

(19)



(11)

EP 1 657 993 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

16.04.2008 Bulletin 2008/16

(51) Int Cl.:

A45D 1/04 (2006.01)

(86) International application number:

PCT/GB2004/003635

(21) Application number: **04768191.1**

(22) Date of filing: **26.08.2004**

(87) International publication number:

WO 2005/020742 (10.03.2005 Gazette 2005/10)

(54) **HAIR CARE APPLIANCE**

HAARPFLEGEGERÄT

APPAREIL DE SOINS POUR LES CHEVEUX

(84) Designated Contracting States:

**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**

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(30) Priority: **27.08.2003 GB 0319969**

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(43) Date of publication of application:
24.05.2006 Bulletin 2006/21

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Description

[0001] This invention concerns improvements in or relating to hair care appliances.

[0002] Hair care appliances such as straighteners are presently available but are generally not very efficient in operation. Accordingly, they may take a significant time to reach operating temperature, and also to return to operating temperature during use. As a result of this it has not been possible for a satisfactory battery operated version of such an appliance to be made.

[0003] WO03/039290 discloses an electric thermal hairstyling appliance with a plate which acts as an electric heating resistor. The plate has a main portion of an aluminium alloy, and an end portion of a thermally insulating plastic material.

[0004] According to the present invention there is provided a hair care appliance, the appliance having at least one heated platen, the platen having a heating element printed thereon.

[0005] The heating element may be provided on an upper side of the platen which can contact the hair, or on an underside of the platen.

[0006] The heating element may be applied by screen printing, transfer printing, or photolithography.

[0007] The heating element preferably has a large temperature coefficient of resistivity, which may be in the range $2-6 \times 10^{-3} \text{K}^{-1}$.

[0008] The heating element may be made of any of tungsten, nickel, silver or platinum, which metal or metals may be in a glassy phase bonding matrix.

[0009] Alternatively the heating element may be non-metallic, could be silicon carbide.

[0010] The platen may be made of a ceramic material, which material may be cordierite. Alternatively, the ceramic material may be based on other compositions within the Al_2O_3 - MgO - SiO_2 system. A further possibility is that the ceramic material may be nitride based, for example aluminium or silicon nitride. As a further alternative the platen may be made from glass or glass-ceramic.

[0011] The ceramic material may have a low thermal expansion coefficient, and preferably has high thermal shock resistance. The thermal expansion coefficient is preferably in the range $0.1 - 8.0 \times 10^{-6}/^\circ\text{C}$.

[0012] The thermal expansion coefficient of the ceramic material and heating element are preferably generally matched.

[0013] In an alternative embodiment the platen may be made of metal, for example by pressing.

[0014] The platen may be formed with a channel or recess, and the heating element may locate in the channel or recess.

[0015] The appliance may include two heated platens between which hair can be located.

[0016] The or each platen may be shaped to straighten, curl or brush hair. Interchangeable different shape platens may be provided.

[0017] The appliance may be mains or battery operated.

ed.

[0018] Terminal pads are preferably provided as part of the heating element to enable electrical connection to the heating element.

[0019] Embodiments of the present invention will now be described by way of example only and with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic side view of a hair care appliance according to the invention;

Fig. 2 is a diagrammatic view from beneath of a component of the appliance of Fig. 1;

Fig. 3 is a diagrammatic end view of the component of Fig. 2;

Fig. 4 is a diagrammatic view from beneath of an alternative component of the appliance of Fig. 1;

Fig. 5 is a diagrammatic side view of the component of Fig. 4; and

Fig. 6 is a similar view to Fig. 1 but of a second hair care appliance according to the invention.

[0020] Figs. 1 to 3 show a hair care appliance in the form of a hair straightening iron 10. The iron 10 comprises a first finger 12 which mounts a platen 14 thereon facing upwardly as shown in Fig. 1.

[0021] A second finger 16 is pivotally mounted to the first finger 12 and mounts a similar platen 18 which faces towards the platen 14 and can be moved theretowards by pivotal movement of the second finger 16.

[0022] The iron 10 is mains operated and a lead 22 is provided therefor. Each of the platens 14, 18 has a generally similar configuration and only the first thereof will now be described. The platen 14 is made of a ceramic material which in this instance is cordierite and has a generally channel shaped profile with the channel 20 facing downwardly as shown in Fig. 1. Engagement formations 24 are provided in the channel corners to provide for mounting of the platen 14 to the finger 12.

[0023] A heating element 26 is provided within the channel. The heating element comprises a silver alloy in a glassy phase bonding matrix and is printed onto the platen 14 by screen printing. Two terminal pads 28 are provided at one end of the heating element 26 for connection to the electrical supply. The cordierite has a low thermal expansion ($1 \times 10^{-6}/^\circ\text{C}$) which is generally compatible with the thermal expansion of the silver alloy heating element. The cordierite also has high thermal shock resistance to prevent damage occurring thereto through regular heating up and cooling down. The heating element 26 has a large temperature coefficient of resistivity.

[0024] In use, power is supplied to the iron 10, and due to the large temperature coefficient of resistivity, and the good thermal contact between the respective heating el-

ement 20 and the platens 14, 18, the latter warm up quickly. Significant cooling of the platens take place when they come into contact with hair, but again due to the large temperature coefficient of resistivity the platens rapidly return to a required working temperature, since there is a significant reduction in resistivity with temperature loss.

[0025] Figs. 4 and 5 show an alternative heating element 30 and platen 32 arrangement. In this instance a recess 34 is provided on the underside of the platen 32 in which the heating element 30 is located. As can be seen the heating element 30 has a different configuration to the heating element 26, but both are configured to provide good heat transfer right across the respective platens 14, 18, 32.

[0026] Fig. 6 shows a further iron 36 according to the invention. The iron 36 is similar to the iron 10 except as follows. In this instance the iron 36 is battery operated and a battery pack 38 is provided within the first finger 12. The battery pack 38 can take any appropriate form and may include rechargeable or disposable batteries.

[0027] In this instance the platens are formed of metal, and are shaped by pressing. The heating elements 40 are provided on the top surface of the platens 42. The heating elements 40 may have a similar arrangement to the heating elements 26, but a conformal dielectric insulating layer is provided on the heating elements 40. In an alternative arrangement (not shown) the heating elements can be provided on the underside of the platens as in the iron 10.

[0028] In use, the iron 36 will operate similarly to the iron 10. Locating the heating elements 40 on the outer surfaces of the platens 42 provides for greater heat transfer and thus in general a lower power usage. Accordingly, with the good heat transfer between the heating elements and platens, and with the relatively low power input required to heat the platens to a required heating temperature and also to return the platens to this temperature following cooling, the iron 36 can operate satisfactorily whilst still being battery powered.

[0029] Various other modifications may be made without departing from the scope of the invention. For instance, a different ceramic material may be used and this could be based on any combination of components in the Al_2O_3 - MgO - SiO_2 system. Alternatively a nitride base material such as aluminium or silicon nitride, or a glass or glass-ceramic could be used. To operate satisfactorily the platen material should have a low expansion coefficient, preferably within the range $0.1 - 8.0 \times 10^{-6}/^\circ\text{C}$, and also have a high thermal shock resistance.

[0030] The heating element could be transfer printed, or printed using photolithography. The battery pack could be located elsewhere.

[0031] The heating element may be made of a different material and could be made for instance of tungsten, nickel or platinum. The element can be made of any material with a sufficiently low resistivity and high thermal coefficient of resistance such that the temperature control can be effected by the material's natural increase in resist-

ance as a function of increasing temperature. As indicated the heating elements may be provided on the top or underside of the platen as required.

[0032] The platen may take a different shape and could be shaped for instance to curl or brush hair. The irons may be arranged such that the platens are interchangeable so different shape platens can be selected as required.

[0033] Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. A hair care appliance, the appliance (10, 36) having at least one heated platen (14, 18, 32, 42), the platen (14, 18, 32, 42) having a heating element (26, 30, 40) printed thereon.
2. An appliance according to claim 1, in which the heating element (40) is provided on an upper side of the platen (42) which can contact the hair.
3. An appliance according to claim 1, in which the heating element (26, 30) is provided on an underside of the platen (14, 18, 32).
4. An appliance according to any of the preceding claims, in which the heating element (26, 30, 40) is applied by screen printing, transfer printing, or photolithography.
5. An appliance according to any of the preceding claims, in which the heating element (26, 30, 40) has a temperature coefficient of resistivity in the range $2-6 \times 10^{-3}\text{K}^{-1}$.
6. An appliance according to any of the preceding claims, in which the heating element (26, 30, 40) is made of any of tungsten, nickel, silver or platinum.
7. An appliance according to claim 6, in which the metal or metals of the heating element (26, 30, 40) is in a glassy phase bonding matrix.
8. An appliance according to any of claims 1 to 5, in which the heating element (26, 30, 40) is non-metallic.
9. An appliance according to claim 8, in which the heating element (26, 30, 40) is made of silicon carbide.
10. An appliance according to any of the preceding

claims, in which the platen (14, 18, 32, 42) is made of a ceramic material.

11. An appliance according to claim 10, in which the platen (14, 18, 32, 42) is made of cordierite. 5
12. An appliance according to claim 10, in which the ceramic material is based on compositions within the Al_2O_3 - MgO - SiO_2 system. 10
13. An appliance according to claim 10, in which the ceramic material is nitride based, for example aluminum or silicon nitride.
14. An appliance according to any of claims 10 to 13, in which the ceramic material has a thermal expansion coefficient in the range $0.1 - 8.0 \times 10^{-6}/^\circ\text{C}$. 15
15. An appliance according to claim 14, in which the thermal expansion coefficient of the ceramic material and heating element (26, 30, 40) are generally matched. 20
16. An appliance according to any of claims 10 to 15, in which the ceramic material has high thermal shock resistance. 25
17. An appliance according to any of claims 1 to 9, in which the platen (14, 18, 32, 42) is made from glass. 30
18. An appliance according to any of claims 1 to 9, in which the platen (14, 18, 32, 42) is made from glass-ceramic.
19. An appliance according to any of claims 1 to 9, in which the platen (14, 18, 32, 42) is made from metal. 35
20. An appliance according to claim 19, in which the platen (14, 18, 32, 42) is made by pressing. 40
21. An appliance according to any of the preceding claims, in which the platen (32) is formed with a channel or recess (34).
22. An appliance according to claim 21, in which the heating element (30) locates in the channel or recess (34). 45
23. An appliance according to any of the preceding claims, in which the appliance includes two heated platens (14, 18, 32, 42) between which hair can be located. 50
24. An appliance according to any of the preceding claims, in which the or each platen (14, 18, 32, 42) is shaped to straighten, curl or brush hair. 55
25. An appliance according to any of the preceding

claims, in which interchangeable different shape platens (14, 18, 32, 42) are provided.

26. An appliance according to any of the preceding claims, in which the appliance (10) is mains operated.
27. An appliance according to any of claims 1 to 25, in which the appliance (36) is battery operated.
28. An appliance (10, 36) according to any of the preceding claims, in which terminal pads (28) are provided as part of the heating element (26, 30, 40) to enable electrical connection to the heating element (26, 30, 40).

Patentansprüche

1. Haarpflegegerät, bei welchem das Gerät (10, 36) mindestens eine beheizte Platte (14, 18, 32, 42) besitzt, wobei die Platte (14, 18, 32, 42) ein auf sie gedrucktes Heizelement (26, 30, 40) besitzt.
2. Gerät nach Anspruch 1, bei welchem das Heizelement (40) an einer Oberseite der Platte (42), die das Haar kontaktieren kann, vorgesehen ist.
3. Gerät nach Anspruch 1, bei welchem das Heizelement (26, 30) an einer Unterseite der Platte (14, 18, 32) vorgesehen ist.
4. Gerät nach einem der vorhergehenden Ansprüche, bei welchem das Heizelement (26, 30, 40) durch Siebdruck, Transferdruck oder Photolithographie aufgetragen ist.
5. Gerät nach einem der vorhergehenden Ansprüche, bei welchem das Heizelement (26, 30, 40) einen Temperatur-Koeffizienten des spezifischen Widerstands im Bereich von $2-6 \times 10^{-3}\text{K}^{-1}$ hat.
6. Gerät nach einem der vorhergehenden Ansprüche, bei welchem das Heizelement (26, 30, 40) aus Wolfram, Nickel, Silber oder Platin besteht.
7. Gerät nach Anspruch 6, bei welchem das Metall oder die Metalle des Heizelements (26, 30, 40) in einer glasartigen Phasenverbund-Matrix angeordnet ist bzw. sind.
8. Gerät nach einem der Ansprüche 1 bis 5, bei welchem das Heizelement (26, 30, 40) nicht-metallisch ist.
9. Gerät nach Anspruch 8, bei welchem das Heizelement (26, 30, 40) aus Siliziumkarbid besteht.

10. Gerät nach einem der vorhergehenden Ansprüche, bei welchem die Platte (14, 18, 32, 42) aus Keramikmaterial besteht.
11. Gerät nach Anspruch 10, bei welchem die Platte (14, 18, 32, 42) aus Cordierit besteht.
12. Gerät nach Anspruch 10, bei welchem das Keramikmaterial ein Material auf Basis von Zusammensetzungen innerhalb des Al_2O_3 - MgO - SiO_2 -Systems ist.
13. Gerät nach Anspruch 10, bei welchem das Keramikmaterial ein Material auf Nitrid-Basis, z.B. Aluminium- oder Siliziumnitrid ist.
14. Gerät nach einem der Ansprüche 10 bis 13, bei welchem das Keramikmaterial einen Wärmeausdehnungs-Koeffizienten im Bereich von $0.1\text{-}8.0 \times 10^{-6}/^\circ\text{C}$ hat.
15. Gerät nach Anspruch 14, bei welchem der Wärmeausdehnungskoeffizient des Keramikmaterials und des Heizelements (26, 30, 42) im wesentlichen aneinander angeglichen sind.
16. Gerät nach einem der Ansprüche 10 bis 15, bei welchem das Keramikmaterial eine hohe Wärmeschock-Beständigkeit hat.
17. Gerät nach einem der Ansprüche 1 bis 9, bei welchem die Platte (14, 18, 32, 42) aus Glas besteht.
18. Gerät nach einem der Ansprüche 1 bis 9, bei welchem die Platte (14, 18, 32, 42) aus Glaskeramik besteht.
19. Gerät nach einem der Ansprüche 1 bis 9, bei welchem die Platte (14, 18, 32, 42) aus Metall besteht.
20. Gerät nach Anspruch 19, bei welchem die Platte (14, 18, 32, 42) durch Pressen gefertigt ist.
21. Gerät nach einem der vorhergehenden Ansprüche, bei welchem die Platte (32) mit einem Kanal oder einer Vertiefung (34) gebildet ist.
22. Gerät nach Anspruch 21, bei welchem das Heizelement (30) in dem Kanal oder der Vertiefung (34) angeordnet ist.
23. Gerät nach einem der vorhergehenden Ansprüche, bei welchem das Gerät zwei beheizte Platten (14, 18, 32, 42) enthält, zwischen welchen das Haar angeordnet werden kann.
24. Gerät nach einem der vorhergehenden Ansprüche, bei welchem die Platte oder jede Platte (14, 18, 32, 42) zum Glätten, Kräuseln oder Bürsten von Haar

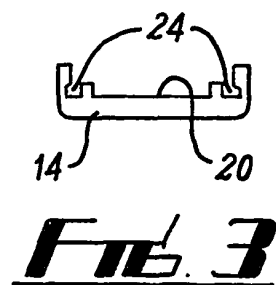
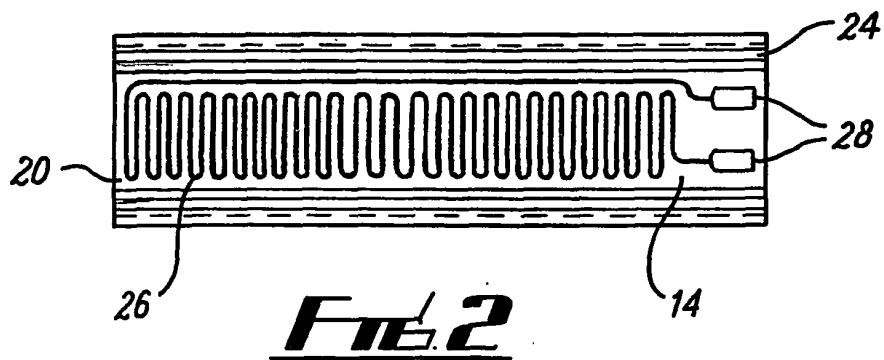
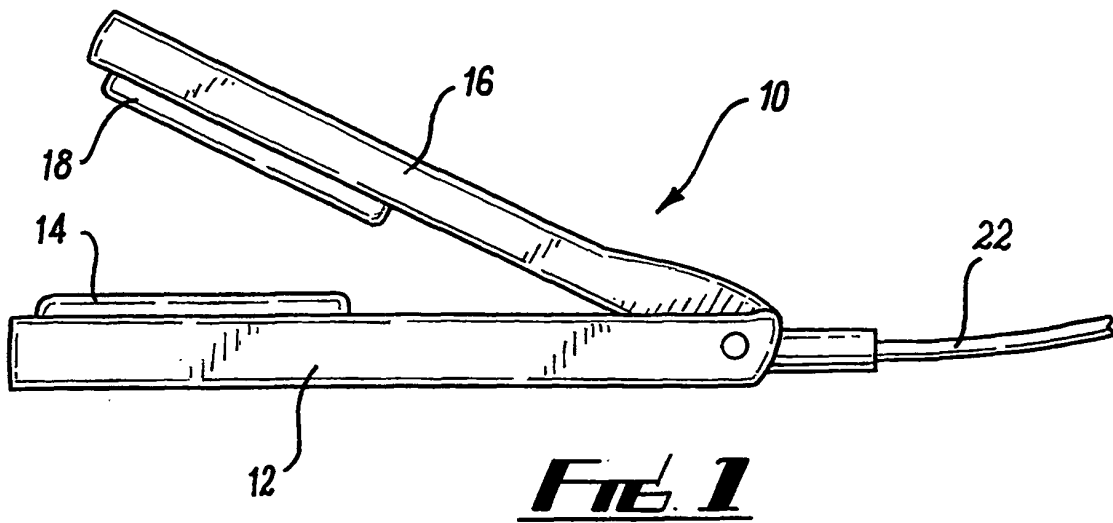
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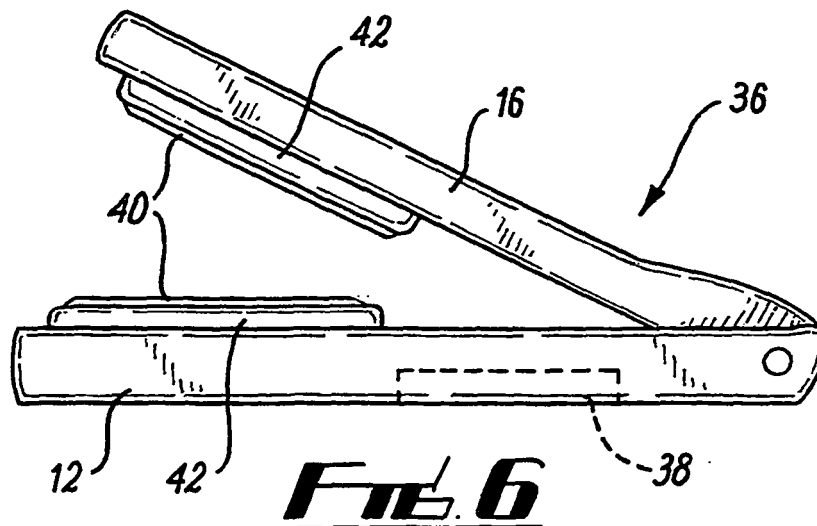
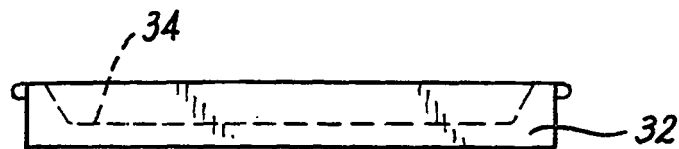
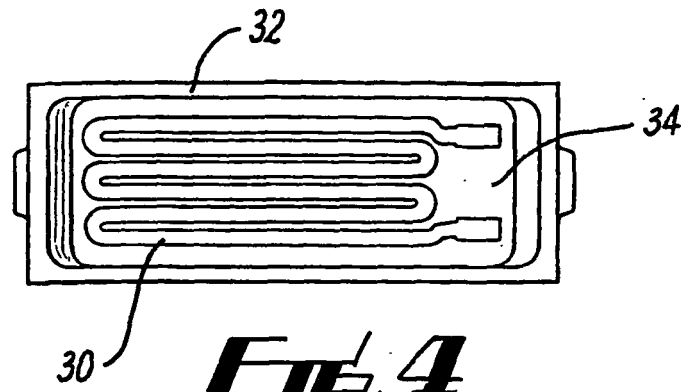
25. Gerät nach einem der vorhergehenden Ansprüche, bei welchem austauschbare, unterschiedlich geformte Platten (14, 18, 32, 42) vorgesehen sind.
26. Gerät nach einem der vorhergehenden Ansprüche, bei welchem das Gerät (10) netzbetrieben ist.
27. Gerät nach einem der Ansprüche 1 bis 25, bei welchem das Gerät (36) batteriebetrieben ist.
28. Gerät (10, 36) nach einem der vorhergehenden Ansprüche, bei welchem Anschluss-Kontaktflächen (28) als Teil des Heizelements (26, 30, 40) vorgesehen sind, um eine elektrische Verbindung mit dem Heizelement (26, 30, 40) zu ermöglichen.

20 Revendications

1. Appareil de soin pour les cheveux, l'appareil (10, 36) ayant au moins une plaque chauffée (14, 18, 32, 42), la plaque (14, 18, 32, 42) ayant un élément chauffant (26, 30, 40) qui y est imprimé.
2. Appareil selon la revendication 1, dans lequel l'élément chauffant (40) est aménagé sur une face supérieure de la plaque (42) qui peut venir en contact avec les cheveux.
3. Appareil selon la revendication 1, dans lequel l'élément chauffant (26, 30) est aménagé sur une face inférieure de la plaque (14, 18, 32).
4. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'élément chauffant (26, 30, 40) est appliqué par sérigraphie, impression par transfert ou photolithographie.
5. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'élément chauffant (26, 30, 40) a un coefficient de température de résistivité dans la plage de $2 \text{ à } 6 \times 10^{-3}\text{K}^{-1}$.
6. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'élément chauffant (26, 30, 40) est fabriqué dans l'un quelconque des matériaux suivants : tungstène, nickel, argent ou platine.
7. Appareil selon la revendication 6, dans lequel le métal ou les métaux de l'élément chauffant (26, 30, 40) est dans une matrice de liaison en phase vitreuse.
8. Appareil selon l'une quelconque des revendications 1 à 5, dans lequel l'élément chauffant (26, 30, 40) n'est pas métallique.

9. Appareil selon la revendication 8, dans lequel l'élément chauffant (26, 30, 40) est fabriqué en carbure de silicium.
10. Appareil selon l'une quelconque des revendications précédentes, dans lequel la plaque (14, 18, 32, 42) est fabriquée en matériau céramique. 5
11. Appareil selon la revendication 10, dans lequel la plaque (14, 18, 32, 42) est fabriquée en cordiélite. 10
12. Appareil selon la revendication 10, dans lequel le matériau céramique est à base de compositions ressortissant au système $\text{Al}_2\text{O}_3\text{-MgO-SiO}_2$. 15
13. Appareil selon la revendication 10, dans lequel le matériau céramique est à base de nitrure, par exemple du nitrure d'aluminium ou du nitrure de silicium.
14. Appareil selon l'une quelconque des revendications 10 à 13, dans lequel le matériau céramique a un coefficient de dilatation thermique dans la plage de $0,1$ à $8,0 \times 10^{-6}/^\circ\text{C}$. 20
15. Appareil selon la revendication 14, dans lequel les coefficients de dilatation thermique du matériau céramique et de l'élément chauffant (26, 30, 40) sont généralement concordants. 25
16. Appareil selon l'une quelconque des revendications 10 à 15, dans lequel le matériau céramique a une résistance élevée aux chocs thermiques. 30
17. Appareil selon l'une quelconque des revendications 1 à 9, dans lequel la plaque (14, 18, 32, 42) est fabriquée en verre. 35
18. Appareil selon l'une quelconque des revendications 1 à 9, dans lequel la plaque (14, 18, 32, 42) est fabriquée en vitrocéramique. 40
19. Appareil selon l'une quelconque des revendications 1 à 9, dans lequel la plaque (14, 18, 32, 42) est fabriquée en métal. 45
20. Appareil selon la revendication 19, dans lequel la plaque (14, 18, 32, 42) est fabriquée par pressage.
21. Appareil selon l'une quelconque des revendications précédentes, dans laquelle la plaque (32) est formée avec un canal ou un évidement (34). 50
22. Appareil selon la revendication 21, dans lequel l'élément chauffant (30) se trouve dans le canal ou l'évidement (34). 55
23. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'appareil comprend deux plaques chauffées (14, 18, 32, 42), entre lesquelles on peut placer les cheveux.
24. Appareil selon l'une quelconque des revendications précédentes, dans lequel la plaque ou chaque plaque (14, 18, 32, 42) est façonnée pour défriser, boucler ou brosser les cheveux.
25. Appareil selon l'une quelconque des revendications précédentes, dans lequel il est prévu des plaques de différentes formes interchangeables (14, 18, 32, 42).
26. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'appareil (10) fonctionne sur le secteur.
27. Appareil selon l'une quelconque des revendications 1 à 25, dans lequel l'appareil (36) fonctionne sur piles.
28. Appareil (10, 36) selon l'une quelconque des revendications précédentes, dans lequel les plaquettes de bornes (28) sont mises en oeuvre comme faisant partie de l'élément chauffant (26, 30, 40) pour permettre une connexion électrique avec l'élément chauffant (26, 30, 40).





REFERENCES CITED IN THE DESCRIPTION

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