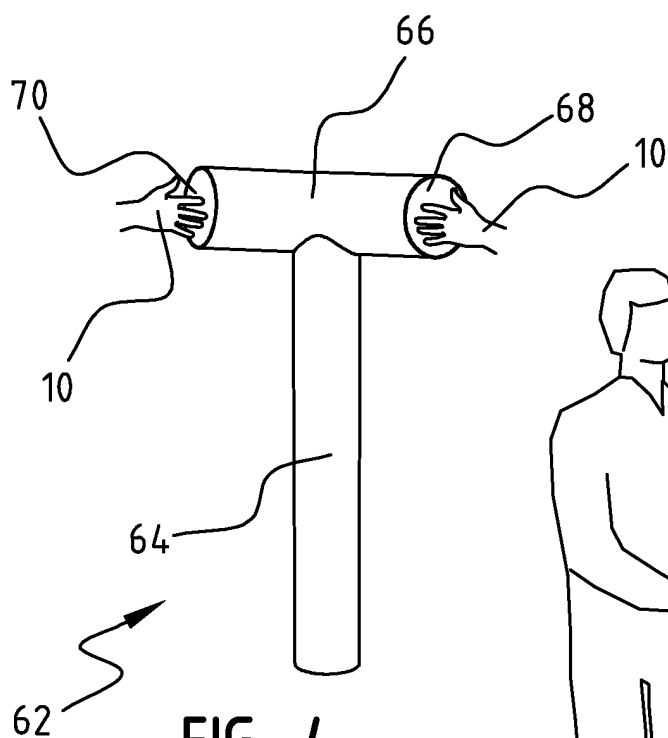
**FIG. 1**



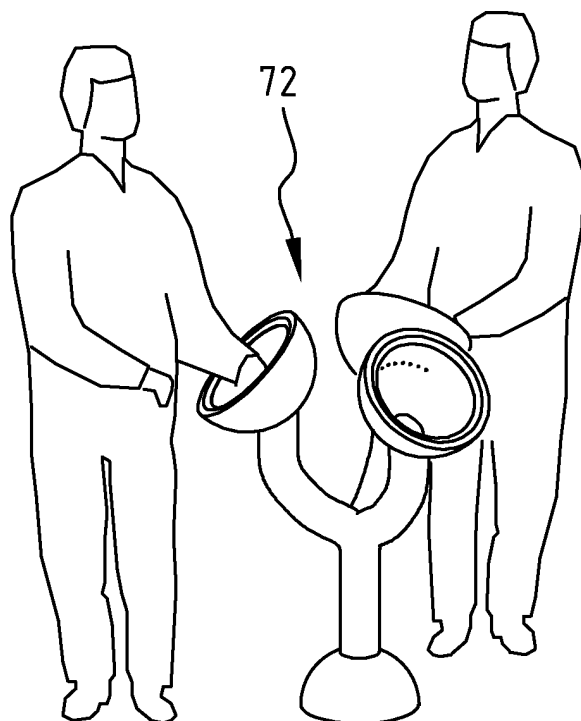
**FIG. 2**



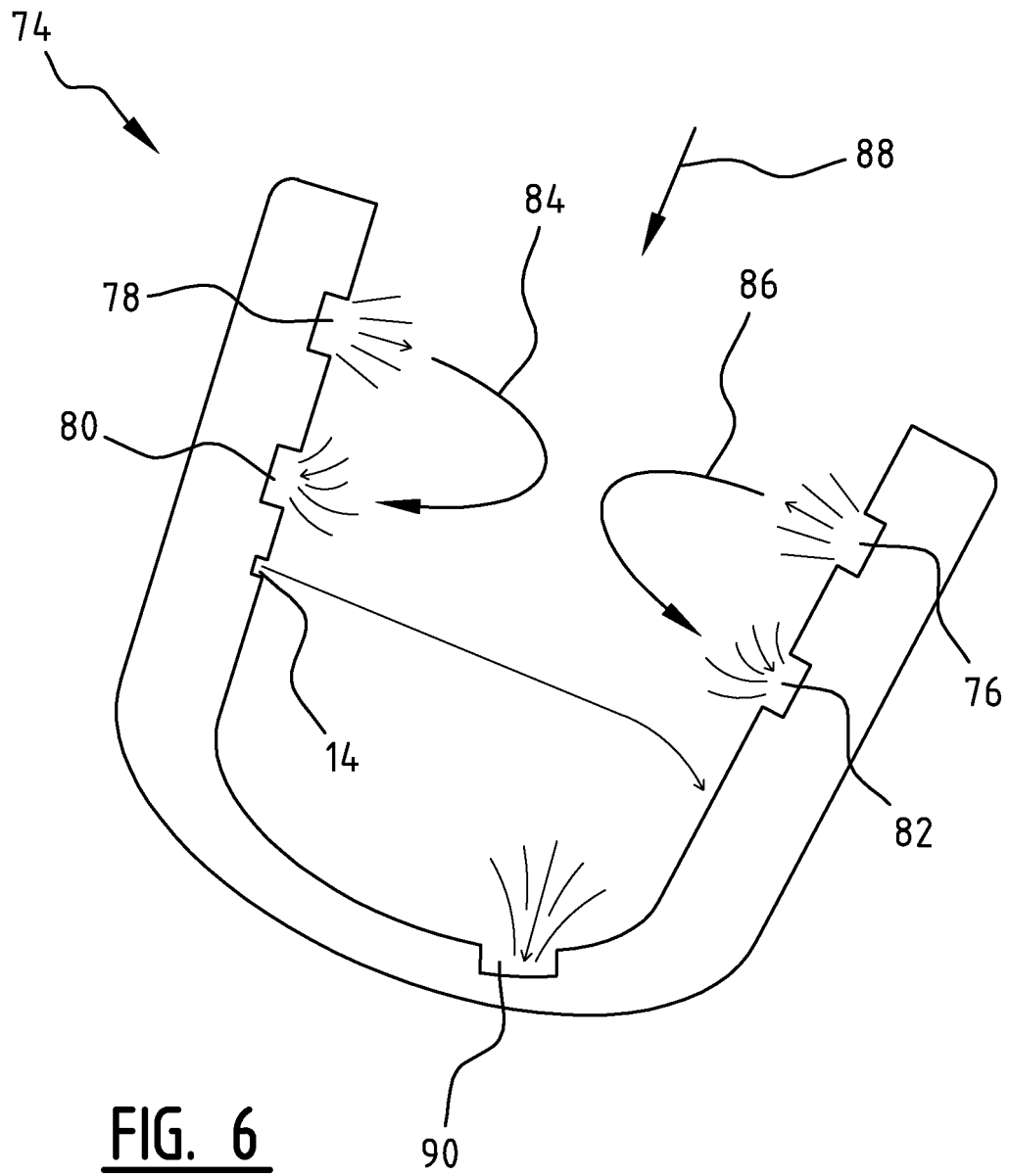
**FIG. 3**



**FIG. 4**



**FIG. 5**



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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