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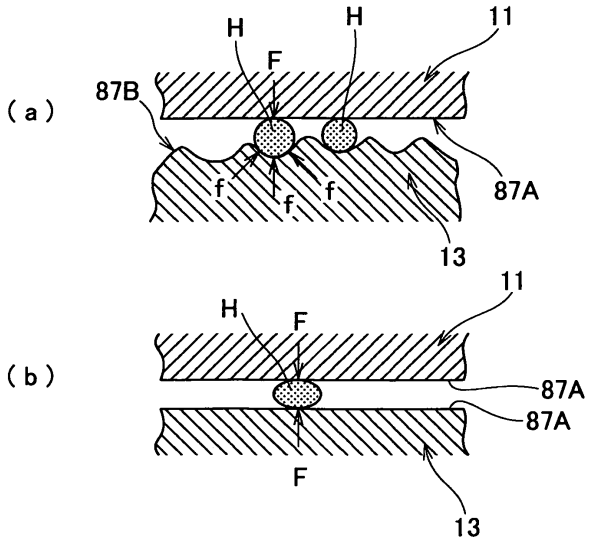
(54) **HAIR IRON**

(57) A hair iron can regulate the surface of hair with the surfaces of correctors and disperse force acting on cross sectional points of each hair that are in contact with the correctors.

The hair iron 1 has clamp arms 7 and 9 and the correctors 11 and 13 that are arranged on the clamp arms 7 and 9, to face each other, hold hair between them, and heat the hair. At this time, correcting surfaces 87A and 87B hold and correct the hair. The correcting surface 87B of one of the correctors 11 and 13 is roughened with irregularities to increase contact points or contact areas with the hair and the correcting surface 87A of the other corrector is formed to be smoother than the correcting surface 87B.

[Fig. 10]



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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a hair iron used to straighten curly hair and the like.

BACKGROUND OF THE INVENTION

[0002] A conventional hair iron is, for example, the one shown in Fig. 13 (refer to Patent Literature 1). Figure 13 (a) is a general schematic view showing the hair iron and Fig. 13(b) is a sectional view showing the inside thereof.

[0003] As shown in Fig. 13, the conventional hair iron 201 has an iron body 203 to which a power source cord 205 is connected. An intermediate part of this power source cord 205 is connected to a temperature controller 207 and an end thereof is fitted to a power source plug 209.

[0004] The iron body 203 has a pair of clamp arms 211 and 213 made of resin. The clamp arms 211 and 213 have base ends 215 and 217 that are joined to be rotatable relative to each other and front ends 219 and 221 where correctors 223 and 225 are arranged to face each other. The correctors 223 and 225 are movably supported by the clamp arms 211 and 213 so that the correctors can advance and retreat within a predetermined range. Behind each of the correctors 223 and 225, there is a spring 227 to push the correctors 223, 225 in an advancing direction.

[0005] The power source plug 209 is inserted into an outlet, the temperature controller 207 is manipulated to heat the correctors 223 and 225, and the correctors 223 and 225 are brought closer to each other to hold hair therebetween and are slid along the hair so that the heat of the correctors 223 and 225 may heat and correct the hair.

[0006] In this case, correcting surfaces of the correctors 223 and 225 are mirror surfaces to regulate the surface of the hair and easily realize glossy finishing.

[0007] However, hair gradually becomes thinner, in particular, at hair tips that are prone to be damaged. When hair is held between, heated by, and slid between the correctors 223 and 225, heat and force concentrate on cross-sectional two points of each hair that are in contact with the correctors 223 and 225. This results in easily collapsing the section of a hair, drying the hair, and aggravating curl of the hair.

[0008]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2001-137038

DESCRIPTION OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0009] A problem to be solved is that treating the surface of each hair with the surfaces of the correctors results in concentrating heat and force on cross-sectional two side points of the hair that are in contact with the correctors and finishing the hair in a damaged state.

MEANS FOR SOLVING THE PROBLEM

[0010] To realize treating the surface of each hair with the surfaces of correctors and dispersing force acting on cross sectional points of the hair that are in contact with the correctors, a hair iron according to the present invention has clamp arms carrying out a clamping action according to a gripping operation of grips and the correctors that are arranged on the clamp arms in such a way as to face each other, to heat, hold, and correct hair with correcting surfaces thereof. The most important characteristic of the hair iron is that a first one of the correcting surfaces of the correctors is roughened with irregularities whereby the irregularities increase contact points or contact areas that are in contact with the hair and a second one of the correcting surfaces is formed to be smoother than the first correcting surface.

EFFECT OF THE INVENTION

[0011] According to the present invention, the hair iron has the clamp arms to carry out a clamping action according to a gripping operation of the grips and the correctors that are arranged on the clamp arms in such a way as to face each other, to heat, hold, and correct hair with the correcting surfaces thereof. The first correcting surface of the correctors is roughened with irregularities to increase contact points or contact areas that are in contact with hair and the second correcting surface is formed to be smoother than the first correcting surface.

[0012] Accordingly, the second correcting surface can regulate and gloss the surface of hair and the first correcting surface can increase contact points or contact areas that are in contact with the hair during treatment. This results in dispersing force acting on the cross section of each hair and maintaining the hair healthy after the treatment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

[Fig. 1] Figure 1 is a perspective view showing a hair iron (Embodiment 1).

[Fig. 2] Figure 2 is a plan view showing the hair iron with divisional parts removed (Embodiment 1).

[Fig. 3] Figure 3 is a side view showing the hair iron (Embodiment 1).

[Fig. 4] Figure 4 is a plan view showing the hair iron (Embodiment 1).

[Fig. 5] Figure 5 is a bottom view showing opened clamp arms (Embodiment 1).

[Fig. 6] Figure 6 is an enlarged sectional view seen

from arrows SA of Fig. 2 (Embodiment 1).

[Fig. 7] Figure 7 is an enlarged plan view showing an essential part of a front end of the hair iron with the divisional parts removed (Embodiment 1).

[Fig. 8] (a) is a front view showing a corrector body, (b) is a back view showing the same, (c) is a plan view showing the same, and (d) is a sectional view showing the same (Embodiment 1).

[Fig. 9] (a) is a sectional view showing an essential part of a second correcting surface and (b) is a sectional view showing an essential part of a first correcting surface (Embodiment 1).

[Fig. 10] (a) is a sectional view showing a treated state of hair according to the embodiment (Embodiment 1) and (b) is a sectional view showing a treated state of hair according to a comparative example (Comparative example).

[Fig. 11] (a) is a plan view showing a first spring and (b) is a back view showing the same (Embodiment 1).

[Fig. 12] (a) is a plan view showing a second spring, (b) is a front view showing the same, and (c) is a side view showing the same (Embodiment 1).

[Fig. 13] (a) is a general schematic view showing a hair iron and (b) is a sectional view showing the inside thereof (Related art).

DESCRIPTION OF NATIONS

[0014]

1:	Hair iron
7, 9:	Clamp arm
11, 13:	Corrector
15, 17:	Base end
21, 23:	Grip
29, 31:	Front end
67:	Thermal plate
69:	Ceramic heater (heat generator)
71:	Magnet plate (magnet)
73:	First spring (magnet pushing means)
75:	Second spring (corrector pushing means)
77:	Casing
87A, 87B:	Correcting surface
88A, 88B:	Base material
89:	Back
90:	Platinum layer
92:	Titanium dioxide layer
94, 96:	Nickel layer

BEST MODE FOR CARRYING OUT THE INVENTION

[0015] Objects of regulating the surface of hair with the surfaces of correctors and dispersing force acting on cross sectional points of each hair that are in contact with the correctors are realized by making one of the correcting surfaces rougher than the other, to thereby increase contact points or contact areas that are in contact with the hair.

EMBODIMENT 1

[0016] Figures 1 to 5 show a hair iron according to an embodiment of the present invention, in which Fig. 1 is a general perspective view partly omitted, Fig. 2 a plan view partly broken with divisional parts removed, Fig. 3 a side view, Fig. 4 a plan view, and Fig. 5 a bottom view with clamp arms opened.

[0017] As shown in Figs. 1 to 5, the hair iron 1 has an iron body 5 to which a power source cord 3 is connected. The power source cord 3 is provided with a power source plug and the like.

[0018] The iron body 5 has a pair of clamp arms 7 and 9 and a pair of correctors 11 and 13. The clamp arms 7 and 9 are made of resin such as C-polyester-based engineering plastic having a liner coefficient of expansion of, for example, 8.8×10^{-6} cm/cm/°C and are rotatably joined together at their base ends 15 and 17 with a rotary shaft 19. The clamp arms 7 and 9 have midsections serving as grips 21 and 23. As shown in Figs. 2, 4, and 5, the grips 21 and 23 are relatively widened to easily be grasped, the widths thereof being substantially equal to the widths of the base ends 15 and 17.

[0019] At front ends of the grips 21 and 23, there are slopes serving as pressing points 25 and 27. The pressing points 25 and 27 are to put the thumb and forefinger thereon when grasping the grips 21 and 23. In the side view of Fig. 3, the pressing points 25 and 27 are slightly expanded from the grips 21 and 23, so that one may easily put the thumb and forefinger thereon.

[0020] One or both of the grips 21 and 23 has, for example, a temperature controller 26, a temperature display 28, and the like. The temperature controller 26 includes temperature setting buttons 30, an ON/OFF switch 32, and the like arranged on the surface of the grip 21 or 23. The grips 21 and 23 incorporate temperature controlling circuits that are not shown. The temperature controller 26 has a circuitry connected between the cord 3 and ceramic heaters 69 to be explained later, to phase-control AC power and adjust the temperature of the ceramic heaters 69 according to a temperature set with the temperature setting buttons 30. The phase-controlled temperature is detected by a thermistor and is used for temperature correction. An actual temperature based on the thermistor detection is displayed on an LED of the temperature display 28 arranged on the surface of the grip 21 or 23.

[0021] As shown in Figs. 2, 4, and 5, front ends 29 and 31 of the clamp arms 7 and 9 are narrower than the grips 21 and 23 in a contact direction. As shown in Fig. 3, the front ends 29 and 31 are narrower than the grips 21 and 23 and are biased to one side with respect to the grips 21 and 23. As a result, side faces 33 of the front ends 29 and 31 protrude from side faces 35 of the grips 21 and 23 and the side faces 33 and 35 are continued to each other through slopes 37 to form steps. Side faces 39 of the front ends 29 and 31 are biased toward the center of the grips 21 and 23 in conformity with the side faces 33.

[0022] The clamp arms 7, 9 are hollow, and as shown in Fig. 3, are divided along a dividing line 41 into divisional parts 43a and 45a, divisional parts 43b and 45b. The divisional parts 43a and 45a, divisional parts 43b and 45b are fixed together with fasteners such as screws 48, 49, and 51 at the front ends 29 and 31, grips 21 and 23, and base ends 15, 17. The divisional parts 43a, 43b are provided with fastening through holes 47 at the front ends 29, 31.

[0023] The hollow grips 21 and 23 have a plurality of reinforcing ribs 53. The clamp arm 7 has a projection 55 to face the other clamp arm 9 and the clamp arm 9 has a recess 57 to receive the projection 55. The projection 55 abuts against the bottom of the recess 57, to function as a stopper.

[0024] The base ends 15 and 17 of the clamp arms 7 and 9 are rotatably joined together, and when the grips 21 and 23 are grasped, the front ends 29 and 31 carry out a clamping action.

[0025] Cross sections of the front ends 29 and 31 of the clamp arms 7 and 9 are configured as shown in Fig. 6 that is an enlarged sectional view seen from arrows SA of Fig. 2. Figure 7 is an enlarged plan view showing sections of the correctors 11 and 13 at the front ends 29 and 31 with the divisional parts 43a and 43b removed. The front ends 29 and 31 of the clamp arms 7 and 9 have symmetrical shapes, and therefore, the front end 29 will mainly be explained and the explanation related to the front end 29 is applied to the other front end 31.

[0026] The front end 29 has, as shown in Figs. 6 and 7, flat vertical walls 59 and 61 and a flat bottom wall 63 that contain a core 83. The front end 31 has vertical and bottom walls that are similar to the flat vertical walls 59 and 61 and flat bottom wall 63, to contain a core 85 of symmetrical shape. The front end 29 has a corrector support hole 65 to movably support the corrector 11, so that the corrector 11 may move toward and away from the other corrector. In the corrector support hole 65, the corrector 11 is movably supported.

[0027] The correctors 11 and 13 are arranged at the front ends 29 and 31 of the clamp arms 7 and 9, so that the correctors may face each other to heat, hold, and correct hair when the clamp arms 7 and 9 are manipulated to clamp the hair.

[0028] The corrector 11 has a thermal plate 67, the ceramic heater 69, a magnet plate 71, and a first spring 73 and is pushed by a second spring 75.

[0029] The thermal plate 67 is made of a light-weight and highly heat conductive material such as aluminum and has a rectangular shape when seen from the opposite side. The back of the thermal plate 67 is integral with a casing 77 that is movably supported in the corrector support hole 65 so that it can move toward and away from the other corrector 13. This back-and-forth moving support is also adopted by the corrector 13.

[0030] Top and bottom walls of the casing 77 have stoppers 79 and 81 to limit the protruding movement of the thermal plate 67 within a predetermined range. The ceramic heater 69, magnet plate 71, and first spring 73 are contained in the casing 77. Namely, the correctors 11 and 13 each have the casing 77 behind the thermal plate 67 and the casing 77 accommodates the magnet plate 71 serving as a magnet and the first spring 73 serving as a magnet pushing means to push the magnet plate 71 toward the thermal plate 67 relative to the casing 77. Behind the thermal plate 67, the magnet plate 71 serving as a magnet is arranged along a correcting surface. In the casing 77, there is arranged between the back of the thermal plate 67 and the magnet plate 71 the ceramic heater 69 serving as a heat generator for carrying out heat conduction to the thermal plate 67 from the back thereof.

[0031] The ceramic heater 69 has a rectangular shape, generates heat up to about 180°C at the maximum, conducts the heat to the thermal plate 67, and is electrically connected to the power source cord 3.

[0032] The magnet plate 71 is made of, for example, a neodymium magnet of 15000 gausses and has a rectangular plate shape. The magnet plates 71 of the correctors 11 and 13 are arranged so that S-poles of the magnet plates 71 may face each other. The magnet plates 71 may be arranged so that their N-poles face each other. The magnet plates 71 may be permanent magnets, electromagnets, or a combination of permanent magnet and electromagnet. It is preferred that the magnet plate 71 is of 10000 gausses or over.

[0033] Magnetic action of the magnet plate 71 provides an ion effect and a low-frequency water activating effect. The ion effect magnetically generates negative ions. The low-frequency water activating effect is achieved by low-frequency oscillations of electromagnetic waves and electromagnetic fields around the magnet plate 71 and periodically vibrates water in hair to energize the water. The magnetic action also atomizes ambient water clusters so that the atomized water may easily permeate into hair.

[0034] The first spring 73 is a plate spring that pushes the magnet plate 71 in the casing 77 toward the back of the thermal plate 67, so that the ceramic heater 69 is tightly attached to the back of the thermal plate 67. At the same time, it stably supports the magnet plate 71. The spring constant of the first spring 73 is set so that, when the opposing magnet plates 71 are arranged with their S-poles facing each other, the first spring 73 may not bend due to the repulsive force of the magnet plates 71.

[0035] The second spring 75 is supported at a rear end of the casing 77. The second spring 75 serves as a corrector pushing means to push the correctors 11 and 13 and elastically adjust a holding state of the correctors 11 and 13. The second spring 75 is a plate spring having inclined ends 75a and 75b whose edges engage with projections of the divisional part 43a in a left-right direction (longitudinal direction) of Fig. 7.

The details of the correctors 11 and 13 and first and second springs 73 and 75 are shown in Figs. 8 to 12. Figure

8(a) is a front view showing the corrector, Fig. 8(b) a back view of the same, Fig. 8(c) a plan view of the same, Fig. 8(d) a sectional view of the same, Fig. 9(a) a sectional view showing essential part of a second correcting surface, Fig. 9(b) a sectional view showing essential part of a first correcting surface, Fig. 10(a) a sectional view showing a hair treating state according to the embodiment, Fig. 10(b) a sectional view showing a hair treating state according to a comparative example, Fig. 11(a) a plan view of the first spring, Fig. 11(b) a back view of the same, Fig. 12(a) a plan view of the second spring, Fig. 12(b) a front view of the same, and Fig. 12(c) a side view of the same.

[0036] As shown in Figs. 8(a) to 8(d), the thermal plates 67 of the correctors 11 and 13 have the flat correcting surfaces 87 that face each other.

[0037] As shown in Fig. 9(a), the correcting surface 87A of the corrector 11 includes a base material 88A of aluminum (A1) whose surface is mirror-finished and a platinum (Pt) layer 90. The platinum layer 90 is plated to a thickness of about 0.01 μm. Between the surface of the base material 88 and the platinum layer 90, a titanium dioxide (TiO_2) layer 92 is formed. Between the surface of the base material 88 and the titanium dioxide layer 92 and between the titanium dioxide layer 92 and the platinum layer 90, nickel (Ni) layers 94 and 96 are formed.

[0038] The correcting surface 87B of one of the correctors 11 and 13 is roughened with irregularities to increase contact points or contact areas with hair and the correcting surface 87A of the other thereof is formed to be smoother than the correcting surface 87B.

[0039] Namely, only the correcting surface 87A of the corrector 11 is formed into a mirror state, and as shown in Fig. 9(b), the correcting surface 87B is roughened with irregularities to increase contact points or contact areas with hair.

In connection with the correcting surface 87B of the corrector 13, the surface of the aluminum (A1) base material 88B is not mirror-finished but it is left as it is, or the surface roughness thereof is adjusted, and the platinum (Pt) layer 90 is arranged. Irregularities at the surface of the platinum layer 90 of the correcting surface 87B are in the range of 5 to 15 μm.

To adjust the surface roughness, irregular lines may be formed in a width direction of the correcting surface 87B, i.e., in a direction to slide the correcting surface relative to hair to treat. For example, irregular lines are formed in a vertical direction of Fig. 8(a). Irregular lines may obliquely be formed in a width direction of the correcting surface 87B, or they may obliquely be curved. Irregularities may be formed into a reticulate state when seen from the front of the correcting surface 87B.

[0040] The platinum layer 90 of the correcting surface 87B is plated to a thickness of about 0.01 μm like that of the correcting surface 87A. Between the surface of the base material 88 and the platinum layer 90, a titanium dioxide (TiO_2) layer 92 is formed. Between the surface of the base material 88 and the titanium dioxide layer 92 and between the titanium dioxide layer 92 and the platinum layer 90, nickel (Ni) layers 94 and 96 are formed.

[0041] The platinum layer 90 has a water-retaining function and a catalytic function. The water-retaining function collects water from air and provides hair with the water. The catalytic function atomizes harmful substances and organic compounds.

[0042] The titanium dioxide layer 92 has a photocatalytic function. This photocatalytic function converts the harmful substances atomized by the platinum layer 90 into harmless water and carbon dioxide. In addition, the titanium dioxide layer provides an ion effect to generate negative ions to neutralize the harmful substances.

[0043] The nickel layer 94 prevents oxidization of the aluminum base material 88 when the platinum layer 90 is plated. The nickel layer 96 helps settle the platinum layer 90 onto the titanium layer 92.

[0044] According to this embodiment, the platinum layer 90 is formed by electrolytic plating to a thickness of 0.01 μm. The platinum layer 90 may be formed by non-electrolytic plating. The titanium dioxide layer 92 is formed by vapor deposition to á thickness of 5 to 15 μm. The titanium dioxide layer 92 is formed when deposited titanium (Ti) changes into titanium dioxide (TiO_2) as time passes. Namely, a product to be marketed includes the titanium dioxide layer 92 altered from a deposited titanium layer. The nickel layers 94 and 96 are each formed by coating to a thickness of 0.5 μm.

The platinum layer 90, titanium dioxide (TiO_2) layer 92, and nickel (Ni) layers 94 and 96 may have optional thicknesses if their respective functions are secured.

The functions of the platinum layer 90 and titanium dioxide (TiO_2) layer 92 and the magnetic action of the magnet plate 71 effectively cause oxidization and reduction to permanently process hair without losing moisture of the hair.

Treating hair as shown in Fig. 10(a) with the corrector 11 having the correcting surface 87A and the corrector 13 having the correcting surface 87B can regulate the surfaces of hair H and gloss the hair due to the operation of the mirror surface of the correcting surface 87A. In addition, the hair enters into the recesses of the correcting surface 87B of the corrector 13, to increase contact points or contact areas of the hair. The increased contact points or contact areas disperse force "f" of the corrector 13 acting on the hair. In addition, the increased contact points or contact areas disperse heat transmitted from the correcting surface 87B to the hair.

On the other hand, the comparative example of Fig. 10 (b) includes correctors 11 and 13 each having a correcting surface 87A whose aluminum (A1) base material is mirror-finished on which a platinum (Pt) layer 90 of about 0.01 μm is plated.

When such correctors 11 and 13 are used to treat hair, heat and force "F" concentrate on cross-sectional two points of each hair H that are in contact with the correctors 11 and 13, to easily collapse the cross section of the hair. In particular, each hair gradually narrows at the tip there-

of, and therefore, the heat and force F easily concentrate on the hair tip, to finish the hair tip in a dried state and worsen a curly state. In this way, the mirror correcting surfaces 87A of the correctors 11 and 13 may damage the hair.

On the other hand, according to the embodiment of the present invention, the correcting surface 87B disperses heat and force acting on each hair, to suppress a dry finished state and curls. In addition, the correcting surface 87A of mirror state can gloss the hair.

[0045] The casing 77 is hollow and is formed along a flat back 89 of the thermal plate 67. Each end of the casing 77 is open at each end of the corrector 11 (13). From one end of the casing 77, it is possible to insert the first spring 73, ceramic heater 69, and magnet plate 71 into the casing 77. The casing 77 has a rear wall 91 having an opening 93. Upper and lower edges of the rear wall 91 have recesses 95 to support and slide the second spring 75.

[0046] As shown in Fig. 11, the first spring 73 is made of a plate spring. The center of the first spring 73 has a curved portion 97. One end of the first spring 73 has a folded portion 99 and the other end thereof has a bent portion 101. The folded portion 99 and bent portion 101 support the magnet plate 71.

[0047] As shown in Fig. 12, the second spring 75 is made of a plate spring. The ends 75a and 75b of the second spring 75 are formed on each side of a flat middle portion 103. Each widthwise edge of the middle portion 103 forms a hook portion 105. Each edge of the ends 75a and 75b has an engaging part 107 to engage with a projection of the divisional part 43a as mentioned above.

[0048] For assembling, the magnet plate 71 is supported with the folded portion 99 and bent portion 101 of the first spring 73 in advance as shown in Fig. 10. The ceramic heater 69 is arranged on the magnet plate 71. The first spring 73, magnet plate 71, and ceramic heater 69 are assembled into an assembly, which is inserted into the casing 77. At this time, the assembly can easily be inserted through an end opening of the casing 77.

[0049] Once the assembly is received in the casing 77, the curved portion 97 of the first spring 73 bends to produce a repulsive force that tightly pushes the ceramic heater 69 against the back 89 of the thermal plate 67. This results in fixing the assembly of the first spring 73, magnet plate 71, and ceramic heater 69 within the casing 77, thereby making the assembling work easier.

[0050] Next, the hook portions 105 of the second spring 75 are engaged with the recesses 95 of the rear wall 91 of the corrector 11 (13), to attach the middle portion 103 of the second spring 75 to the rear wall 91 of the corrector 11 (13). At this time, the second spring 75 is slid from an end of the rear wall 91. Alternatively, the middle portion 103 of the second spring 75 is placed on the rear wall 91 and is pressed to the rear wall 91. When the second spring 75 is attached to the rear wall 91, the middle portion 103 is attracted by the magnet plate 71 and the second spring 75 is thereby positioned with respect to the rear wall 91. In this way, the second spring 75 can freely be moved relative to the rear wall 91 and can be positioned at a moved location with the magnetic force mentioned above. In this way, the positioning of the second spring 75 can very easily be carried out.

[0051] Thereafter, the corrector 11 (13) with the assembly of the second spring 75 is placed in the corrector support hole 65 of the divisional part 45a (45b), the other divisional part 43a (43b) is attached thereto, and predetermined locations are fastened to complete the fabrication.

[0052] Operation of the hair iron 1 to straighten curly hair or artificial permanent waves of hair will be explained.

[0053] When using the hair iron 1, a first water solution mainly containing a mercapto compound (reduction agent) such as thioglycol acid and cysteine is prepared. To the first water solution, a basic material such as ammonia, monoethanolamine, and triethanolamine is added to adjust pH to 6 to 10. This liquid is applied to hair. The liquid reduces disulfide bonds of cystine contained in keratin protein of the hair and cuts the same as mercapto groups. Thereafter, the hair is washed with water and is successively dried with a drier. The hair iron 1 is adjusted to a temperature of 160 to 180°C and is applied to the hair to straighten the hair.

[0054] More precisely, the grips 21 and 23 of the clamp arms 7 and 9 are grasped and the thumb and forefinger are put on the pressing points 25 and 27, to hold hair between the thermal plates 67 of the correctors 11 and 13. While keeping this state, the clamp arms 7 and 9 are slid toward the tips of the hair. At this time, the hair is heated and straightened between the thermal plates 67 heated with the ceramic heaters 69.

[0055] At this time, the correcting surface 87B disperses heat and force acting on the hair, to suppress dryness and curl of finished hair and the mirror-state correcting surface 87A glosses the hair. The correcting surface 87A must be put on the surface side of the hair, to gloss the surface of the hair. To make the correcting surfaces 87A and 87B visually distinguishable from each other, the surfaces of the clamp arms 7 and 9 may have indications. The platinum layers 90 of the correctors 11 and 13 collect ambient moisture and make the hair absorb the moisture, to thereby prevent the hair treated between the thermal plates 67 from drying. At this time, the magnet plates 71 achieve magnetic action to pulverize ambient water clusters so that the hair may easily absorb the water. Namely, the magnet plates pulverize the ambient water clusters collected by the platinum layers 90 so that the hair may easily absorb water and increase water content. Each platinum layer 90 achieves a catalytic function to atomize harmful substances and organic compounds and each titanium dioxide layer 92 carries out a photocatalytic function to convert the substances atomized by the platinum layer 90 into harmless water and carbon dioxide. The photocatalytic function of the titanium dioxide layers 92 also generates negative ions to neutralize the harmful substances.

[0056] At the same time, each magnet plate 71 per-

forms a magnetic action to generate negative ions. In addition, the magnet plates 71 create low-frequency oscillations of electromagnetic waves and electromagnetic fields around the same to periodically vibrate water in the hair, energize the water, and activate the water.

[0057] In this way, each platinum layer 90 achieves the water sustaining effect on the hair, so that the thermal plates 67 may surely correct curls of the hair and secure a gloss of the hair.

[0058] The platinum layers 90 and titanium dioxide layers 92 provide a synergistic effect (catalytic effect) to treat hair and promote health of the hair.

[0059] The synergistic effect of the platinum layers 90 and titanium dioxide layers 92 decomposes harmful substances into harmless substances to improve a hair treating environment.

[0060] The platinum layers 90, titanium dioxide layers 92, and magnet plates 71 provide synergistic effects of minimizing damages on hair due to heat and pressure produced by the hair iron 1 and atomizing, decomposing, and removing harmful substances and organic compounds, to maintain best hair treating conditions.

[0061] When the hair iron 1 is used on hair after carrying out a one-liquid treatment of the permanent liquid in a permanent process, the particle decomposing function of the platinum layers 90 atomizes harmful substances and organic compounds. At the same time, the titanium dioxide layers 92 achieve the oxidation-reduction catalytic action and ion effect. These functions and effects deodorize the permanent liquid and decompose harmful substances.

Generally, an odor of ammonia remains on hair after a two-liquid treatment in the permanent process. The platinum layers 90 and titanium dioxide layers 92 can remove the smell of ammonia remaining after the permanent process, to maintain a proper hair treating environment.

[0062] The hair is moved at a given speed between the magnet plates 71 whose S- or N-poles are facing each other. The magnet plates 71 generate reduction energy due to the Fleming's right-hand rule. This energy is generated by the S-pole of each magnet plate 71 where electrons turn rightward, to promote a reduction action of the one-liquid. The energy also works to close cuticles on the surface of each hair. Closing the cuticles prevents ultraviolet rays from entering and damaging the hair.

[0063] The reduction energy makes water clusters in the first liquid smaller. The small water clusters help the first liquid permeating into hair. The reduction energy also promotes reduction of the first liquid, to shorten a treatment time to thereby prevent the hair from being damaged.

[0064] Thereafter, the two-liquid, i.e., a water solution of oxidant such as sodium bromate and hydrogen peroxide is applied to the hair, to oxidize mercapto groups and produce new disulfide bonds on the hair. This results in settling the straightened state of the hair.

[0065] In the case of the magnet plates 71 arranged so that their S-poles face each other, the magnet plates 71 repel each other when the correctors 11 and 13 are brought closer to each other by grasping the clamp arms 7 and 9. The second springs 75 bend in proportion to the repelling action so that the magnet plates 71 become parallel to each other. This results in aligning the correctors 11 and 13 and automatically making the correcting surfaces 87 parallel to each other. When the clamp arms 7 and 9 are further grasped, the correcting surfaces 87 of the correctors 11 and 13 that are already in parallel with each other come in contact with each other.

[0066] If the magnet plates 71 are arranged so that their S- and N-poles face each other, the magnet plates 71 quickly attract each other. At this time, the second springs 75 bend to make the magnet plates 71 parallel to each other. Namely, when the correcting surfaces 87 of the correctors 11 and 13 are brought in contact with each other, the correcting surfaces 87 are already in parallel with each other.

[0067] In this way, when the correctors 11 and 13 are brought closer to each other by grasping the clamp arms 7 and 9, the magnet plates 71 and second springs 75 cooperate to automatically make the correctors 11 and 13 parallel to each other.

[0068] When the correctors 11 and 13 hold hair between them, the correctors 11 and 13 are parallel to each other from the beginning, to prevent the uneven ironing of the hair due to uneven contact.

[0069] When the magnet plates 71 are arranged with their S- and N-poles facing each other, the correctors 11 and 13 will quickly attract each other when the clamp arms 7 and 9 are grasped. At this time, the second springs 75 absorb a shock, to properly treat hair.

[0070] Each magnet plate 71 is pressed toward the thermal plate 67 by the first spring 73, so that the magnet plate 71 is stably supported on the corrector 11 (13). The magnet plates 71 and first springs 73 cooperate to surely align the correctors 11 and 13 relative to each other.

[0071] Between the back 89 of the thermal plate 67 and the magnet plate 71 in the casing 77, the ceramic heater 69 is arranged to conduct heat through the back 89 to the thermal plate 67. The ceramic heater 69 is tightly attached to the back 89 of the thermal plate 67 by the pressing force of the first spring 71, so that the ceramic heater 69 can efficiently conduct heat to the thermal plate 67.

[0072] The present invention is not limited to the above-mentioned embodiment.

For example, the body 5 may have an optional shape. The temperature controller and temperature display can be arranged at optional locations on the body 5.

The magnet plate 71 may be arranged on only one of the correctors 11 and 13 and the other of the correctors 11 and 13 may be made of a magnetic material to be attracted by the magnet plate 71. It is possible to omit the first spring 73. One of the correcting surfaces 87A and 87B may be convex and the other concave.

[0073] Only one of the correcting surfaces 87 of the correctors 11 and 13 may have the platinum layer 90,

titanium dioxide (TiO_2) layer 92, and nickel (Ni) layers 94 and 96.

[0074] It is possible to omit the titanium dioxide (TiO_2) layer 92 and/or the nickel (Ni) layers 94 and 96.

Claims

1. A hair iron comprising:

clamp arms carrying out a clamping action according to a gripping operation of grips;
correctors arranged on the clamp arms in such a way as to face each other, the correctors being configured to heat hair, hold and correct hair with correcting surfaces in the clamping action;
a first one of the correcting surfaces of the correctors being roughened with irregularities whereby the irregularities increase contact points or contact areas that are in contact with the hair; and
a second one of the correcting surfaces being formed to be smoother than the first one of the correcting surface.

2. The hair iron as set forth in claim 1, wherein:

only the second one of the correcting surfaces is formed into a mirror surface state and the first one of the correcting surfaces is formed by regulating the surface or roughness of a material.

3. The hair iron as set forth in claim 1 or 2, wherein:

the correcting surface of one or both of the correctors is provided with a platinum layer.

4. The hair iron as set forth in claim 2 or 3, wherein:

between the surface of a base material and the platinum layer, there is formed a titanium layer.

5. The hair iron as set forth in claim 4, wherein:

between the surface of the base material and the titanium layer and between the titanium layer and the platinum layer, there is formed a nickel layer.

6. The hair iron as set forth in any one of claims 1 to 5, wherein:

the first one of the correcting surfaces is roughened with irregularities of 5 to 15 μm.

7. The hair iron as set forth in any one of claims 1 to 6, wherein:

a magnet is arranged along the back side of the correcting surface.

8. The hair iron as set forth in any one of claims 1 to 6, wherein:

at least one of the correctors is movably supported with corrector pushing means with respect to the clamp arm such that the corrector advances and retreats within a predetermined range relative to the other corrector from a fitted state to the clamp arm;
a magnet is arranged along the back side of the correcting surface; and
repulsive or attractive force between the magnets or attractive force of the magnet with respect to the other corrector bends the corrector pushing means in response to the repulsion or attraction, to advance or retract the corrector from the fitted state and thereby correct a mutual attitude.

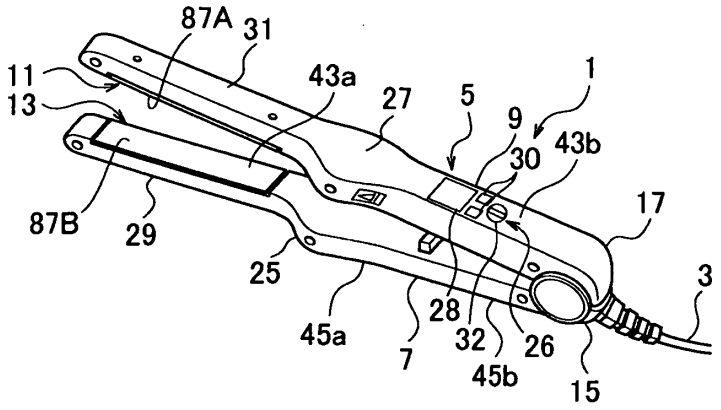
9. The hair iron as set forth in claim 8, wherein:

the corrector has a casing on the back side of the correcting surface; and
the casing accommodates the magnet and a magnet pushing means that pushes the magnet toward the correcting surface with respect to the casing.

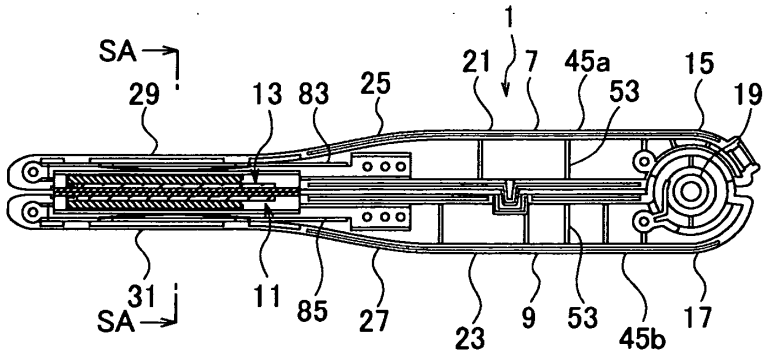
10. The hair iron as set forth in claim 8 or 9, wherein:

between the back side of the correcting surface and the magnet in the casing, there is arranged a heat generator for heating.

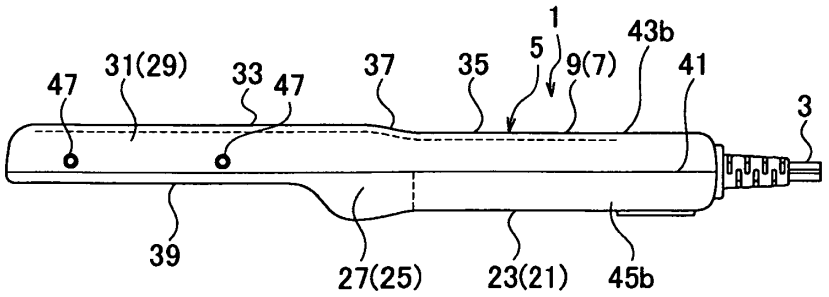
[Fig. 1]



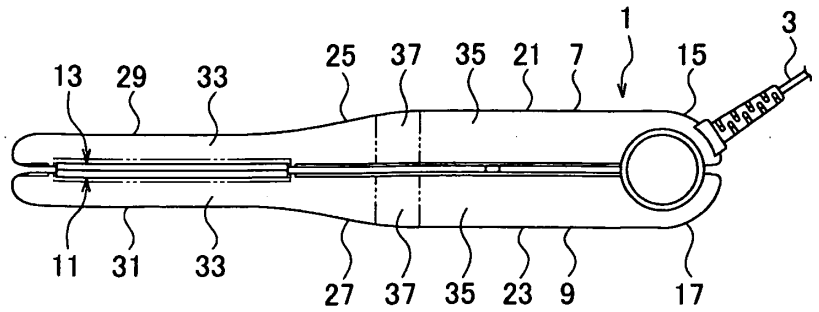
[Fig. 2]



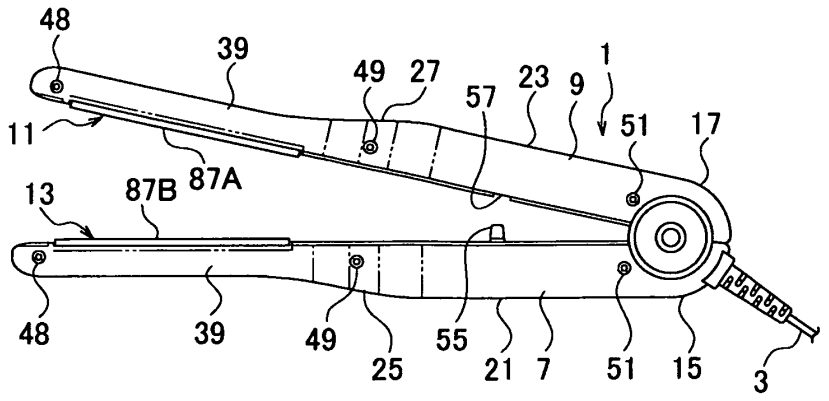
[Fig. 3]



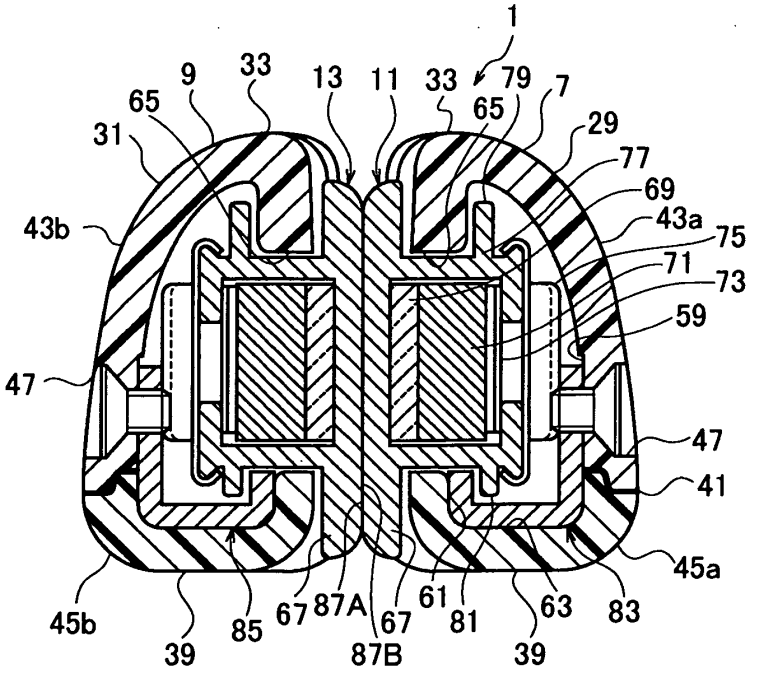
[Fig. 4]



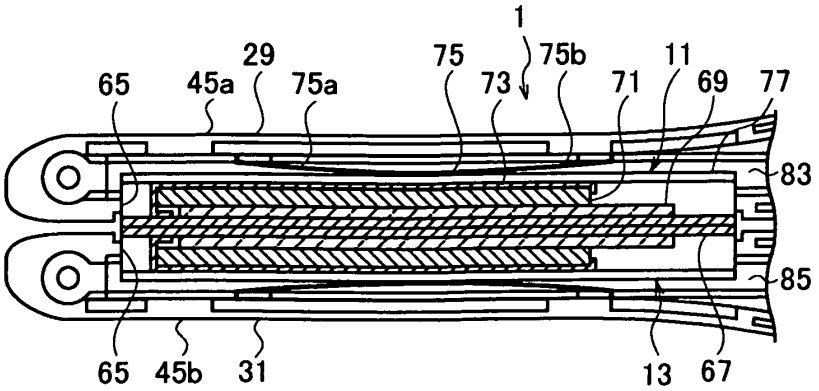
[Fig. 5]



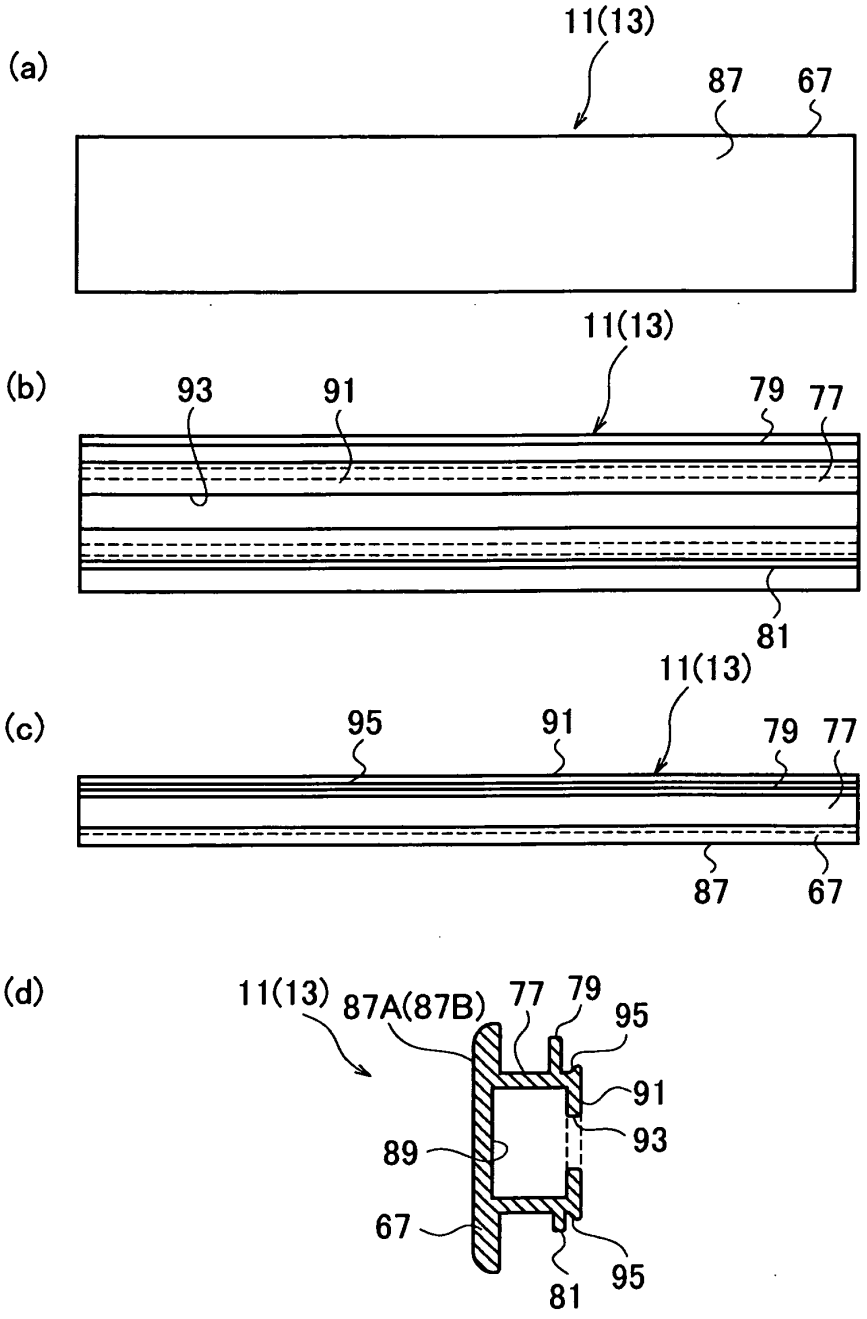
[Fig. 6]



[Fig. 7]



[Fig. 8]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(b)
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89
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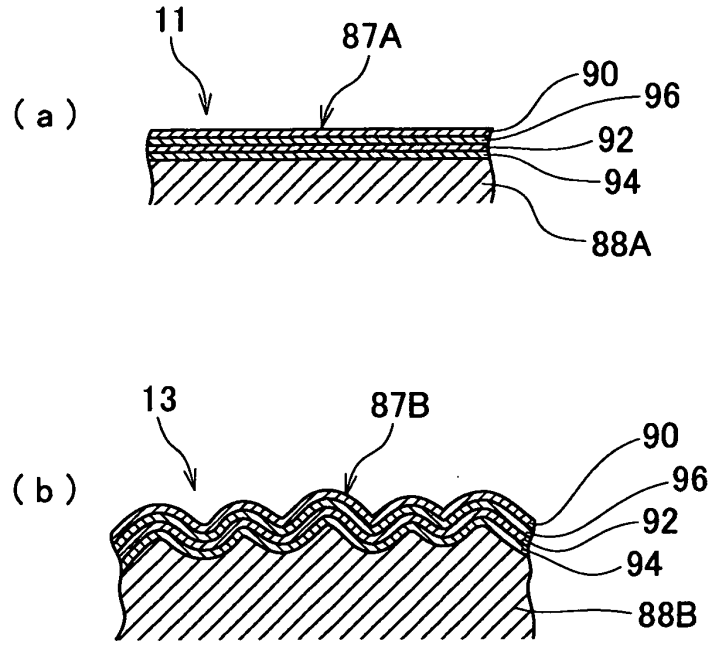
95
81

[Fig. 9]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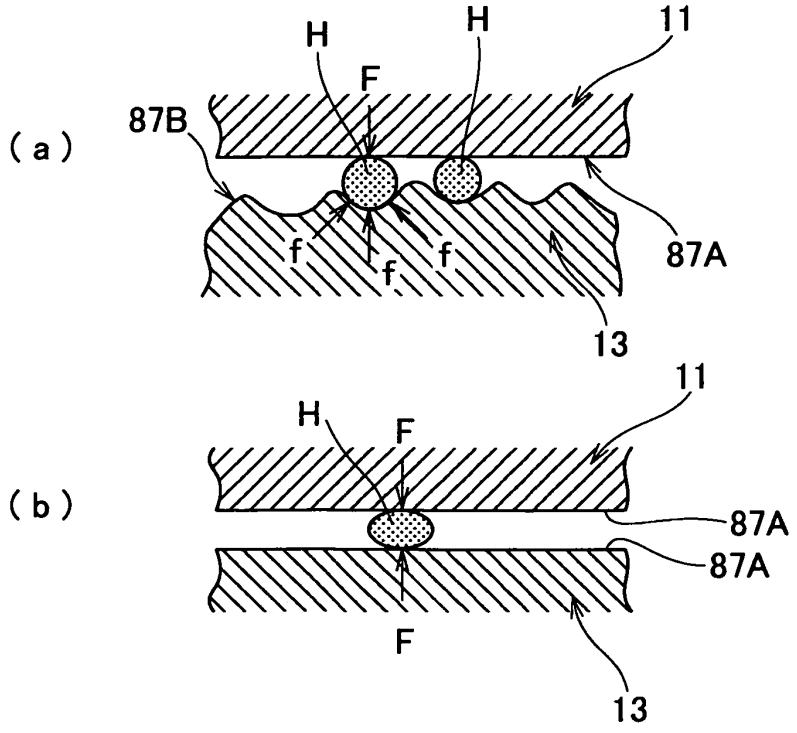
88B

[Fig. 10]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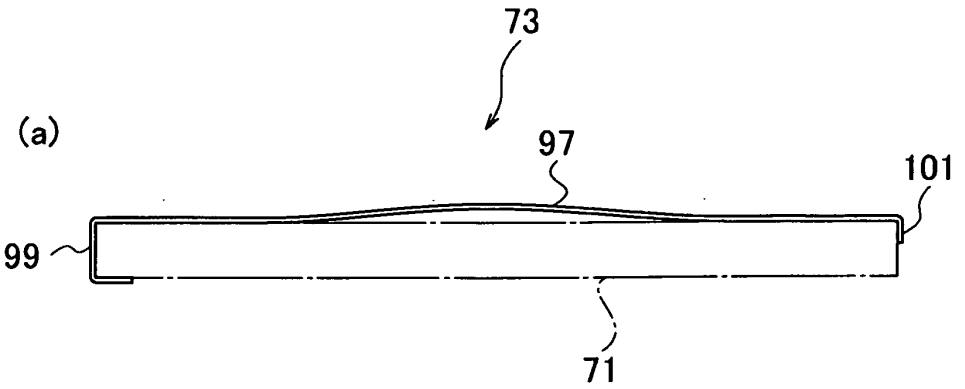
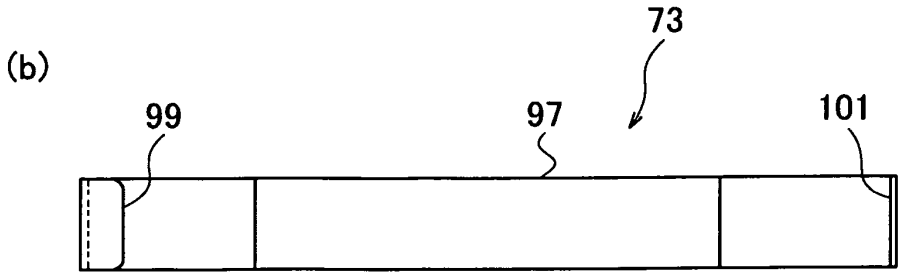
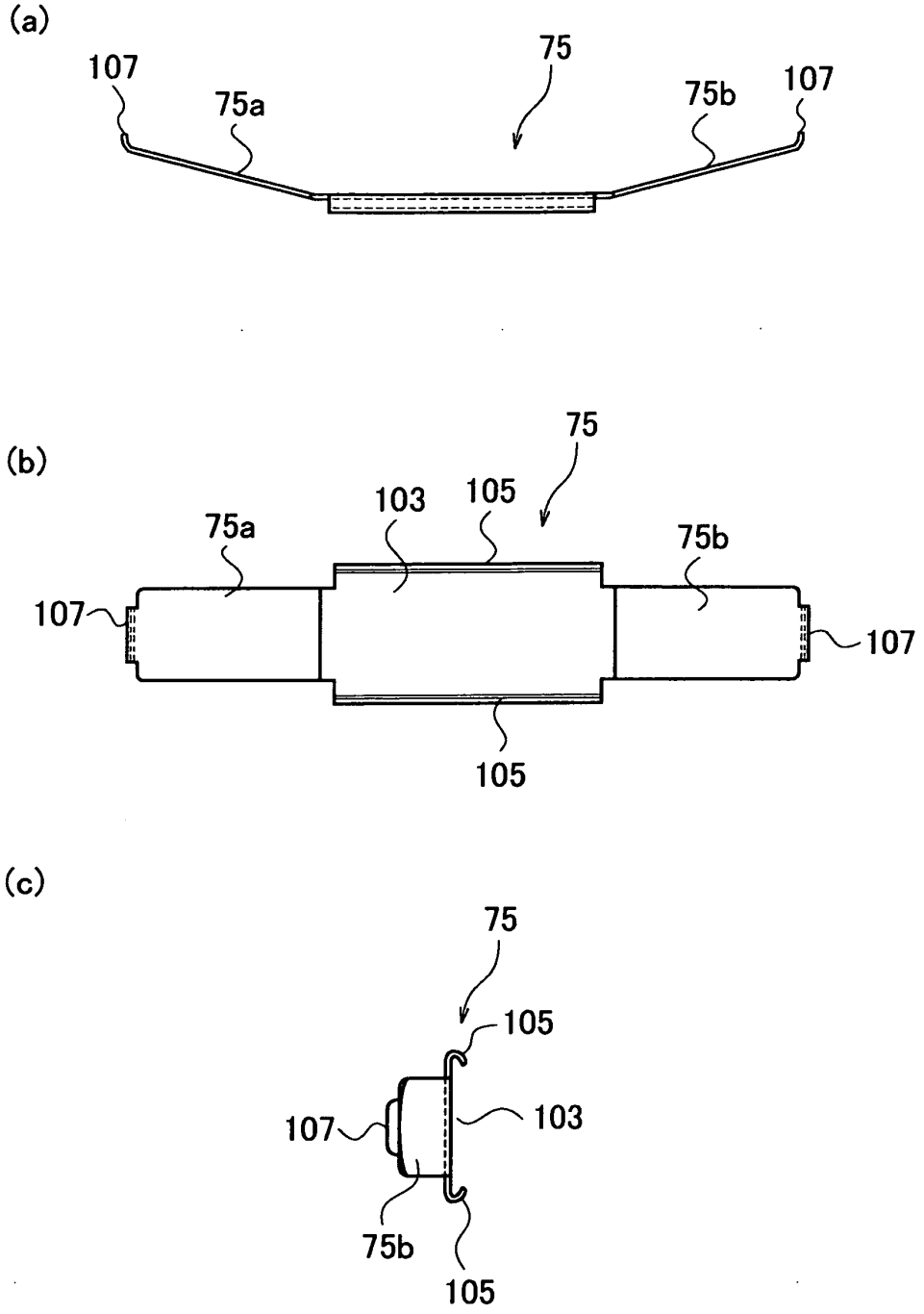
F
13

[Fig. 11]





[Fig. 12]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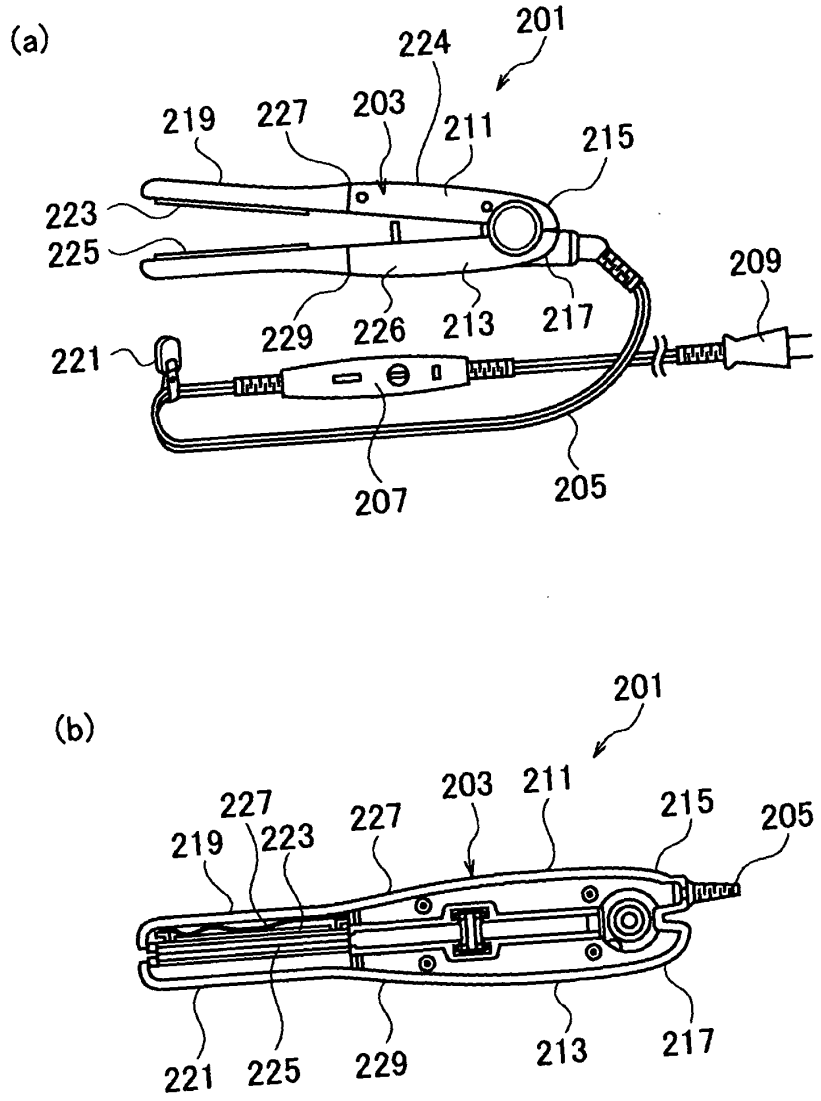
[Fig. 13]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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2007/070272

A. CLASSIFICATION OF SUBJECT MATTER
A45D1/04(2006.01)i

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)
A45D1/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2007
Kokai Jitsuyo Shinan Koho 1971-2007 Toroku Jitsuyo Shinan Koho 1994-2007

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.
Y	JP 2003-250628 A (Takashi MUKAI), 09 September, 2003 (09.09.03), Par. Nos. [0014] to [0053]; Figs. 1 to 11 (Family: none)	1-3,6-10
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 96212/1988(Laid-open No. 18301/1990) (Toyo Denki Kogyo Kabushiki Kaisha), 07 February, 1990 (07.02.90), Page 3, line 6 to page 4, line 6; Fig. 4 (Family: none)	1-3,6-10

☒ Further documents are listed in the continuation of Box C. ☐ 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
31 October, 2007 (31.10.07)	13 November, 2007 (13.11.07)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2007/070272

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 63-59908 A (Matsushita Electric Industrial Co., Ltd.), 15 March, 1988 (15.03.88), Page 2, upper right column, line 3 to page 3, upper right column, line 18; Fig. 1 (Family: none)	3

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Patent documents cited in the description

- JP 2001137038 A **[0008]**