



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 661 480 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
31.05.2006 Bulletin 2006/22

(51) Int Cl.:
A45D 1/00 (1968.09)

(21) Application number: **04771163.5**

(86) International application number:
PCT/JP2004/011112

(22) Date of filing: **28.07.2004**

(87) International publication number:
WO 2005/011434 (10.02.2005 Gazette 2005/06)

(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**

(30) Priority: **01.08.2003 JP 2003284631**

(71) Applicant: **Phild Co., Ltd.**
Kyoto pref. 604-8152 (JP)

(72) Inventors:
• **HIRATA, Yoshihiro**
Nakagyo ku,
Kyoto 604-8152 (JP)
• **TAKASE, Hiroaki**
Nakagyo ku,
Kyoto 604-8152 (JP)

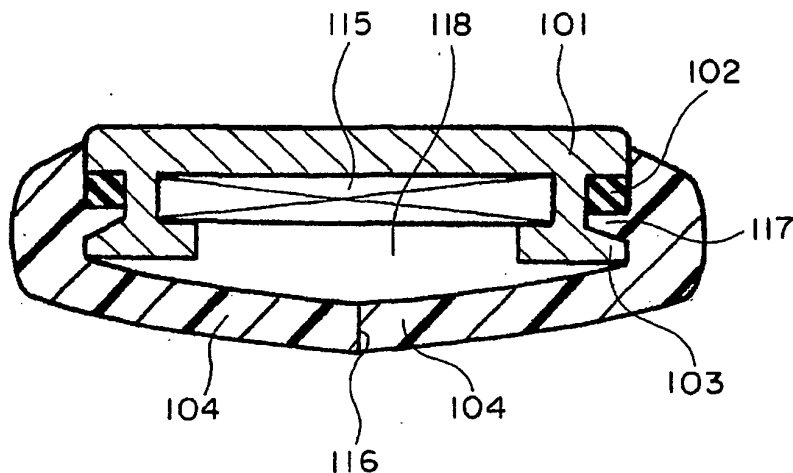
(74) Representative: **Vossius & Partner**
Siebertstrasse 4
81675 München (DE)

(54) **HAIR IRON**

(57) A hair iron comprising a pair of openable/closable hair-sandwiching arms that each store in void spaces shielded by shielding members a heat-source plate and a hair-heating plate positioned adjacent to the heat-source plate and sandwiches hairs when the arms are closed; wherein the pair of arms are openably/closably connected on one end by a pivot, and spring pressure is

used to maintain the pair or arms in opening directions in a normal condition; wherein the heating plates are installed so that they face each other; wherein tapered portions are provided in a base, on the void space side, of the heating plate, and a gasket is securely fitted in the formed tapered voids in order to improve the steam cutoff property of the void spaces; and wherein the temperature can be controlled easily at the operator's fingertips.

FIG. 5



EP 1 661 480 A1

Description

Technical Field

[0001] The present invention relates to improving the steam cutoff property of a hair iron of V-shaped, hair-sandwiching type used for various perm treatments, where hairs are sandwiched between a pair of openable/closable heating plates that are attached on the opposing surfaces of the hair-sandwiching arms of the hair iron.

[0002] The present invention also relates to a hair iron of V-shaped, hair-sandwiching type offering improved steam cutoff property with respect to one void space in the hair-sandwiching arm shielded by shielding members, by means of placing a heating plate with its base end tapered and then tight-fitting a gasket in the applicable tapered void.

[0003] The present invention further relates to a hair iron of V-shaped, hair-sandwiching type fitted with a gasket for the purpose of improving the steam cutoff property of the connection area between one void space in the hair-sandwiching arm in which a heat-source plate and a heating plate are stored and the other void space in the hair-sandwiching arm.

Background Technology

[0004] Hair irons used for hair straightening include hair irons of V-shaped, grip type having a pair of heating plates attached in a manner facing each other, such as those described in Publications of Unexamined Patent Application Nos. Sho 62-172905, 2000-166634, 2001-137038 and 2002-291517 and Publication of Utility Model Registration No. 3072722. A hair iron of this type has a pair of heating plates attached on the opposing surfaces of V-shaped, hair-sandwiching arms that are maintained by force in opening directions, where the V-shaped, hair-sandwiching arms are operated to sandwich a specified amount of hairs between the pair of heating plates and the heating plates are moved in this condition in the direction of extending the hairs. This so-called ironing motion removes any frizzles and curls and thereby straightens the hairs. Among hair irons of V-shaped, grip type where a pair of openable/closable heating plates are placed in a manner facing each other, the hair iron disclosed in Publication of Unexamined Patent Application No. 2003-24127 is known where the surface of the heating plate has grooves extending in the longitudinal direction of the arm so as to reduce the effect on the scalp of the steam generated by heated perm solution. When hair irons of this type are used in hair perms, generally perm solution is applied to the hairs. In the case of hair straightening, the temperature of the heating plates is controlled in the range of 100 to 170°C using the selector switch provided on the hair iron.

[Patent Literature 1] Publication of Unexamined Patent Application No. Sho 62-172905

[Patent Literature 2] Publication of Unexamined Patent Application No. 2000-166634

[Patent Literature 3] Publication of Unexamined Patent Application No. 2001-137038

[Patent Literature 4] Publication of Unexamined Patent Application No. 2002-291517

[Patent Literature 5] Publication of Utility Model Registration No. 3072722

[Patent Literature 6] Publication of Unexamined Patent Application No. 2003-24127

[0005] With a hair iron of V-shaped, hair-sandwiching type, normally both of the pair of facing heating plates are controlled to an appropriate temperature. Hairs on which perm solution has been applied are then sandwiched between these heating plates and heated. Some of these hair irons store, in a void space formed by shielding members in each V-shaped hair-sandwiching arm, a heating plate, a heat-source plate to heat the heating plate, and also a handy switch and a temperature controller to switch the temperature. On these hair irons, the handy switch is operated to adjust the temperature controller in the range of 100 to 170°C and hairs are sandwiched between the heating plates set to the specified heating temperature, as mentioned above. As hairs are sandwiched, the water content of the perm solution and other chemicals applied to the hairs evaporates instantaneously and high-temperature steam generates. This steam is then released from the heating plates in four directions. As a result, the high-temperature steam is trapped between the heating plates and eventually seeps into the void spaces in V-shaped, hair-sandwiching arms that are shielded by shielding members. This can cause the temperature selector switch, temperature controller, temperature display and other control devices to suffer electrical damage due to high-temperature steam, and for this reason the aforementioned control devices had to be placed away from the hair-sandwiching arms. Therefore, even when the handy switch on the hair-sandwiching arm is operated to adjust the temperature, it was an extremely cumbersome task for the operator implementing hair perm to confirm the actual temperature every time the temperature was changed, by looking at the temperature controller or temperature display that had to be placed away from the V-shaped, hair-sandwiching arms.

Summary of the Invention

[0006] As explained above, conventional hair irons had the problem of high-temperature steam trapped along the periphery of the heating plates and eventually seeping into the void spaces shielded by shielding members via the gaps between the heating plate attached to the V-shaped, hair-sandwiching arm and the shielding members. To prevent this problem, various ways to improve steam cutoff property have been proposed, such as screw-tightening or bonding a gasket or filling calking

agent between the heating plate and shielding members. However, filling calking agent makes it difficult to disassemble the hair iron into component parts. Screw-tightening a gasket permits easy assembly, but such attachment structure is vulnerable to large impact and exhibits poor durability. When hairs are sandwiched between the heating plates during the perm, repeated pressurization of the shielding members by the heating plate affects the shielding property between the heating plate and shielding members. This has sometimes led to the problem of high-temperature steam seeping into the void space along the shielding members in a V-shaped, hair-sandwiching arm and contacting the heat-source plate to cause the complex circuitry of the temperature controller to suffer electrical damage. In addition to presenting the risks of fire resulting from such electrical damage, conventional hair irons had to have their temperature controller and temperature display installed away from the V-shaped, hair-sandwiching arms.

[0007] The present invention was devised in light of the aforementioned circumstances and the object of the present invention is to provide a safe, easy-to-operate hair iron that eliminates the possibility of electrical damage. This hair iron also permits easy temperature adjustment because the temperature controller and temperature display can be stored in a void space in the V-shaped, hair-sandwiching arm that is shielded by shielding members, which in turn is made possible by changing the structure of the heating plate base supported by the shielding members in the V-shaped, hair-sandwiching arm and thereby improving the steam cutoff property of the shielded void space in the V-shaped, hair-sandwiching arm.

[0008] In order to achieve the aforementioned object, a gasket offering excellent heat resistance and elasticity is fitted between the shielding members and the bases, on the void space side, of the heating plates that are attached in a manner facing each other and maintained on the V-shaped, hair-sandwiching arms (each comprising a pair of right and left shielding members) so that the plates remain open in normal condition, and the gasket is secured using a taper shape provided at each base of the heating plate. This prevents high-temperature steam from seeping into the void space and thereby presents a hair iron of V-shaped, hair-sandwiching type wherein temperature-adjustable heat-source plates, temperature display and temperature controller are stored in the void spaces in the hair-sandwiching arms.

[0009] Specifically, the hair iron proposed by the present invention is characterized by the basic structure described below:

(1) A hair iron of V-shaped, hair-sandwiching type, comprising a pair of openable/closable hair-sandwiching arms that each store, in a void space shielded by a pair of right and left shielding members constituting each hair-sandwiching arm, a temperature-adjustable heat-source plate and a heating plate that

contacts the heat-source plate and sandwich hairs when the arms are closed, wherein the hair-sandwiching arms are openably/closably connected on one end by a pivot so that the force of a spring provided at a bearing maintains the pair of openable/closable arms in open directions in a normal condition, and the heating plates are affixed in a manner facing each other; the hair iron characterized in that the bases, on the void space side, of the heating plate are tapered and a gasket is fitted in gaps formed by the tapers in order to improve the steam cutoff property of the void space and also facilitate disassembly and assembly.

(2) A hair iron described in (1), characterized in that a gasket is placed in the connection area between one void space shielded by the shielding members of the hair-sandwiching arm in which the heat-source plate and the heating plate are stored, and the other void space also shielded by the shielding members of the hair-sandwiching arm, in order to improve the steam cutoff property of both void spaces.

(3) A hair iron described in (1) or (2), characterized in that a temperature controller and/or a temperature display is placed in the one void space in which the heat-source plate and the heating plate are stored, or in the other void space.

[0010] As explained above, the hair iron of V-shaped, hair-sandwiching type proposed by the present invention comprises a pair of right and left shielding members, and the bases of each heating plate stored in the void space shielded by the shielding members are tapered in advance. In the process where the pair of shielding members are assembled and installed from both sides, the convex parts of the shielding members are engaged completely in the tapered voids along the tapered bases of the heating plate, thereby enhancing the airtightness of the void space and thereby improving the steam cutoff property. As a result, the hair iron proposed by the present invention prevents steam from seeping into the void space between the shielding members where the heating plate is attached, even when steam generates from the water content of the perm solution and other chemicals as a result of heating the heating plate during hair ironing. Consequently, this hair iron can completely cut off steam from the void space. Also, a heat-source plate, a temperature controller and a temperature display can also be stored in the void space of the V-shaped arm shielded by the pair of right and left shielding members, which allows the operator to adjust the temperature easily at his or her fingertips. Furthermore, such structure prevents the risks of fire caused by high-temperature steam seeping into the void space and contacting the heat-source plate. Moreover, the operator can easily adjust the temperature by looking at the temperature display near his/her operating hand. Also, simply connecting the

pair of shielding members from both sides allows the gasket to align automatically along the tapered bases of the heating plate and completely fit the tapered voids, so the shielding members can be disassembled or assembled from right and left with ease.

[0011] The gasket fitted between the heating plate bases and shielding members must be made of a material that withstands high temperatures of well over 100°C. Any material can be used as long as it can act as a buffer, without swelling or dissolving, against the various chemicals contained in the steam of perm solution that generates and comes in contact with the gasket during the treatment. For example, a composition comprising an appropriate blend of natural rubber and synthetic rubber such as polybutadiene rubber, polyisoprene rubber, styrene-butadiene rubber, nitrile rubber, polychloroprene, butyl rubber, Hypalon, EPM, EPDM, urethane rubber or fluorine rubber can be favorably used.

Brief Explanation of the Drawings

[0012]

[Fig. 1] The heating plate used in the hair iron proposed by the present invention, and the gasket fitted to the heating plate

[Fig. 2] A side view of the gasket-fitted heating plate used in the hair iron proposed by the present invention

[Fig. 3] A cross-section view of the gasket-fitted heating plate used in the hair iron proposed by the present invention (cross-section view taken along line A-A of Fig. 2)

[Fig. 4] A condition before the gasket is fitted to the body of the hair iron proposed by the present invention

[Fig. 5] A condition after the gasket is fitted to the hair iron proposed by the present invention as shown in Fig. 4

[Fig. 6] A side view of the hair-sandwiching arm constituting the hair iron proposed by the present invention

[Fig. 7] A cross-section view taken along line B-B of Fig. 6

[Fig. 8] A perspective view of a conventional hair iron

[Fig. 9] A conventional heating plate in a fitted state

Description of the Symbols

[0013]

101	Heating plate
102	Gasket
103	Heating plate base
104	Shielding member
105	Tapered heating plate base
106	Grip
107	Hair-sandwiching arm

108	Pivot
109	Gasket
109'	Second gasket
110	Affixing part
5 111	Protective sheet
112	Force spring
113	Temperature controller
114	Temperature display
115	Heat-source plate
10 116	Shield joint
117	Convex part of shielding member
118	Void space (where a temperature controller is stored)
119	Tapered void
15 201	Heating plate
202	Gasket
203	Heating plate base
204	Shield
206	Grip
20 207	Hair-sandwiching arm
208	Pivot
211	Protective sheet
212	Force spring
215	Heat-source plate
25 216	Shield joint
218	Void space
220	Handy temperature selector switch
221	Screw

Best Mode for carrying Out the Invention

[0014] An embodiment of the present invention is explained according to the drawings.

[0015] Fig. 1 shows the heating plate of the V-shaped hair iron proposed by the present invention and the gasket fitted to the heating plate. Fig. 2 is a side view of the gasket-fitted heating plate, while Fig. 3 provides a cross-section view of the gasket-fitted heating plate (cross-section view of the section indicated by the arrows in Fig. 2). Fig. 4 shows a condition before the gasket-fitted heating plate is installed on the iron body, while Fig. 5 shows a condition after the gasket has been fully engaged with the iron body. Fig. 6 shows a side view of the hair-sandwiching arm constituting the hair iron proposed by the present invention, while Fig. 7 shows a cross-section view taken along line B-B of Fig. 6. Fig. 8 is a perspective view of a conventional hair iron of V-shaped, hair-sandwiching arm type, while Fig. 9 is a cross-section view showing how a heating plate is supported on a conventional V-shaped, hair-sandwiching arm.

[0016] As shown in Fig. 8, the conventional hair iron of V-shaped, hair-sandwiching arm type has the surface of a shielding member (204) covered by a protective sheet (211), and a pivot (208) of a grip (206) on one end of a hair-sandwiching arm (207) that supports a heating plate (201) by means of the shielding member (204) permits connection of the heating plates (201) openably/closably, with the force of a spring (212) provided at a

bearing maintaining the arms in open directions and a handy temperature selector switch (220) permitting temperature change. However, a temperature controller and temperature display (not shown) for heat-source plates had to be positioned far away, because a void space (218) formed in each hair-sandwiching arm (207) has poor steam cutoff property. Even when the temperature was switched using the handy selector switch (220), therefore, the operator had to perform the cumbersome task of checking the distant temperature display controlled by the temperature controller in order to confirm the actual temperature.

[0017] Fig. 9 shows a cross-section of the heating plate supported on the same conventional hair iron of V-shaped, hair-sandwiching arm type where a gasket (202) is fitted at a base (203) of the heating plate (201) on the void space (218) side of a heat-source plate (215). The gasket (202) is fitted by means of accurately aligning, at a joint (216), a pair of right and left shielding members (204) from the right and left, and then securely affixing to the heating plate (201) using screws (221). The fitting method is not limited to screw-in, and the gasket can also be fitted by filling calking agent or by bonding. Regardless of the fitting method, however, the gasket (202) invariably changes its position due to impact or a long period of use and creates a gap between the shielding members (204) and the heating plate (201) as a result. This in turn causes high-pressure steam to seep into the void space (218) during the perm, and if a temperature controller or a temperature display is placed in this void space, electrical damage may occur as explained earlier.

[0018] As shown in Figs. 1 and 2, the hair iron proposed by the present invention has a gasket (102) fitted beforehand at each base (103) of a heating plate (101) where hairs contact a hair-sandwiching arm (107) (Fig. 2 shows a condition where the gasket (102) is fitted, while Fig. 3 shows a cross-section view taken along line A-A of Fig. 2). A heat-source plate (115) can be temperature-adjusted by means of a temperature controller (113), and the base (103) of the heating plate (101) placed adjacent to the heat-source plate (115) is tapered (105), so that the gasket (102) is fitted in a formed tapered void (119).

[0019] The hair iron of V-shaped, hair-sandwiching arm type proposed by the present invention comprises a pair of openable/closable hair-sandwiching arms (107). To constitute the hair-sandwiching arm, a pair of right and left shielding members must be assembled to securely support the heating plate (101). The heating plate (101) adjacent to the heat-source plate (115) has the gasket (102) pre-fitted as shown in Fig. 3, and this gasket-fitted heating plate (101) is securely supported by attaching a pair of right and left shielding members (104) from both sides and then affixing as appropriately a joint (116) of the shielding members (104) using screws, etc. When assembling the pair of right and left shielding members (104) from both sides, the shielding members (104) are moved closer toward the center from the right and left as shown in Fig. 4 (in the directions of the right and left ar-

rows shown at the center of Fig. 4), in order to form a void space (118). As the shielding members (104) are moved closer toward the center from both sides, a convex part (117) of the inner wall of each shielding member moves toward the center (inward) along the tapered (105) surface of the heating plate base (103), consequently engaging with the tapered void (119) and sealing the void space. The heating plate moves toward the joint (116) of the shielding members (104) (in the direction of the downward arrow shown at the center of Fig. 4). As the convex part (117) of the shielding member moves, the gasket (102) is pressured against the heating plate (101) in all directions of right, left, up and down, and consequently the convex part (117) of the shielding member is completely engaged with the tapered void (119) as shown in Fig. 5, with the gasket (102) securely fitted to the shielding members (104) and thereby improving the steam cutoff property dramatically.

[0020] Fig. 6 is a longitudinal cross-section view of one (upper) hair-sandwiching arm (107) of the pair (upper and lower, in the figure) of hair-sandwiching arms each comprising the heating plate (101) as proposed by the V-shaped hair iron body of the present invention. The hair-sandwiching arm (107) securely supports the heating plate (101) in the void space (118) shielded by the shielding members (104), and the end of a grip (106) of the aforementioned arm is openably/closably connected to a pivot (108). The force of a spring (112) provided at a bearing maintains the pair of openable/closable arms in open directions in normal condition, while the pair of heating plates (101) are supported so that they face each other and can sandwich and heat hairs. The hair-sandwiching arm (107) has an appropriate protective sheet, an affixing part (110) and a temperature display (114).

[0021] As explained above, the hair iron of V-shaped, hair-sandwiching arm type proposed by the present invention has the structure wherein the V-shaped grips (106) of the pair of openable/closable hair-sandwiching arms (107) are connected circularly movably via the pivot (108). The spring force holds the heating plates (101) in parallel when the arms (107) of the V-shaped grips (106) are closed, thereby allowing the heating plates to contact with each other over their entire surface as they sandwich the hairs.

[0022] The arm (107) of each V-shaped grip (106) has the heat-source plate (115) placed on the back of the heating plate (101) (on the opposite side of the surface contacting hairs), and a temperature selector switch (120) is used to heat the heating plate (101) located adjacent to the heat-source plate (115) that is temperature-adjusted by the temperature controller (113). The temperature is then shown on the temperature display (114).

[0023] The hair iron of V-shaped, hair-sandwiching arm type proposed by the present invention comprises the pair of right and left shielding members (104) that are assembled from the right and left as indicated by the arrows in Fig. 5, and these pair of shielding members create a void space in which the heat-source plate (115) and

the heating plate (101) are stored, and another void space on the grip (106) side. In Fig. 6, the temperature controller (113) is positioned in the grip-side void space. Since the present invention provides improved steam cutoff property by way of tight-fitting a gasket, the temperature controller can also be placed in the void space (118) on the heating plate (101) side.

[0024] It is also effective to position a second gasket (109') at the joint (116) of the pair of shielding members (104) connecting the void space in which the heat-source plate and the heating plate (101) are stored and the void space on the grip side, in order to further improve the steam cutoff property with respect to both void spaces. In other words, by placing the second gasket (109') as shown in Fig. 7 that is a cross-section view taken along line B-B of Fig. 6, high-temperature steam around the heating plate (101) can be cut off and steam can be completely cut off from the void space in which the heat-source plate and the heating plate are stored as well as from the void space on the grip side.

[0025] The aforementioned hair iron proposed by the present invention is used in the same manner as any conventional hair iron of V-shaped, hair-sandwiching arm type is used. Specifically, perm solution is applied to hairs, the heating plates (101) are heated to a specified temperature, and then the V-shaped grips (106) are operated to sandwich a specified amount of hairs between the heating plates (101). At this time, high-temperature steam generates as the perm solution on the hairs evaporates. This steam is released from the heating plates (101) in four directions. However, due to the gasket (102), which allows the heating plate base (103) and the convex part (117) of each shielding member to engage securely and completely in the tapered void along the taper (105) when the pair of right and left shielding members (104) are assembled from the right and left, the steam is completely cut off from the formed void space. Therefore, the heat-source plate (115) and the temperature controller (113) stored in the void space on the grip side or the heating plate side can operate safely and stably.

Industrial Field of Application

[0026] As explained above, the hair iron proposed by the present invention allows a gasket to be securely fitted to the shielding members by utilizing the tapered shapes provided at the bases of heating plates attached on the opposing surfaces of the pair of openable/closable arms that constitute the V-shaped hair iron. Also, the elasticity of the heat-resistant, elastic gasket material is maximally utilized to completely prevent seeping in of steam of perm solution that generates during the perm. Also, a temperature controller and a temperature display can be provided near the operating hand, in addition to a temperature selector device, so that the operator can control the temperature at his or her fingertips and check the actual temperature with ease, which significantly reduces the time and trouble of perm treatment.

Claims

1. A hair iron of V-shaped, hair-sandwiching type, comprising a pair of openable/closable hair-sandwiching arms that store, in void spaces each shielded by a pair of right and left shielding members constituting each hair-sandwiching arm, temperature-adjustable heat-source plates and heating plates that contact the respective heat-source plates and sandwich hairs when the arms are closed, wherein the hair-sandwiching arms are openably/closably connected on one end by a pivot so that the force of a spring provided at a pivot bearing maintains the pair of openable/closable arms in open directions in a normal condition, and the heating plates are affixed in a manner facing each other; said hair iron **characterized in that** tapered portions are provided in a base, on the void space side, of each heating plate and a gasket is fitted in gaps formed by the tapered portions in order to improve steam cutoff property of the void space and also facilitate disassembly and assembly.
2. The hair iron claimed in Claim 1, **characterized in that** a gasket is placed in a connection area between one void space shielded by the shielding member of the hair-sandwiching arm in which the heat-source plate and the heating plate are stored, and the other void space shielded by the shielding member of the hair-sandwiching arm, in order to improve the steam cutoff property of both sides of the void space.
3. The hair iron claimed in Claim 1 or 2, **characterized in that** a temperature controller and/or a temperature display is placed in one void space in which the heat-source plate and the heating plate are stored, or in the other void space.

FIG. 1

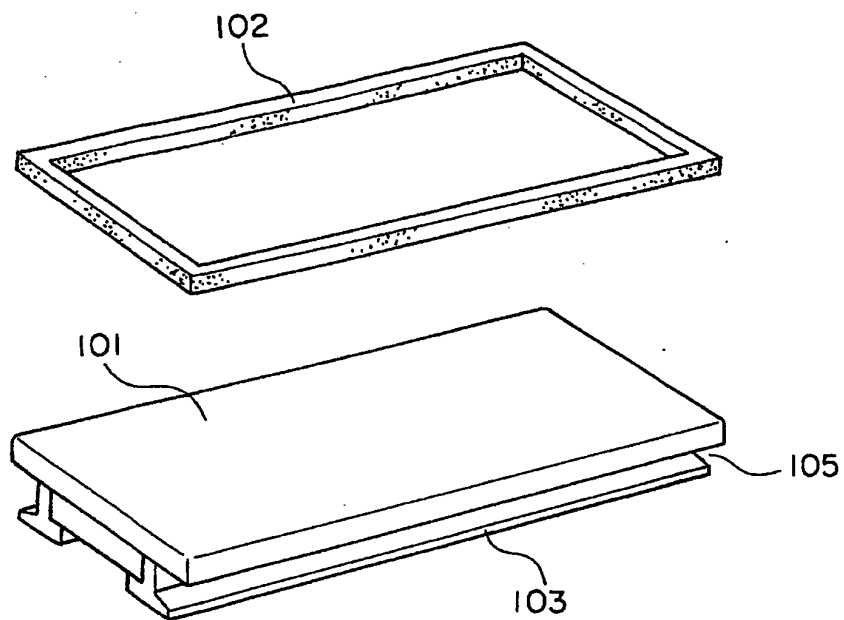


FIG. 2

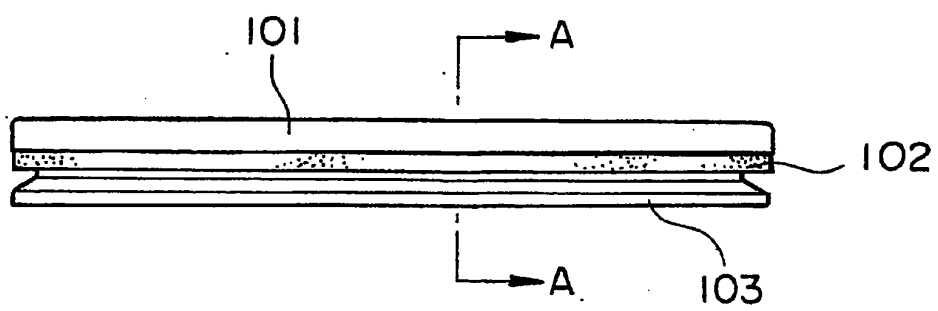


FIG. 3

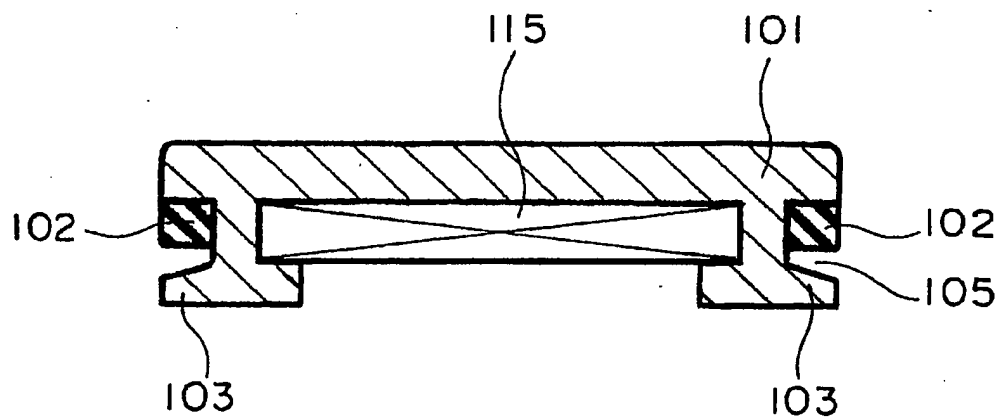


FIG. 4

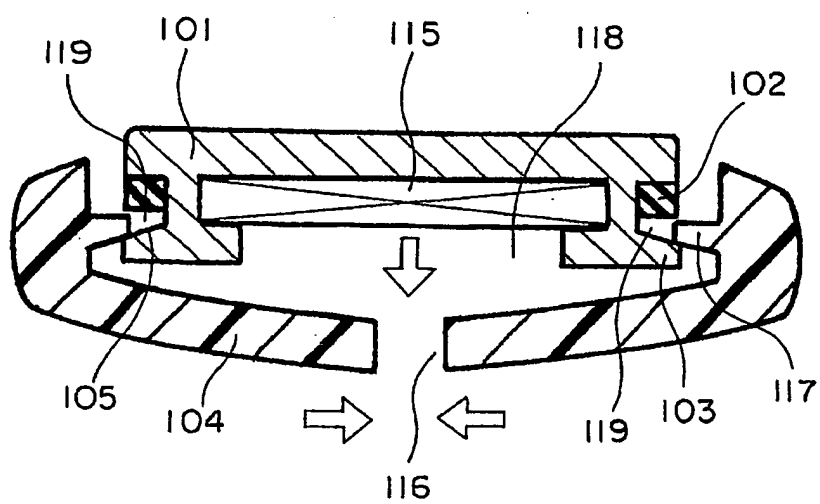


FIG. 5

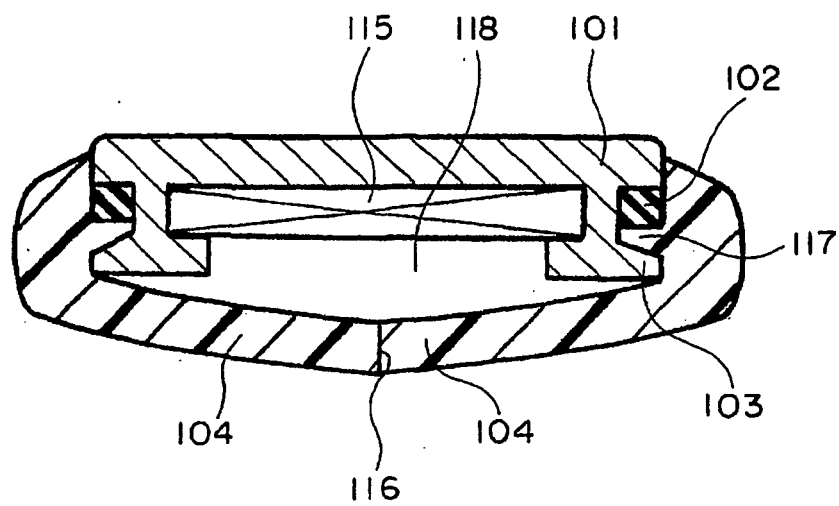


FIG. 16

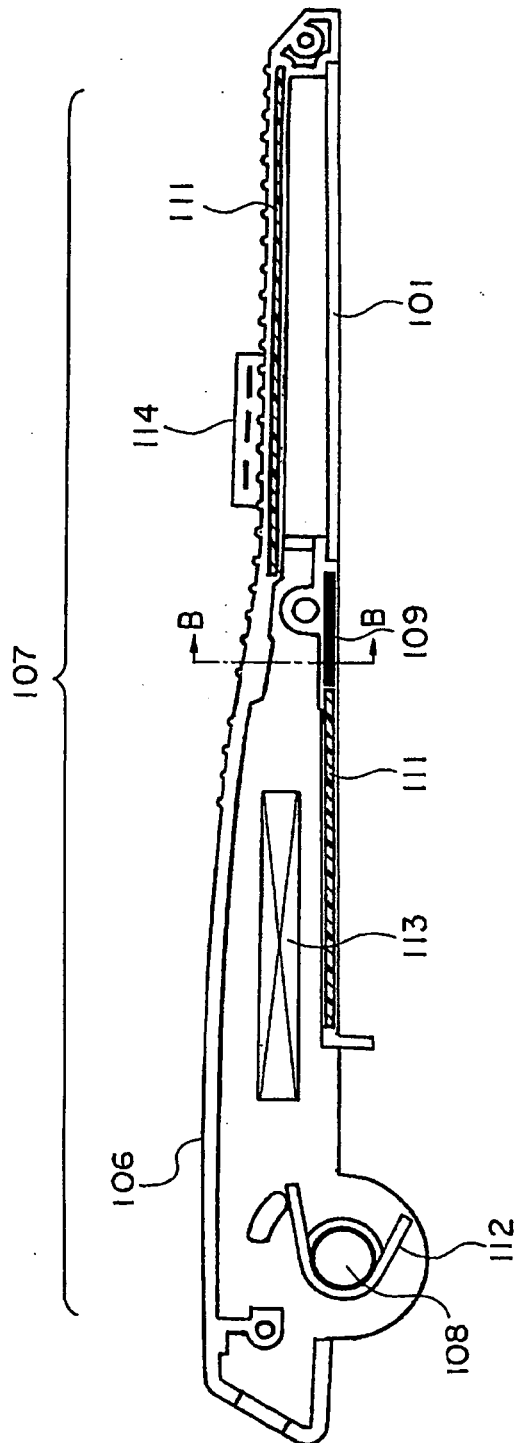


FIG. 7

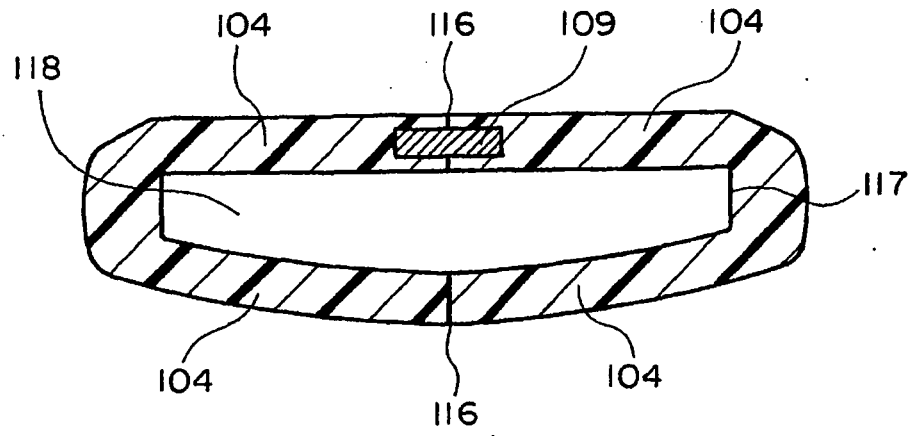


FIG. 8

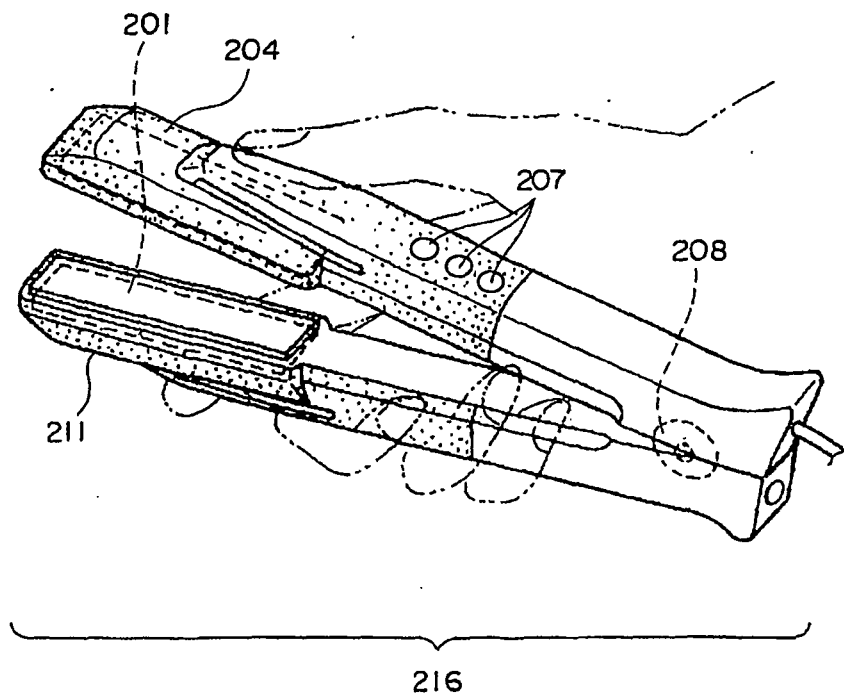
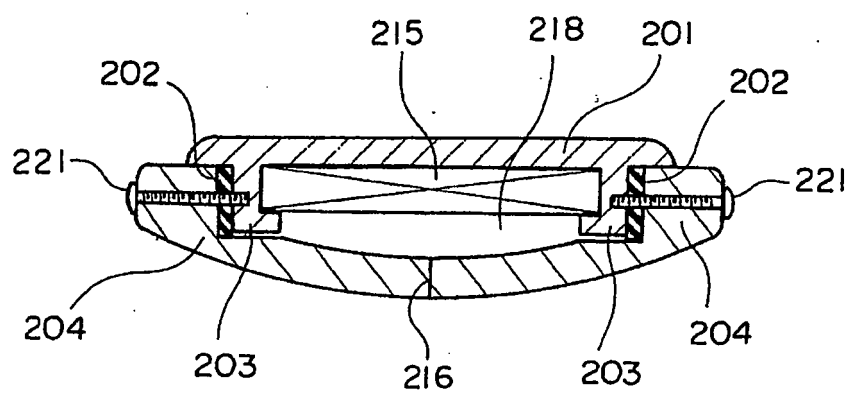


FIG. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/011112

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl. ⁷ A45D1/00		
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) Int.Cl. ⁷ A45D1/00-1/28		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-2004 Kokai Jitsuyo Shinan Koho 1971-2004 Jitsuyo Shinan Toroku Koho 1996-2004		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, Y	JP 2003-339422 A (Hattori Heating Kogyo Kabushiki Kaisha), 02 December, 2003 (02.12.03), Par. Nos. [0032] to [0034], [0036], [0046]; Fig. 3 (Family: none)	1
A	JP 2002-291517 A (Kabushiki Kaisha T.I. Purosu), 08 October, 2002 (08.10.02), Full text; all drawings (Family: none)	1-3
A	JP 2000-166634 A (Tatsuya OTA), 20 June, 2000 (20.06.00), Full text; all drawings (Family: none)	1-3
☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 07 October, 2004 (07.10.04)		Date of mailing of the international search report 02 November, 2004 (02.11.04)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2004/011112

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2003-24127 A (Hakko Kogyo Kabushiki Kaisha), 28 January, 2003 (28.01.03), Full text; all drawings (Family: none)	1-3

Form PCT/ISA/210 (continuation of second sheet) (January 2004)