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(54) Title: STEAMER HEAD

(57) Abstract: The present application relates to a steamer head comprising a treating face (13A, 33A) from which steam is expelled, and a steam generating surface (14A, 34A) onto which a liquid is provided to be converted into steam. The treating face (13A, 33A) is in thermal conductive communication with the steam generating surface (14A, 34A). The steam generating surface (14A, 34A) is at an angle to the treating face (13A, 33A) such that when the treating face (13A, 33A) is orientated vertically, the liquid is able to descend onto and flow along the steam generating surface (14A, 34A) to be converted into steam.

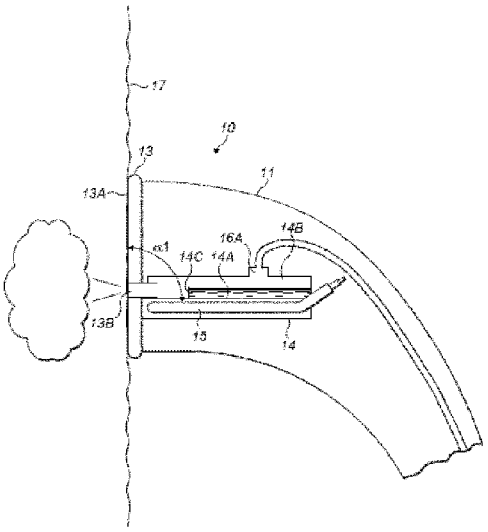

Fig. 2

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Steamer Head

FIELD OF THE INVENTION

The present invention relates to a steamer head. The present invention also relates to a steaming device comprising a steamer head. The present invention has some application for example in the field of garment care.

BACKGROUND OF THE INVENTION

To remove creases from a vertically disposed fabric, for example, of a garment, it is known to use a fabric steamer. Such a fabric steamer generally comprises a steam generating unit and a steamer head connected to the steam generating unit by a flexible hose through which steam is conveyed to the steamer head. The steamer head is provided with one or more steam vents to discharge steam onto the fabric being treated. The garment is vertically hung and is then treated with steam from the steamer head to remove creases from the fabric of the garment. However, such steamer heads may cause spitting due to unevaporated water accumulating in the steam generating unit.

Steam irons are also known for removing creases from a fabric paced on an ironing board through the use of heat and moisture. A typical steam iron comprises a soleplate through which steam is expelled onto the fabric of the garment. However, such steam irons are only suitable for treating horizontally disposed fabrics, since in other orientations the steam iron cannot effectively and consistently generate steam.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a steamer head and/or a steaming device which substantially alleviates or overcomes the problems mentioned above, among others.

The invention is defined by the independent claims; the dependent claims define advantageous embodiments.

According to the present invention, there is provided a steamer head comprising a treating face from which steam is expelled, and a steam generating surface onto which a liquid is provided to be converted into steam. The treating face is in thermal

conductive communication with the steam generating surface. The steam generating surface is at an angle to the treating face such that when the treating face is orientated vertically, the liquid is able to descend onto and flow along the steam generating surface to be converted into steam.

When a liquid, for example, water, is supplied to the steamer head, it will descend onto and flow along the steam generating surface such that the liquid disperses across the surface area of the steam generating surface. By increasing the surface area of the steam generating surface that is in contact with the liquid it is possible to maximize the rate of heat transfer from the steam generating surface to the liquid such that the rate of evaporation of the liquid can be increased. Furthermore, liquid is prevented from accumulating on the steam generating surface. In addition, the flow rate of liquid along the steam generating surface will be minimized, for example compared to a vertically disposed steam generating surface, and so heat is more effectively transferred to the liquid to evaporate it into steam. The fact of having the treating face configured to be in thermal conductive communication with the steam generating surface allows the fabric being treated to be dried by the heat from the steam generating surface and also steam is prevented from condensing on the treating face.

In one embodiment, the steam generating surface is at an angle of between 75 degrees and 150 degrees to the treating face. The angle between the steam generating surface and the treating face may be equal to or less than 135 degrees. In such an arrangement, when the treating face is disposed vertically the angle of the steam generating surface with respect to the horizontal is equal to or less than 45 degrees to restrict the liquid from flowing off the steam generating surface so quickly that it does not evaporate into steam. The angle between the steam generating surface and the treating face may be equal to or greater than 90 degrees to prevent the liquid supplied to the steam generating face from flowing towards and being expelled from the treating face when the fabric treating face is disposed vertically.

At least part of the steam generating surface may be planar. This may allow for an even spread of liquid over the steam generating surface. The steam generating surface may be orientated in an upwardly facing direction when the treating face is orientated vertically. Therefore, liquid is able to descend onto the steam generating surface under the force of gravity. In one embodiment, the treating face is planar.

In one embodiment, the steamer head further comprises a heater to heat the steam generating surface.

The heater may be in thermally conductive communication with the steam generating surface. Therefore, heat is efficiently transferred to the steam generating surface.

The treating face and the steam generating surface may be integrally formed.

In one embodiment, the treating face is configured to have a predetermined temperature difference with respect to the steam generating surface. The steamer head may comprise a layer of material with a predetermined thermal conductivity and thickness. Therefore, the treating face is prevented from getting too hot when the steam generating surface is heated to generate steam.

In one embodiment, the steamer head comprises a steam generating element forming the steam generating surface and a treating element forming the treating face. The steam generating element may be removably mountable to the treating element. This helps to simplify manufacturing and minimize costs. A thermally conductive paste may be disposed between the steam generating element and the treating element. The thermally conductive paste improves heat transfer between the steam generating element and the treating element to increase the temperature of the treating face.

In one embodiment, the steamer head comprises a liquid outlet for supplying the liquid to the steam generating surface, wherein the liquid outlet is configured to be disposed above the steam generating surface when the treating face is orientated vertically such that the liquid is able to descend onto the steam generating surface through gravity. Therefore, water can be supplied to the steam generating surface under the force of gravity and so water may be supplied to the steam generating surface without the use of a pump.

The steamer head may further comprise a handle configured to orientate the steamer head such that the treating face is disposed substantially vertically when the handle is in a normal operating position.

According to another aspect of the present invention, there is also provided a steaming device comprising a steamer head according to the invention. In one embodiment, the steaming device is a fabric steamer, while in another embodiment, the steaming device is a steam cleaner.

These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a steamer head according to an embodiment of the invention;

Fig. 2 is a schematic cross-sectional side view of the steamer head of Fig. 1, in a vertical position;

Fig. 3 is a schematic cross-sectional side view of a steamer head according to another embodiment of the invention, in a vertical position;

Fig. 4 is a schematic cross-sectional side view of the steamer head of Fig. 3, in position between the horizontal and vertical; and,

Fig. 5 is a schematic cross-sectional side view of a steamer head according to another embodiment of the invention, in a vertical position.

DETAILED DESCRIPTION OF EMBODIMENTS

Referring now to Figs. 1 and 2, a steamer head 10 for a fabric steamer according to an embodiment of the invention is shown. The steamer head 10 forms a nozzle which comprises a body 11 with a handle 12 extending therefrom.

The steamer head 10 comprises a soleplate 13 that is located at an end of the body 11 that is distal to the handle 12. A major surface of the soleplate 13 faces away from the handle 12 and comprises a fabric treating face 13A which, during use, is located against a fabric 17 to be treated. The soleplate 13 comprises a plurality of apertures 13B that extend through the thickness of the soleplate 13. However, it will be understood that in one embodiment the soleplate has one aperture.

A steam generating unit 14 comprising a plate is disposed inside the body 11 of the steamer head 10 and has a major surface that comprises a steam generating surface 14A. The steam generating surface 14A forms a wall of a steam chamber 14B that is disposed inside the body 11 of the steamer head 10. A heater 15 is disposed inside the steam generating unit 14. The heater 15 comprises a resistive heating element that is connected to an electrical power supply (not shown). The soleplate 13 and steam generating unit 14 are integrally formed and comprise a thermally conductive material, for example, metal. Therefore, when the heater 15 is operated to heat the steam generating unit 14, heat is transferred from the steam generating unit 14 to the soleplate 13 such that the soleplate 13 is

also heated by the heater 15. The treating face is in thermal conductive communication with the steam generating surface.

A flexible hose 16 extends from the handle 12 at a distal end to the body 11. The flexible hose 16 extends between the steamer head 11 and a base unit (not shown) that comprises a water tank (not shown) and a pump (not shown). The pump is configured to supply water from the water tank to a nozzle 16A disposed inside the body 11 of the steamer head 10. The nozzle 16A is arranged to spray liquid water supplied thereto onto the steam generating surface 14A such that the liquid water spreads over the steam generating surface 14A. Therefore, when the steam generating surface 14A is heated by the heater 15, the liquid water is evaporated into steam inside the steam chamber 14B. The generated steam flows along the steam chamber 14B and out of the apertures 13B in the soleplate 13 to be expelled from the fabric treating face 13A such that the portion of the fabric 17 located against the fabric treating face 13A is treated by the steam.

The steam expelled from fabric treating face 13A is generated within the steamer head 10 and therefore it is not necessary to supply steam from an external source using an external hose. This is advantageous since generating the steam externally and then passing the steam through an external hose to the steamer head 10 can cause the steam to cool and condense in the external hose, resulting in drops of liquid water being expelled from the fabric treating face 13A that dampen the fabric being treated. In addition, since the heater 15 used to generate the steam in the steamer head 10 also heats the soleplate 13, a build up of wet spots on the fabric treating face 13A due to condensation is prevented. Such wet spots could otherwise be transferred to the fabric being treated. The heated soleplate 13 also provides the advantage of drying the fabric being treated.

The steam generating surface 14A is at an angle $\alpha 1$ of 90 degrees to the fabric treating face 13A such that the fabric treating face 13A faces away from the handle 12 of the steamer head 10. The steam generating surface 14A being angled with respect to the fabric treating face 13A of the soleplate 13, such that the steam generating surface 14A is not vertically disposed when the fabric treating face 13A is located against a vertically disposed fabric 17, enables liquid water that is supplied to the steam generating unit 14 by the nozzle 16A to be spread over the steam generating surface 14A when the steamer head 10 is used to treat a vertically disposed fabric 17 (as shown in Fig. 2). More specifically, when the steamer head 10 is positioned such that the fabric treating face 13A is orientated vertically and located against the vertically disposed fabric 17, the steam generating surface 14A, which is at an angle $\alpha 1$ of 90 degrees to the fabric treating face 13A, will be disposed horizontally

such that the nozzle 16A is located above the steam generating surface 14A. Therefore, when the pump (not shown) is activated to supply liquid water to the steamer head 10, the liquid water will descend from the nozzle 16A and onto the steam generating surface 14A wherein it will flow along the steam generating surface 14A such that the liquid water is spread over a larger surface area of the steam generating surface 14A in comparison to if the steam generating surface 14A was disposed vertically. The increased surface area of the steam generating surface 14A that is in contact with the liquid water means that a higher rate of heat transfer from the heater 15 to the liquid water is achievable such that the liquid water can more quickly be evaporated into steam. Furthermore, since the steam generating surface 14A is disposed horizontally, rather than being inclined or vertical, liquid water is prevented from collecting at a lower end of the steam chamber 14B due to gravity when the fabric treating face 13A is located against the vertically disposed fabric 17.

The steamer head 10 is also suitable for use on fabrics that are not vertically disposed. For example, if the steamer head 10 is used to treat a fabric that is inclined at an angle between the vertical and the horizontal, the steam generating surface 14A will not be vertically disposed. More specifically, the steam generating surface 14A will not be perpendicular to the horizontal and instead will also be inclined at an angle between the horizontal and the vertical, offset from the fabric treating face 13A by the angle $\alpha 1$ of 90 degrees, such that liquid water is able to descend from the nozzle 16A and onto the steam generating unit 14 to spread over the steam generating surface 14A. Furthermore, since the steam generating surface 14A is not disposed vertically, the liquid water will more slowly flow along the steam generating surface 14A and so a higher rate of heat transfer from the heater 15 to the liquid water may be obtained to evaporate the liquid water into steam.

The steam generating unit 14 comprises a protrusion 14C that extends from the steam generating surface 14A. The protrusion 14C is disposed between the nozzle 16A and the soleplate 13 such that liquid water supplied to the steam generating surface 14A is prevented from leaking out of the steam chamber 14B and being expelled from the fabric treating face 13A. More specifically, when the fabric treating face 13A is orientated such that the steam generating surface 14A slopes downwardly towards the fabric treating face 13A, liquid water that is supplied to the steam generating surface 14A will flow towards the protrusion 14C and collect against the protrusion 14C.

Referring now to Figs. 3 and 4, a steamer head 20 for a fabric steamer according to another embodiment of the invention is shown. The steamer head 20 shown in Figs. 3 and 4 is similar to the steamer head 10 described above in relation to Figs. 1 and 2,

with like features retaining the same reference numerals. A difference is that steam generating surface 14A of the steamer head 20 shown in Figs. 3 and 4 is at an angle α1 of 135 degrees to the fabric treating face 13A. The angle α1 between the fabric treating face 13A and the steam generating surface 14A is such that the fabric treating face 13A faces away from the handle 12 of the steamer head 20.

The steam generating surface 14A being angled with respect to the fabric treating face 13A of the soleplate 13 enables liquid water that is supplied to the steam generating unit 14 by the nozzle 16A to be spread over the steam generating surface 14A when the steamer head 20 is used to treat a vertically disposed fabric 17.

To treat a vertically disposed fabric 17 the user locates the fabric treating face 13A against an upper portion of the vertically disposed fabric 17 (as shown in Fig. 3). The fabric treating face 13A will be orientated vertically and so the steam generating surface 14A, which is at an angle α1 of 135 degrees to the fabric treating face 13A, will be inclined at 45 degrees between the horizontal and vertical such that the nozzle 16A is located above the steam generating surface 14A. Therefore, when the pump (not shown) is activated to supply liquid water to the steamer head 20, the liquid water will descend from the nozzle 16A and onto the steam generating surface 14A wherein it will flow along the steam generating surface 14A such that the liquid water is spread over a larger surface area of the steam generating surface 14A in comparison to if the steam generating surface 14A was disposed vertically. The increased surface area of the steam generating surface 14A that is in contact with the liquid water means that a higher rate of heat transfer from the steam generating unit 14 to the liquid water is possible such that the liquid water can more quickly be evaporated into steam. Furthermore, since the steam generating surface 14A is not disposed vertically, the liquid water will more slowly flow along the steam generating surface 14A towards the lower end of the steam chamber 14B and so a higher rate of heat transfer from the heater 15 to the liquid water to evaporate the liquid water into steam will be obtained.

The user may then treat the remainder of the fabric 17 by drawing the steamer head 20 down the vertically disposed fabric 17, in the direction of arrow 'A' shown in Fig. 3. When the steamer head 20 is drawn down the fabric 17, the user's arm moves in an arcuate motion and so the angle that the user's arm and the handle 12 extends relative to the fabric 17 changes as the steamer head 20 is moved down the fabric 17, resulting in the angle of the fabric treating face 13A relative to the fabric 17 also changing. Therefore, to prevent a gap forming between the fabric treating face 13A and the fabric 17, the user may pull the bottom of the fabric 17 towards the user, in the direction of arrow 'B' shown in Fig. 4. This will

result in the fabric 17 becoming inclined with respect to the horizontal such that the fabric 17 remains flush to the fabric treating face 13A. When the steamer head 20 is drawn down the fabric 17 such that the fabric 17 and fabric treating face 13A become inclined with respect to the vertical, the angle of the steam generating surface 14A with respect to the horizontal will decrease such that the steam generating surface 14A becomes increasingly horizontally disposed. Therefore, the liquid water supplied by the nozzle 16A is still able to descend from the nozzle 16A and onto the steam generating unit 14 to spread over the steam generating surface 14A to facilitate effective steam generation.

The steamer head 20 is also suitable for use on fabrics that are horizontally disposed, since the steam generating surface 14A will be inclined at an angle between the vertical and horizontal rather than being vertically disposed. More specifically, when the fabric treating face 13A is horizontally disposed, the steam generating surface 14A will be inclined at an angle of 45 degrees to the horizontal and vertical and therefore liquid water will be able to descend from the nozzle 16A and onto the steam generating unit 14 to spread over the steam generating surface 14A. Furthermore, since the steam generating surface 14A is not disposed vertically, the liquid water will more slowly flow along the steam generating surface 14A and so a higher rate of heat transfer from the heater 15 to the liquid water to evaporate the liquid water into steam will be obtained.

Referring now to Fig. 5, a steamer head 30 for a fabric steamer according to another embodiment of the invention is shown. The steamer head 30 shown in Fig. 5 is similar to the steamer head 10 described above in relation to Figs. 1 and 2, with like features retaining the same reference numerals. A difference is that the integrally formed soleplate 13 and steam generating unit 14 are omitted and are replaced by a soleplate 33 and steam generating unit 34 that are fastened together.

The soleplate 33 and steam generating unit 34 have major surfaces that respectively comprise a fabric treating face 33A and a steam generating surface 34A. The steam generating surface 34A forms a wall of a steam chamber 34B that is disposed in the steamer head 30. A heater 35 is disposed in the steam generating unit 34. The heater 35 comprises a resistive heating element that is connected to an electrical power supply (not shown).

The steamer head 30 comprises a bracket 36 that extends from the soleplate 33 in a direction opposite to the direction that the fabric treating face 33A faces. The bracket 36 comprises a plurality of screw holes 37A and the steam generating unit 34 comprises a plurality of screw holes 37B. The steam generating unit 34 is received against the bracket 36

such that the screw holes 37A of the bracket 36 are aligned with the screw holes 37B of the steam generating unit 34. Bolts or screws 38 are received in the aligned screw holes 37A, 37B to fasten the steam generating unit 34 to the bracket 36 and thus to the soleplate 33. Alternatively, or additionally, the steam generating unit 34 may be secured to the bracket 36 using adhesive (not shown) or another fastening means.

A thermally conductive paste 39 is disposed between the steam generating unit 34 and the bracket 36 to improve heat transfer between the steam generating unit 34 and the bracket 36. Therefore, when the heater 35 is operated to heat the steam generating surface 34A, heat will be transferred to the bracket 36. The bracket 36 and soleplate 33 are integrally formed and comprise a thermally conductive material. Therefore, heat will be transferred from the heater 35 and through the bracket 36 to heat the fabric treating face 33A of the soleplate 33.

The thermally conductive paste 39 improves the heat transfer between the steam generating unit 34 and the bracket 36 so that the temperature of the soleplate 33 is increased. However, it should be recognized that in an alternative embodiment the thermally conductive paste 39 may be omitted such that the steam generating unit 34 directly contacts the bracket 36.

Since the steam generating unit 34 is not integrally formed with the soleplate 33, the steam generating unit 34 can be manufactured separately, for example in a different factory, and subsequently secured to the soleplate 33. Furthermore, if the steam generating unit 34 malfunctions, the steam generating unit 34 can easily be removed from the steamer head 30 and repaired or replaced.

In the above described embodiments, a seal (not shown) is provided around the periphery of the steam chamber 14B, 34B to prevent steam leaking therefrom into the inside of the steamer head 10, 20, 30.

In the above described embodiments, the steam generating surface 14A, 34A is at an angle $\alpha 1$ of either 90 degrees or 135 degrees to the fabric treating face 13A, 33A. However, it should be recognized that the angle $\alpha 1$ between the steam generating surface 14A, 34A and the fabric treating face 13A, 33A may be between 75 degrees and 150 degrees. Preferably, the angle $\alpha 1$ between the steam generating surface 14A, 34A and the fabric treating face 13A, 33A is equal to or less than 135 degrees such that when the fabric treating face 13A, 33A is disposed vertically the angle of the steam generating surface 14A, 34A with respect to the horizontal is equal to or less than 45 degrees to alleviate the problem that the water runs off the steam generating surface 14A, 34A too quickly for effective steam

evaporation. Preferably the angle α1 between the steam generating surface 14A, 34A and the fabric treating face 13A, 33A is equal to or greater than 90 degrees to prevent the liquid water supplied to the steam generating unit 14, 34 from flowing towards the soleplate 13, 33, and potentially out of the apertures 13B therein, when the fabric treating face 13A, 33A is disposed vertically.

Although in the above described embodiments the soleplate 13, 33 is heated by the same heater 15, 35 that heats the steam generating unit 14, 34, in alternative embodiments (not shown) a first heater is provided to heat the soleplate and a second heater is provide to heat the steam generating unit. In another embodiment (not shown) the soleplate is not heated by a heater. In one embodiment, the soleplate is configured to have a predetermined temperature difference with respect to the steam generating unit. The steamer head comprises, for example, a layer of material with a predetermined thermal conductivity and thickness. The layer of material may be disposed between the soleplate and the steam generating unit. In another embodiment, the soleplate is thermally conductively insulated from the steam generating unit by, for example, a thermally insulating layer that is disposed between the soleplate and the steam generating unit.

Although in the above described embodiments the water tank and pump are provided in a base unit (not shown), in alternate embodiments (not shown) the pump and/or water tank may be disposed inside the steamer head. In another embodiment (not shown), the pump may be omitted and instead liquid water is gravity fed from the nozzle to the steam generating surface. This is possible because the nozzle is positioned above a portion of the steam generating surface when the steamer head is in use, for example, when the fabric treating face is located against a vertically disposed fabric. Therefore, liquid water can descend from the nozzle and onto the steam generating surface under the force of gravity, without any pumping action being necessary.

Although in the above described embodiments the steamer head 10, 20, 30 is described for use with a fabric steamer for removing creases from fabrics, it should be recognized that the steamer head of the present invention is also suitable for use in steam cleaning applications. For example, the steamer head may be used with a steam cleaning device to remove dirt and debris from the fabric of an item of furniture or a carpet. In one such embodiment (not shown), the steamer head comprises a brush or mop pad that is attached to the soleplate of the steamer head to aid in the removal of dirt and debris from the fabric.

The above embodiments as described are only illustrative, and not intended to limit the technique approaches of the present invention. Although the present invention is described in details referring to the preferable embodiments, those skilled in the art will understand that the technique approaches of the present invention can be modified or equally displaced without departing from the spirit and scope of the technique approaches of the present invention, which will also fall into the protective scope of the claims of the present invention. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope.

CLAIMS:

1. A steamer head comprising:

- a treating face (13A, 33A) from which steam is expelled, and

- a steam generating surface (14A, 34A) onto which a liquid is provided to be converted into steam, the treating face (13A, 33A) being in thermal conductive communication with the steam generating surface (14A, 34A),

wherein the steam generating surface (14A, 34A) is at an angle to the treating face (13A, 33A) such that when the treating face (13A, 33A) is orientated vertically, the liquid is able to descend onto and flow along the steam generating surface (14A, 34A) to be converted into steam.

2. The steamer head according to claim 1, wherein the steam generating surface (14A, 34A) is at an angle of between 75 degrees and 150 degrees to the treating face (13A, 33A), and preferably at an angle of between 90 degrees and 135 degrees to the treating face (13A, 33A).

3. The steamer head according to claim 1 or claim 2, wherein at least part of the steam generating surface (14A, 34A) is planar.

4. The steamer head according to any one of claims 1 to 3, wherein the steam generating surface (14A, 34A) is orientated in an upwardly facing direction when the treating face (13A, 33A) is orientated vertically.

5. The steamer head according to any one of the preceding claims, further comprising a heater (15, 35) to heat the steam generating surface (14A, 34A).

6. The steamer head according to claim 5, wherein the heater (15, 35) is in thermally conductive communication with the steam generating surface (14A, 34A).

7. The steamer head according to any one of the preceding claims, wherein the treating face (13A, 33A) is configured to have a predetermined temperature difference with respect to the steam generating surface and, preferably, the steamer head comprises a layer of material with a predetermined thermal conductivity and thickness.

8. The steamer head according to any preceding claim, wherein the treating face (13A, 33A) and steam generating surface (14A, 34A) are integrally formed.

9. The steamer head according to any one of claims 1 to 8, further comprising a steam generating element (14, 34) forming the steam generating surface (14A, 34A) and a treating element (13, 33) forming the treating face (13A, 33A).

10. The steamer head according to claim 9, wherein the steam generating element (14, 34) is removably mountable to the treating element (13, 33).

11. The steamer head according to any one of the preceding claims, wherein the treating face (13A, 33A) is planar.

12. The steamer head according to any one of the preceding claims, further comprising a liquid outlet (16A) for supplying the liquid to the steam generating surface (14A, 34A), wherein the liquid outlet is configured to be disposed above the steam generating surface when the treating face (13A, 33A) is orientated vertically such that the liquid is able to descend onto the steam generating surface through gravity.

13. The steamer head according to any preceding claim, further comprising a handle (12) configured to orientate the steamer head such that the treating face (13A, 33A) is disposed substantially vertically when the handle is held in a normal operating position.

14. A steaming device comprising a steamer head according to any one of claims 1 to 13.

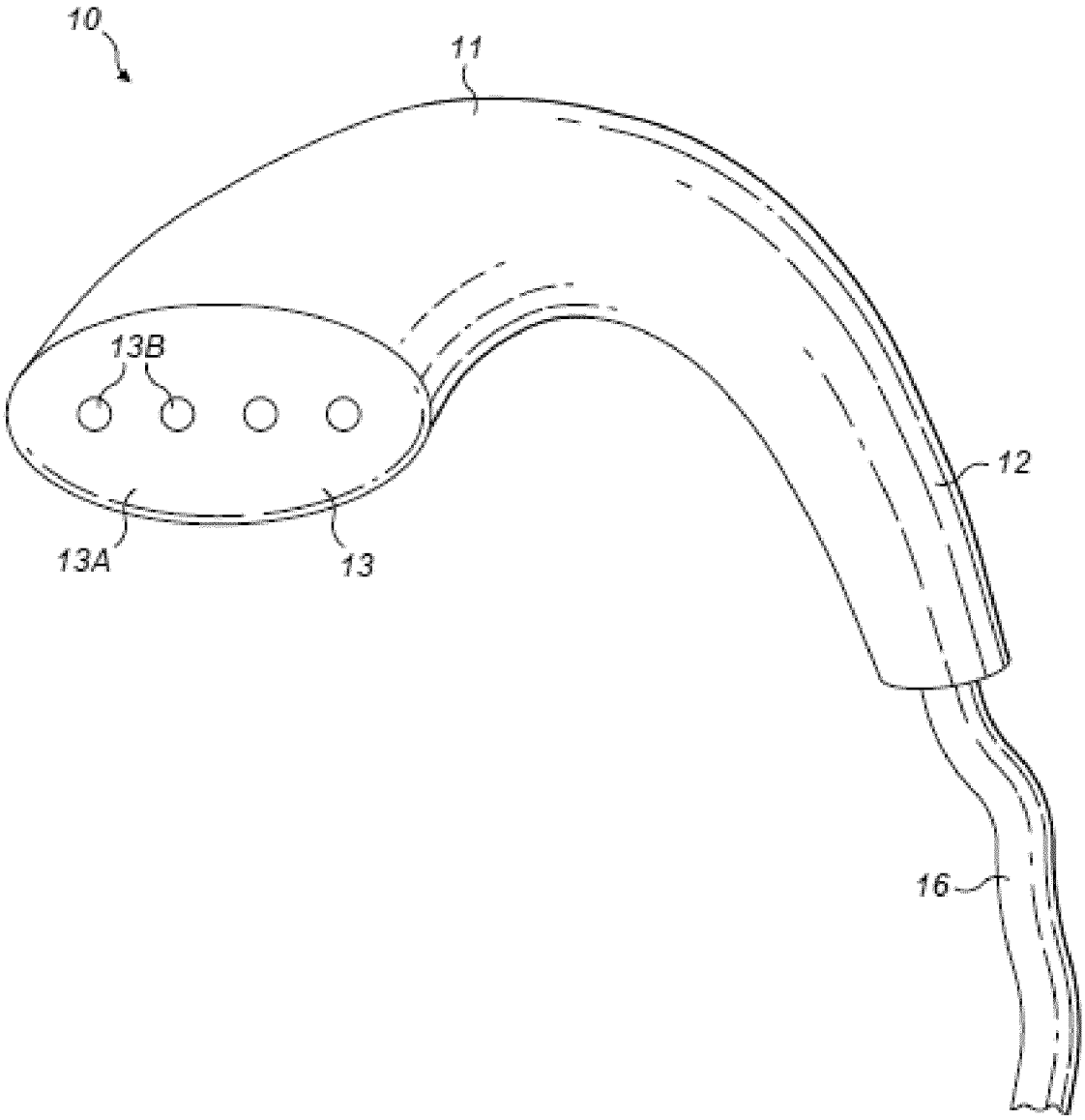

Fig. 1

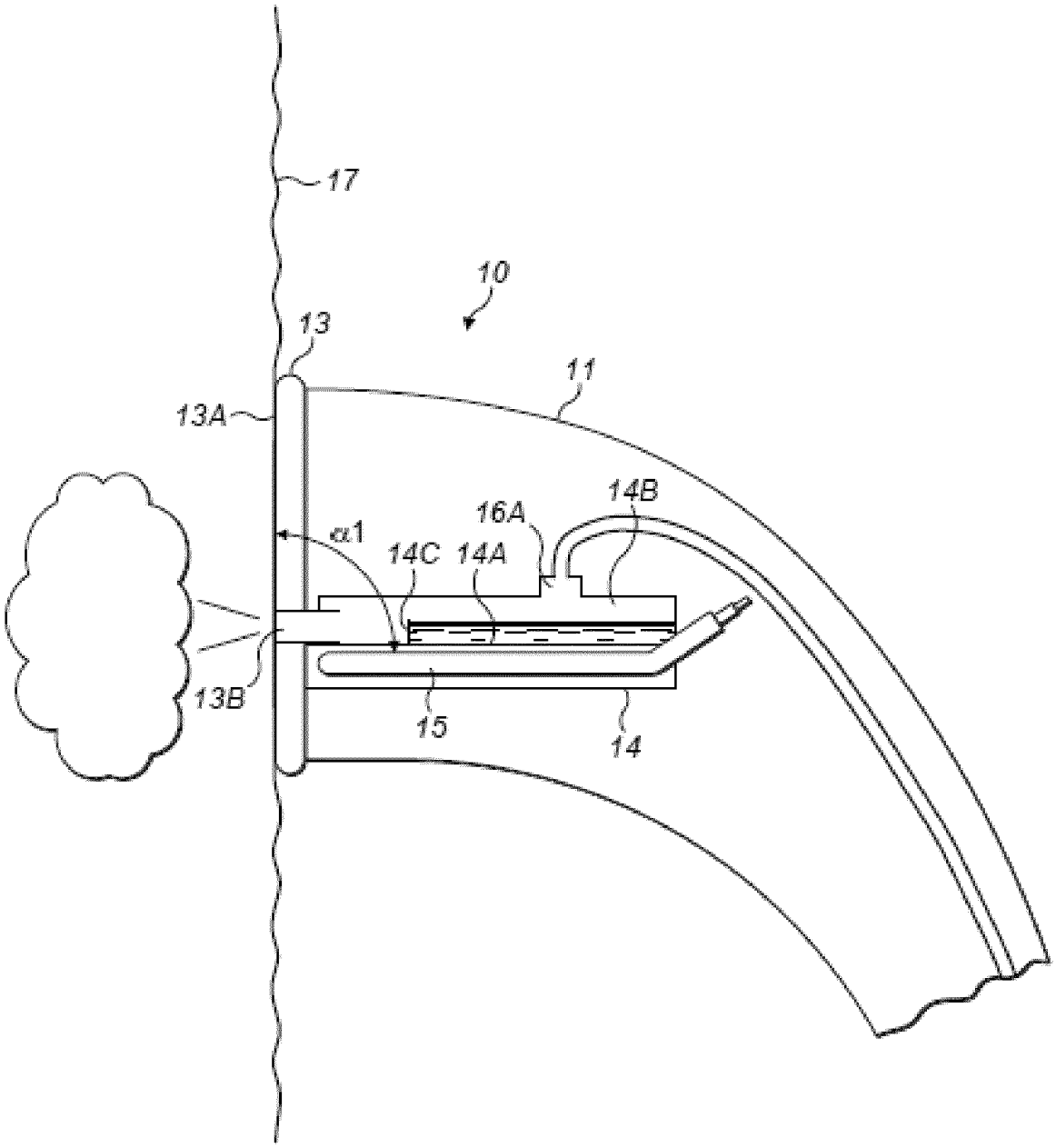

Fig. 2

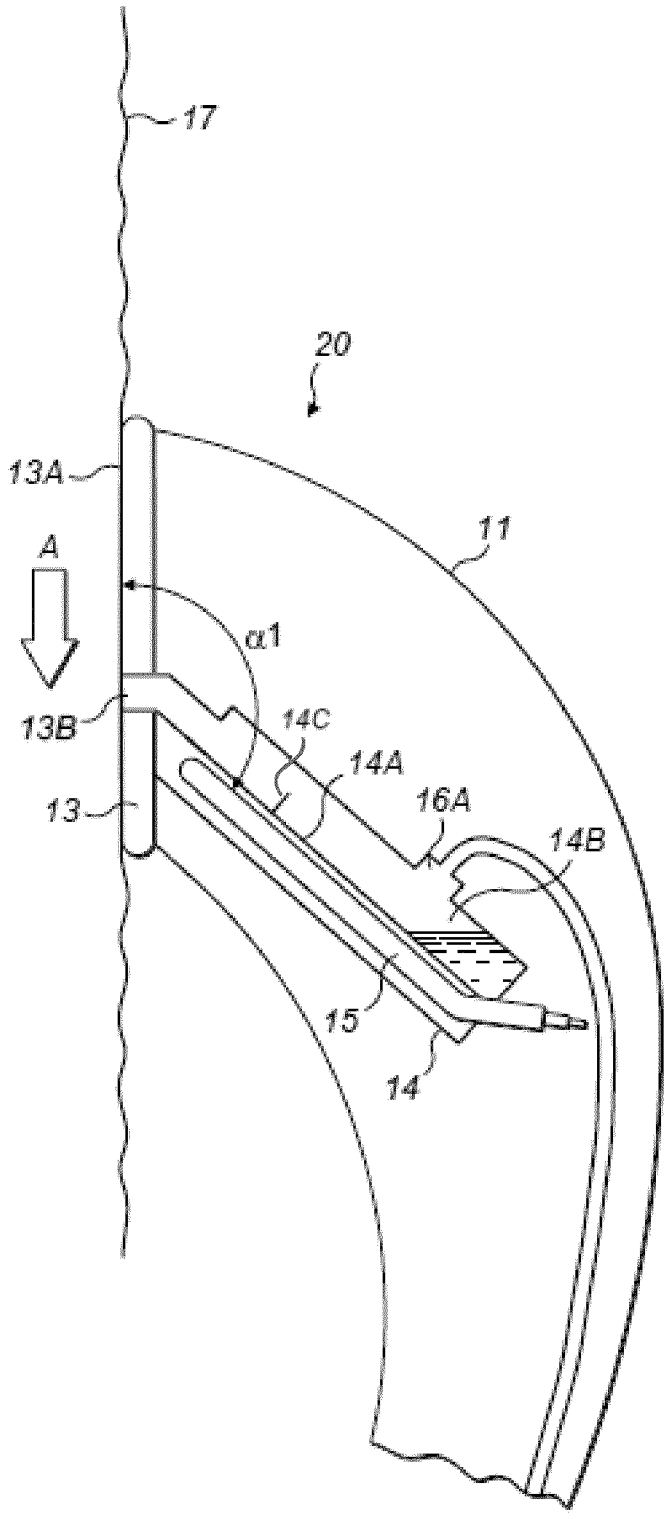

Fig. 3

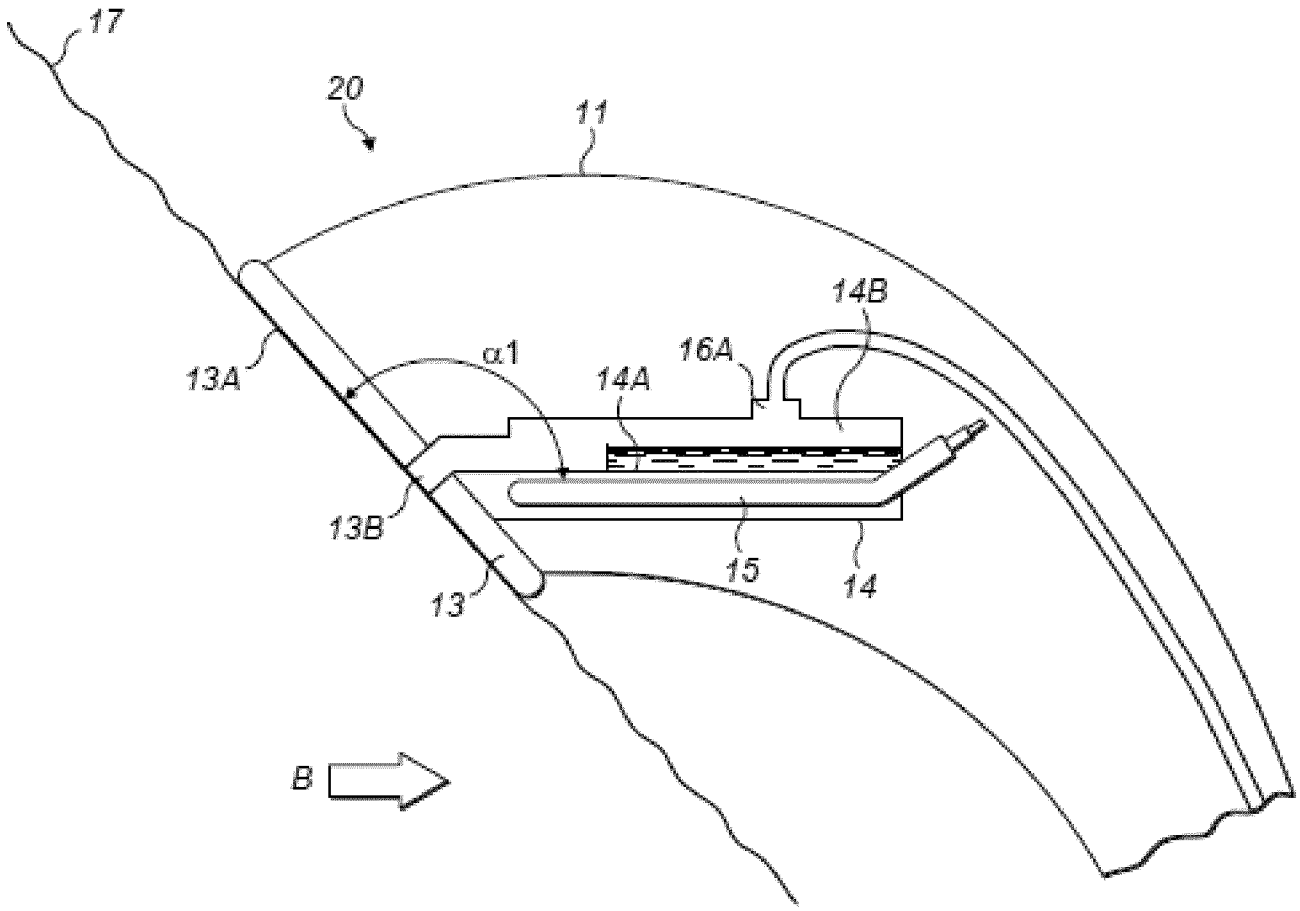

Fig. 4

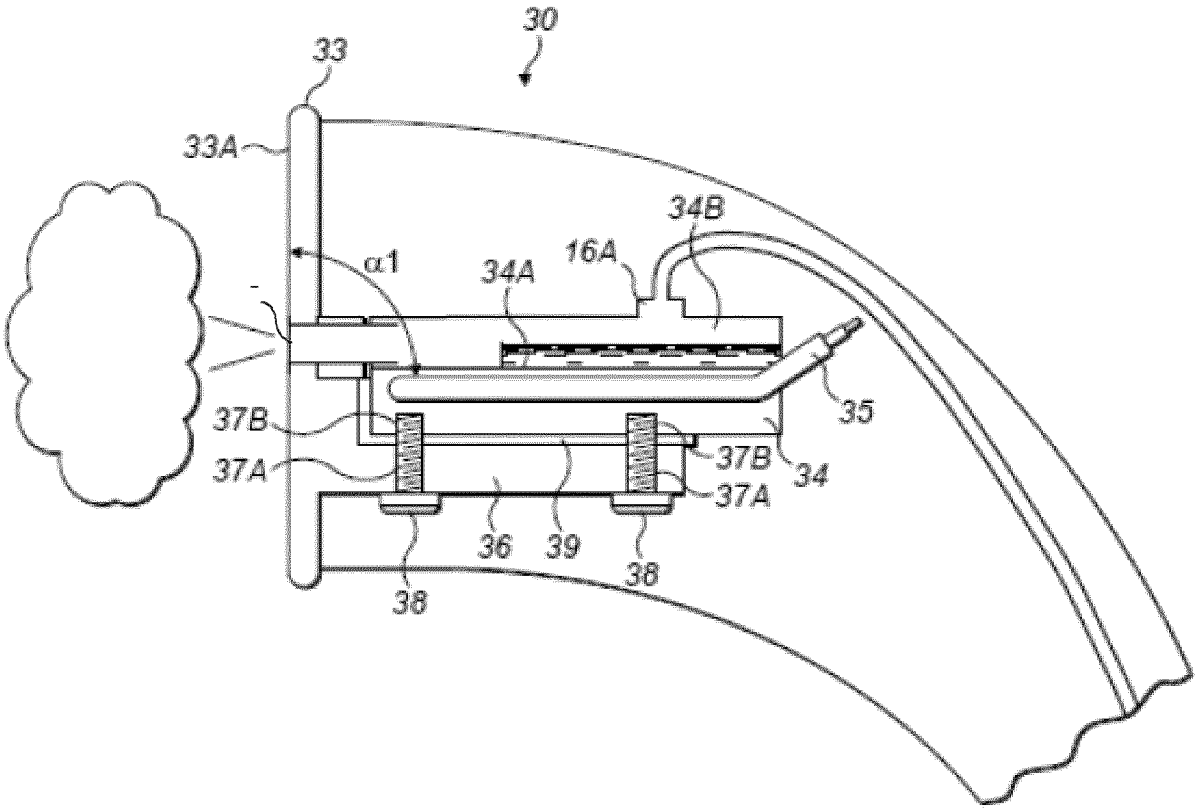

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/060830

A. CLASSIFICATION OF SUBJECT MATTER
INV. F22B1/28
ADD.

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)
F22B D06F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 651 453 A (DOYLE EDWARD J [US]) 24 March 1987 (1987-03-24) claim 7; figures 3,5 page 2, line 56 - page 3, line 3 page 3, line 44 - line 61	1-14
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A	US 2006/005345 A1 (LAM RAYMOND H [HK]) 12 January 2006 (2006-01-12) figures 3,4,7b	1-14

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
17 July 2015	23/07/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Coquau, Stéphane

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INTERNATIONAL SEARCH REPORT

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PCT/EP2015/060830

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	FR 2 916 004 A1 (ROWENTA WERKE GMBH [DE]) 14 November 2008 (2008-11-14) page 3, line 27 - page 4, line 21; figure 3	1,2,5,7, 11-14
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Information on patent family members

International application No
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		US 2011219646 A1	15-09-2011
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