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• **KOBAYASHI, Masahiro**
Tsubame-shi
Niigata 959-0292 (JP)
• **YOSHIDA, Katsuhiko**
Tsubame-shi
Niigata 959-0292 (JP)

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(71) Applicant: **Twinbird Corporation**
Niigata 959-0292 (JP)

(74) Representative: **De Souza, Paula**
Cabinet Malemont
42, avenue du Président Wilson
75116 Paris (FR)

(72) Inventors:
• **SAKAI, Hiroei**
Tsubame-shi
Niigata 959-0292 (JP)

(54) **ELECTRIC BRUSH DEVICE**

(57) A brush member is caused to properly face any location of a scalp. An electric brush device (1) includes an electric-brush-device main body (2) that is a drive section, and a brush member (3) operated by the electric-brush-device main body (2). The brush member (3) includes a body plate (4) formed of a flexible material, and a plurality of protrusions (5) protrudingly formed on a surface (4S) of the body plate (4). The electric-brush-device main body (2) is provided with a frame (6) that holds the peripheral edge of the body plate (4). The frame (6) is provided so as to be capable of wobbling with respect to the electric-brush-device main body (2) through the support means (7). Accordingly, even if the brush member (3) abuts a scalp (S) in a state not properly facing the scalp, the brush member (3) wobbles with respect to the electric-brush-device main body (2) depending on the abutting state of the protrusions (5), so that the brush member (3) is automatically caused to properly face the scalp (S).

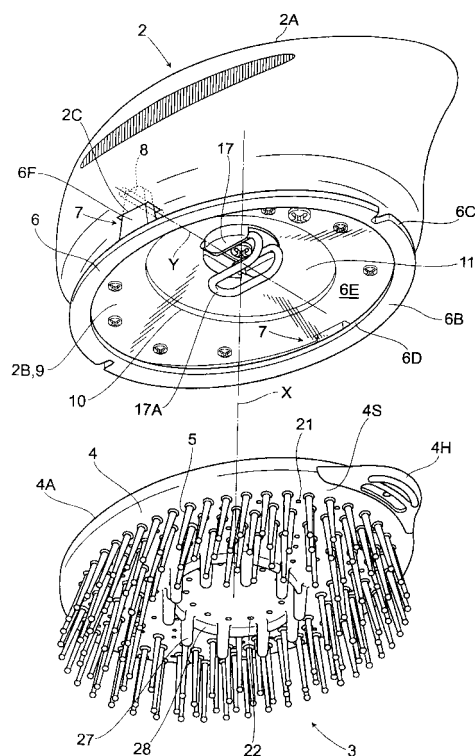


FIG.3

Description

Technical Field

[0001] The present invention relates to an electric brush device, and more particularly, to an electric brush device which can be used for washing, massaging, etc., of a scalp.

Background Art

[0002] Conventionally, a massaging device is known, which is also an electric brush device of this type including a drive section and a treating section (corresponding to the brush member of the present invention) operated by the drive section. The drive section is provided with a frame that holds the peripheral edge of the body plate of the treating section in a freely detachable manner with the positional relationship of the treating section relative to the drive section being fixed. Reciprocating drive means which is connected to the center of the body plate and which deflects the body plate in a direction orthogonal to the plane of the body plate is also provided and the treating section includes the body plate formed of a flexible material and a plurality of protrusions protrudingly provided on the body plate. According to such a massaging device, a user grabs the drive section, holds the device with the tips of the protrusions being pushed against a scalp, and the body plate of the treating section is deflected by the reciprocating drive means, so that the plurality of protrusions provided on the body plate are repeatedly laid down and risen up and thus mutually opened/closed. The scalp is massaged in a complex manner so as to be kneaded, scrubbed, and tapped by the protrusions mutually opened/closed. As shown in FIGS. 9 and 10, when a body plate 103 in a treating section 102 driven by the drive section 101 repeats deformation between a downwardly deflected curved convex state and an upwardly deflected curved concave state, plural kinds of protrusions 104, 105, 106, and 107 arranged from the center to the periphery move together with the deflection of the body plate 103, so that a scalp S is massaged by the protrusions 104, 105, 106, and 107 pushed against the scalp S as if the scalp is massaged by fingers (see, for example, Patent Literatures 1 and 2). **[0003]** Moreover, an electric brush device of this type is also known, which has an edge of the body plate freely slidable relative to the frame of the drive section (see, for example, Patent Literature 3).

Prior Art Document

Patent Literatures

[0004] Patent Literature 1: JP 2007-229159 A

Patent Literature 2: JP 2008-206902 A

Patent Literature 3: JP 2006-187544 A

Disclosure of Invention

Problem to be Solved by the Invention

- [0005]** According to the related arts, it is necessary for the user to hold the drive section 101 so that the treating section 102 properly faces the scalp S in order to push a large number of plural protrusions 104, 105, 106, and 107 uniformly against the scalp S.
- [0006]** However, a scalp is directed upwardly at the top of the head and is directed laterally at the side of the head, and in order to hold the massaging device main body so that the treating section properly faces such a scalp, it is necessary to change the direction of the treating section depending on the position on the scalp. However, since it is difficult for the treating section to properly face the scalp unless a wrist is twisted or the holding of the driving section is changed, it is difficult to face the treating section properly against a scalp without twisting the wrist of the user or without changing the manner of gripping the drive section. Moreover, since the head of a human is not in a simple shape, it is difficult for the conventional massaging device to massage or wash the surface of the head, i.e., the scalp well.
- [0007]** The problem to be solved by the present invention is to cause protrusions of a brush member to properly face a scalp at any location on a head in an electric brush device which connects the brush member to a drive device and which washes and massages the scalp as if the scalp is washed and massaged by fingers with the protrusions of the brush member being pushed against the scalp.

Means for Solving the Problem

- [0008]** In order to achieve the above object, a first aspect of the present invention provides an electric brush device that includes: a drive section; and a brush member that is operated by the drive section, in which the brush member includes: a body plate formed of a flexible material; and a plurality of protrusions protrudingly provided on a surface of the body plate, the drive section comprises a frame that holds a peripheral edge of the body plate, and the frame is movably attached to the drive section through support means.
- [0009]** A second aspect of the present invention provides the above-explained electric brush device that further includes reciprocating drive means which is connected to the body plate and which causes the body plate to deflect in a direction orthogonal to a surface of the body plate.
- [0010]** A third aspect of the present invention provides the above-explained electric brush device in which the support means is provided so that the frame is capable of wobbling with respect to the drive section.
- [0011]** A fourth aspect of the present invention provides the above-explained electric brush device in which the support means comprises a shaft and a shaft bush

joined with the shaft, and a wobbling center axis line of the shaft is orthogonal to a center axis line of the body plate.

[0012] A fifth aspect of the present invention provides the above-explained electric brush device in which the support means is provided at a pair of locations of the frame opposite to each other.

[0013] A sixth aspect of the present invention provides the above-explained electric brush device in which the frame is configured to be elastically deformable.

Effect of the Invention

[0014] According to the electric brush device of the first aspect of the present invention, depending on the abutting state of the protrusions, the frame supporting the brush member is allowed to move by the support means relative to the drive section, so that the brush member is automatically allowed to properly face a scalp.

[0015] According to the electric brush device of the second aspect of the present invention, with the protrusions of the brush member properly facing the scalp, the body plate is deflected by the reciprocating drive means in order to perform massaging.

[0016] According to the electric brush device of the third aspect of the present invention, the body plate is allowed to wobble with respect to the drive section by the support means, so that the body plate is automatically allowed to properly face the scalp.

[0017] According to the electric brush device of the fourth aspect of the present invention, the support means is configured by the shaft and the shaft bush joined with the shaft, and the wobbling center axis line of the shaft is orthogonal to the center axis line of the body plate, so that the brush member held by the frame is automatically allowed to properly face the scalp around the shaft.

[0018] According to the electric brush device of the fifth aspect of the present invention, by the support means provided at a pair of locations of the frame opposite to each other, the frame can be supported at several locations.

[0019] According to the electric brush device of the sixth aspect of the present invention, the frame is configured to be elastically deformable, so that the frame elastically deforms in accordance with the shape of the scalp, and thus the protrusions of the brush member can contact the scalp well.

Brief Description of the Drawings

[0020] FIG. 1 is a perspective view for a first embodiment of the present invention;

FIG. 2 is a whole cross-sectional view of the present invention;

FIG. 3 is a whole exploded perspective view of the present invention;

FIG. 4 is a diagram of the present invention, showing

an external shape of a frame in a natural state;

FIG. 5 is a diagram of the present invention, showing an external shape of the frame deflected;

FIG. 6 is a diagram of the frame of the present invention, showing another external shape of the frame deflected;

FIG. 7 is a cross-sectional view of a major part of the present invention;

FIG. 8 is a cross-sectional view for a second embodiment of the present invention;

FIG. 9 is a cross-sectional view around a brush member in a curved convex state according to a related art; and

FIG. 10 is a cross-sectional view around a brush member in a curved concave state according to a related art.

Best Mode for Carrying Out the Invention

[0021] Preferred embodiments of the present invention will be explained below with reference to the accompanying drawings.

First Embodiment

[0022] FIGS. 1 to 7 show a first embodiment. In the present embodiment, upward and downward directions (i.e., a vertical direction) are defined based on a posture shown in FIG. 2. Reference numeral 1 denotes an electric brush device according to the present invention. The electric brush device 1 includes an electric-brush-device main body 2 that is a drive section, and a brush member 3 that is freely detachably held at the lower side of the electric-brush-device main body 2.

[0023] The brush member 3 includes a body plate 4 and protrusions 5 formed together with the body plate 4 so as to protrude in the downward direction that is a direction orthogonal to a surface 4S of the body plate 4. The body plate 4 is formed of a flexible and elastic elastomer in an oval shape in a planar view. An edge 4A of the body plate 4 is fixed to a frame 6 that is provided at a bottom-face-2B side of the electric-brush-device main body 2. The term "fix" in this specification includes a connection allowing slight movement, and in the present embodiment, the edge 4A of the body plate 4 is engaged with the frame 6, so that the edge and the frame are freely detachably connected together around the whole circumference. Reference numeral 4H is a nipple formed together with one end of the body plate 4 in a longer diameter direction.

[0024] The frame 6 is formed of an elastically deformable synthetic resin, and is in an annular oval shape in a planar view. The frame 6 is provided slightly below the bottom face 2B of the electric-brush-device main body 2 having a clearance L therebetween. Moreover, the frame 6 is provided so as to be capable of wobbling with respect to the electric-brush-device main body 2. An inclined face 6A is formed at an upper face of the frame 6. The inclined

face 6A is formed so as to gradually become low from the inside (a center line axis X side to be discussed later) thereof to the outside in natural state. In contrast, a bottom face 6B of the frame 6 is flat in a natural state. The edge 4A of the body plate 4 of the brush member 3 folded back inwardly in a U shape or a rectangular shape having one end opened is engaged with an outer edge 6C of the frame 6. At this time, since the frame 6 is provided with the inclined face 6A, the outer edge 6C becomes thin, so that the edge 4A can be easily engaged with the outer edge 6C of the frame 6. A sheet 6E which is formed of a flexible and elastic material like an elastomer is provided so as to spread across a window opening 6D formed inwardly of the frame 6. An interconnection member 17 and a hook 17A are provided at the center of the sheet 6E. Furthermore, a pair of hanging members 6F in a shape of a support pole are symmetrically provided in a standing manner on the shorter diameter sides of the frame 6 in an annular oval shape. The hanging members 6F are formed longer than the dimension of the clearance L.

[0025] The frame 6 is supported by support means 7 so as to be capable of wobbling with respect to the electric-brush-device main body 2. The support means 7 includes a shaft 8 and shaft bushes 8A. The shaft bushes 8A are provided at a pair of recesses 2C formed in the bottom face 2B of the electric-brush-device main body 2, and the upper portions of the hanging members 6F are inserted in respective recesses 2C. The hanging member 6F is rotatably coupled to the shaft bush 8A through the shaft 8. Moreover, a rotation center axial line Y of the shaft 8 is orthogonal to the center line axis X to be discussed later.

[0026] The electric-brush-device main body 2 includes a case main body 2A having an opened bottom-face side and in a size holdable by one hand, and the bottom face 2B that blocks off the opened bottom-face side of the case main body 2A. The bottom face 2B includes a bottom plate 9 and a cover 11. The bottom plate 9 is formed in an oval shape in a planar view, has an outer periphery fixed to the bottom edge of the case main body 2A, and is formed with a circular window opening 10 passing all the way through the center of the bottom plate 9 in the vertical direction. The cover 11 that is stretchable is provided so as to cover the window opening 10. The cover 11 is a bellows film formed of a flexible material, such as a rubber, a synthetic rubber, or an elastomer, and water-tightly blocks off the window opening 10. Reciprocating drive means 12 that causes the center of the body plate 4 to reciprocate in the vertical direction is provided in the interior of the electric-brush-device main body 2. The reciprocating drive means 12 includes a motor 13 that is a drive source, a crank 15 connected to a motor shaft 13A of the motor 13 through a reduction gear mechanism 14, a yoke 16 coupled to an eccentric shaft 15A, and a rod 16A formed together with the yoke 16. As explained above, a so-called scotch-yoke mechanism is employed in the present embodiment, but a crank mechanism may

be employed. The interconnection member 17 is joined together with the cover 11 at the substantial center thereof. The interconnection member 17 holds and fixes the cover 11 between the upper face side of the interconnection member 17 and the bottom end of the rod 16A, and is provided with a hook 17A at the bottom face side of the interconnection member 17. A hook receiver 4B provided at the center of the upper face of the body plate 4 is freely detachably coupled to the hook 17A. Hence, the interconnection member 17 is reciprocated in the vertical direction as the rotational motion of the motor 13 is converted into a reciprocal motion by the crank 15 and the yoke 16. Accordingly, the position where the hook receiver 4B is provided becomes a maximum amplitude location of the body plate 4, and the amplitude thereof is twice as much as an eccentric distance F from the center axis of the crank 15 to the eccentric shaft 15A (i.e., 2F). Moreover, a virtual center axis line X passing through the hook receiver 4 and the interconnection member 17 is formed in the vertical direction. Furthermore, a battery 18 that supplies power to the motor 13 is provided in the interior of the electric-brush-device main body 2, and a switch 19 for operating the motor 13 is provided at the upper face of the electric-brush-device main body 2.

[0027] The body plate 4 is further provided with first communicating portions 21 and second communicating portions 22 which are small through-holes that cause the interior of a region surrounded by the frame 6, the sheet 6E and the brush member 3 to be communicated with the exterior thereof. A shampoo reservoir 26 which is communicated with the communicating portions 21 and 22 and which is actuated together with the deflection of the body plate 4 is provided in that region. A plurality of tiny protrusions 27 are arranged annularly around the center axis line X, and an annular wall 28 is provided so as to connect adjoining tiny protrusions 27. The protrusive dimension of the annular wall 28 from the surface 4S of the body plate 4 is smaller than the protrusive dimension of the tiny protrusions 27. The tiny protrusions 27 and the annular wall 28 partition the internal side of the body plate 4 and the external side thereof. The second communicating portions 22 are formed in a region surrounded by the tiny protrusions 27 and the annular wall 28. Conversely, the first communicating portions 21 are formed in a region outside the tiny protrusions 27 and the annular wall 28.

[0028] The reservoir 26 repeats compression and restoration together with the deflection of the body plate 4, thereby suctioning or discharging the shampoo from respective communicating portions 21 and 22. The reservoir 26 is formed of an elastic body, such as a synthetic sponge like successive-bubble-type foamed polyurethane or foamed rubber or a marine sponge (i.e., a natural sponge) in the present embodiment, and as shown in FIG. 2, when the body plate 4 is in a downwardly deflected curved convex state, the reservoir 26 becomes substantially non-compressed state or slightly compressed state, and is present between the frame 6, the

sheet 6E and top face of the body plate 4. That is, when the body plate 4 is in a downwardly deflected curved convex state, a top face 26A of the reservoir 26 contacts or is located near the bottom face 6B of the frame 6 and the sheet 6E, a bottom face 26B of the reservoir 26 contacts or is located near the top face of the body plate 4, and an outer periphery 26C of the reservoir 26 contacts or is located near the edge 4A of the body plate 4. Conversely, a through hole 26D is formed in the center of the reservoir 26 along the center axis line X. The hook receiver 4B and the hook 17A can be joined together through the through hole 26D.

[0029] Next, the effect of the above-explained configuration will be explained. When attempting to wash or massage a scalp S, a user first puts an appropriate amount of water in the reservoir 26 beforehand. The water can be adsorbed in the reservoir 26 through respective communicating portions 21 and 22 by dipping the electric brush device 1 to water. Next, with the surface 4S of the body plate 4 facing up, an appropriate amount of shampoo is put on the region surrounded by the tiny protrusions 27 and the annular wall 28. At this time, no shampoo put on the region surrounded by the tiny protrusions 27 and the annular wall 28 flows out to the exterior region of the tiny protrusions 27 and the annular wall 28 as long as it is not excessive. The reservoir 26 is soaked with a tiny amount of shampoo through the second communicating portions 22.

[0030] Next, upon operating the switch 19, power is supplied from the battery 18, so that the motor 13 is actuated and the motor shaft 13A rotates. Together with this rotation, the crank 15 connected to the motor shaft 13A through the reduction gear mechanism 14 also rotates, and the rotational motion of the motor shaft 13A is converted into a reciprocal motion by the crank 15 and the yoke 16 joined with the eccentric shaft 15A of the crank 15, thereby reciprocating, in the vertical direction, the interconnection member 17 attached to the bottom end of the rod 16A formed together with the yoke 16. Next, the body plate 4 repeats deformation between a downwardly deflected curved convex state and an upwardly deflected curved concave state like the related art so that the hook receiver 4B connected to the hook 17A provided at the interconnection member 17, i.e., the center of the body plate 4 becomes a maximum amplitude location. The amplitude of the maximum amplitude location is twice as much as the eccentric distance F from the center axis of the crank 15 to the eccentric shaft 15A (i.e., 2F).

[0031] By the body plate 4 that repeats deformation between a downwardly deflected curved convex state and an upwardly deflected curved concave state, a space between the body plate 4 and the bottom face 6B of the frame 6 and the sheet 6E repeats compression and restoration, and as a result, the reservoir 26 repeats compression and restoration together with the deflection of the body plate 4. When the reservoir 26 returns from the compressed state, the space between the body plate 4

and the bottom face 6B of the frame 6 and the sheet 6E becomes a pressure-reduction state, so that the shampoo put on the region inwardly of the annular tiny protrusions 27 and the annular wall 28 is suctioned through the second communicating portions 22, is caused to flow into the space, and is retained in the reservoir 26. On the other hand, when the reservoir 26 is compressed, the shampoo retained in the reservoir 26 is discharged through the second communicating portions 22. The shampoo is mixed with air when pushed out through the second communicating portions 22 and is foamed. By the reservoir 26 that repeats deformation in this fashion, the shampoo gradually spreads from the center of the reservoir 26 to the outer periphery, and thus the foamed shampoo is also pushed out through the first communicating portions 21. By the reservoir 26 that repeats compression and restoration together with the deformation of the body plate 4 which is repeated between a curved convex state and a curved concave state, the shampoo put on the region inwardly of the tiny protrusions 27 and the annular wall 18 is foamed and is supplied to the exterior throughout the whole brush member 3. The shampoo is finely foamed when passing through the communicating portions 21 and 22. The smaller the diameter of the opening of the communicating portion 21 or 22 is, the finer the shampoo is foamed.

[0032] With the shampoo being foamed as explained above, the user holds the electric-brush-device main body 2, pushes the tips of the protrusions 5 against the scalp S and holds it by a hand. Accordingly, mainly the protrusions 5 repeat inclination in the inward direction relative to the center axis line X and rising thereafter, so that the scalp S is scrubbed and washed or massaged with stimulations.

[0033] At this time, it is necessary to allow the plurality of protrusions 5 to uniformly abut the scalp S by causing the brush member 3 to properly face the scalp S, but it is difficult for the user to visually recognize this state precisely, so that the brush member 3 roughly faces the scalp S with the electric-brush-device main body 2 being held. However, when the brush member 3 does not properly face the scalp S (namely, the center axis line X is inclined relative to the scalp S), as is indicated by an arrow Z in FIG. 2, by the brush member 3 that wobbles around the wobbling center axis line Y with respect to the electric-brush-device main body 2, the brush member 3 can abut the scalp S while properly facing the scalp automatically, so that the plurality of protrusions 5 can uniformly wash and massage the scalp S.

[0034] The head of a human is not in a simple shape in reality, so that even if the brush member 3 properly faces the head surface, i.e., the scalp S, it is not always true that the scalp S is washed and massaged well by the protrusions 5. However, as explained above, since the frame 6 is configured to be elastically deformable, when the brush member 3 is pushed against the scalp S, the body plate 4 of the brush member 3 deflects in accordance with the shape of the scalp S, and the frame

6 that is fixing the brush member 3 also deflects together with the deflection of the body plate 4. The frame 6 has both ends deformable in a curved manner (see FIG. 5) and deformable in a twisted manner (see FIG. 6). Since the body plate 4 of the brush member 3 is deformed in accordance with the shape of the scalp S as explained above, the protrusions 5 can wash and massage the scalp S well.

[0035] As explained above, according to the present embodiment, the electric brush device 1 includes the electric-brush-device main body 2 and the brush member 3 that is operated by the electric-brush-device main body 2. The brush member 3 includes the body plate 4 formed of a flexible material and the plurality of protrusions 5 protrudingly provided on the surface 4S of the body plate 4. The electric-brush-device main body 2 is provided with the frame 6 that freely detachably holds the peripheral edge of the body plate 4, and the frame 6 is provided to the electric-brush-device main body 2 through the support means 7 in a manner capable of wobbling. Hence, even if the protrusions 5 abut the scalp S with the brush member 3 not properly facing the scalp, the brush member 3 wobbles against the electric-brush-device main body 2 depending on the abutting state of the protrusions 5. Accordingly, the brush member 3 is automatically corrected so as to properly face the scalp S, and the scalp S can be washed or massaged with the plurality of protrusions 5 of the brush member 3 uniformly abutting the scalp S.

[0036] Moreover, since the frame 6 is joined by the support means 7 including the shaft 8 and the shaft bushes 8A, and the wobbling center axis line Y of the shaft 8 is orthogonal to the center axis line X of the body plate 4, the brush member 3 held by the frame 6 can be automatically caused to properly face the scalp S with the shaft 8 being as the wobbling center axis line Y

[0037] Furthermore, since the frame 6 is configured to be elastically deformable, the frame 6 and thus the brush member 3 attached to the frame 6 can elastically deform depending on the shape of the scalp S, so that the protrusions 5 of the brush member 3 can contact the scalp S well.

[0038] Other embodiments will be explained below. The same structural element as that of the first embodiment will be denoted by the same reference numeral throughout the other embodiments, and the detail explanation thereof will be omitted.

Second Embodiment

[0039] FIG. 8 shows a second embodiment, and the same structural element as that of the first embodiment will be denoted by the same reference numeral and the detailed explanation thereof will be omitted. Support means 7' of the second embodiment has a pair of hanging members 7'A each in a shape like a support pole and provided downwardly from the bottom face 2B of the electric-brush-device main body 2. A shaft bush 6'F formed

on the top face of the frame 6 is rotatably joined with the bottom portion of the hanging member 7'A through a shaft 8'. The wobbling center axis (unillustrated) of the shaft 8' is orthogonal to the center axis line (unillustrated).

[0040] Hence, the brush member 3 can wobble with respect to the electric-brush-device main body 2 around the shaft 8' as a wobbling center depending on the abutting state of the protrusions 5, and the brush member 3 is automatically caused to properly face the scalp S.

[0041] The electric brush device of the present invention is not limited to the above-explained embodiments, and can be changed and modified in various forms within the scope and spirit of the present invention. For example, the explanation was given of the electric brush device that can be used for washing and massaging a scalp, etc., in the above-explained embodiments, but the present invention can be applied to a massaging device that can be used for any location of a human body.

Claims

1. An electric brush device comprising:

a drive section;
a brush member that is operated by the drive section, said brush member being composed of a body plate formed of a flexible material and a plurality of protrusions protrudingly provided on a surface of the body plate; and
a frame provided on the drive section to hold a peripheral edge of the body plate,
characterized in that
the frame is movably attached to the drive section through support means.

2. The electric brush device according to claim 1, **characterized in** further comprising reciprocating drive means which is connected to the body plate and which causes the body plate to deflect in a direction orthogonal to a surface of the body plate.

3. The electric brush device according to claim 1 or 2, **characterized in that** the support means is provided so that the frame is capable of wobbling with respect to the drive section.

4. The electric brush device according to claim 3, **characterized in that** the support means comprises a shaft and a shaft bush joined with the shaft, and a wobbling center axis line of the shaft is orthogonal to a center axis line of the body plate.

5. The electric brush device according to claim 4, **characterized in that** the support means is provided at a pair of locations of the frame opposite to each other.

6. The electric brush device according to any one of

claims 1 to 5, **characterized in that** the frame is configured to be elastically deformable.

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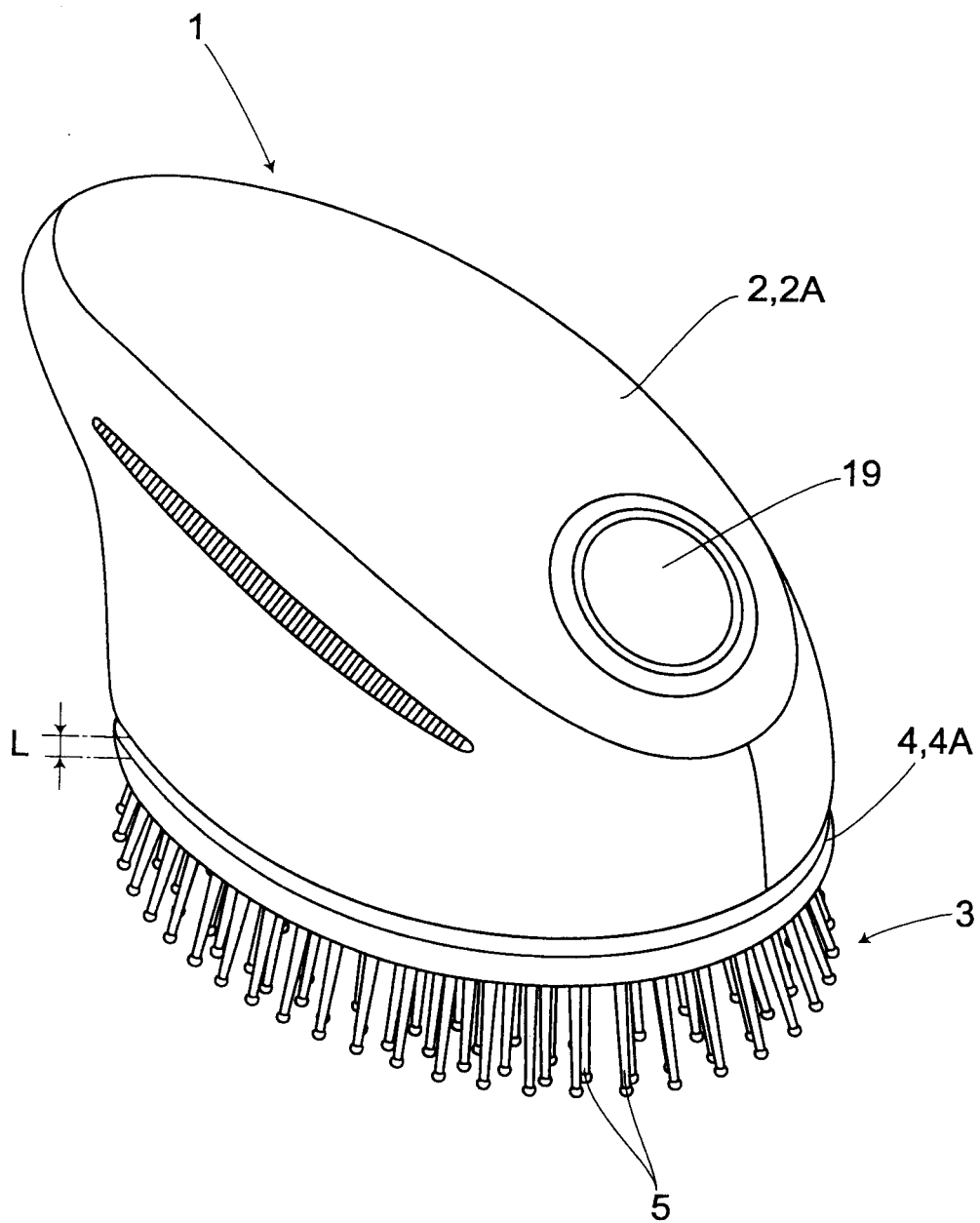


FIG.1

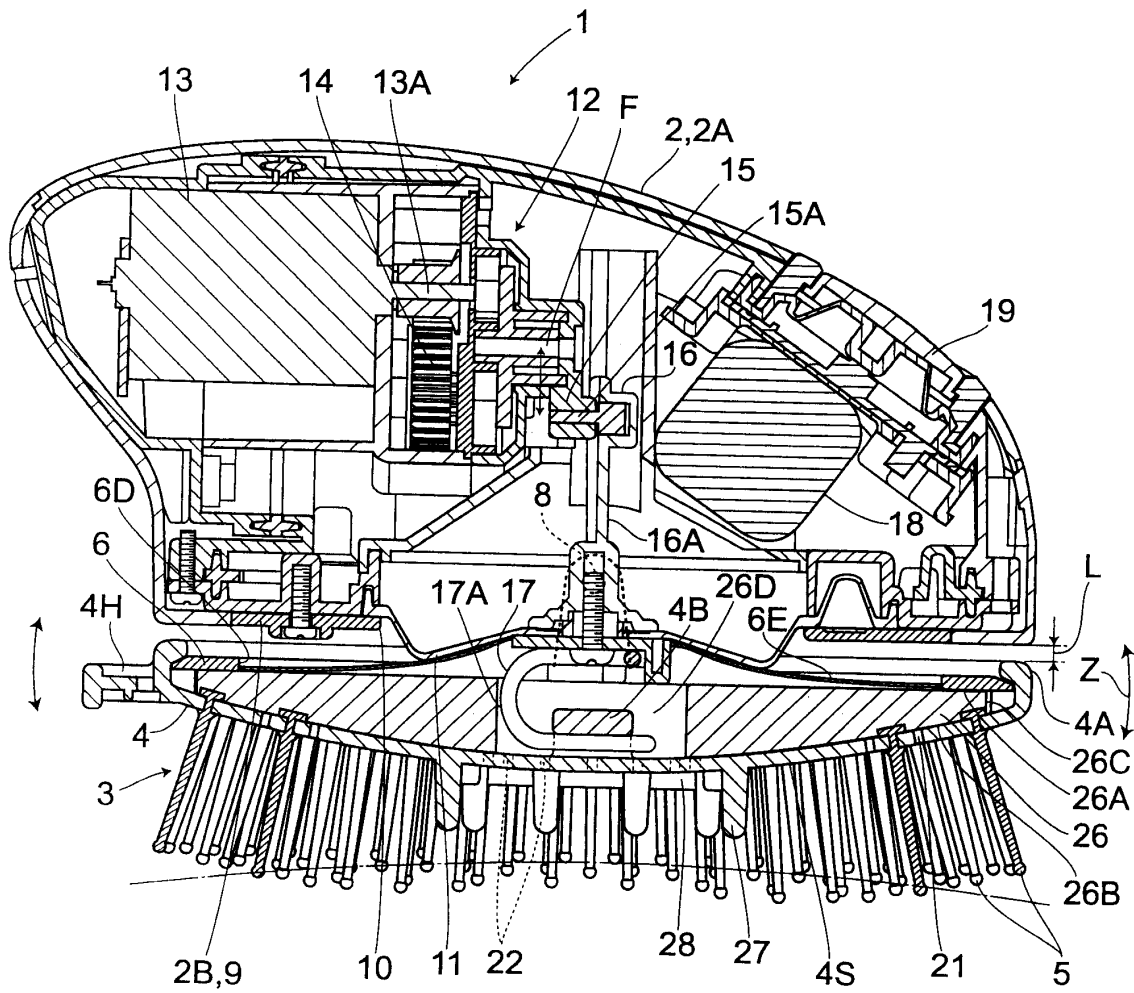


FIG.2

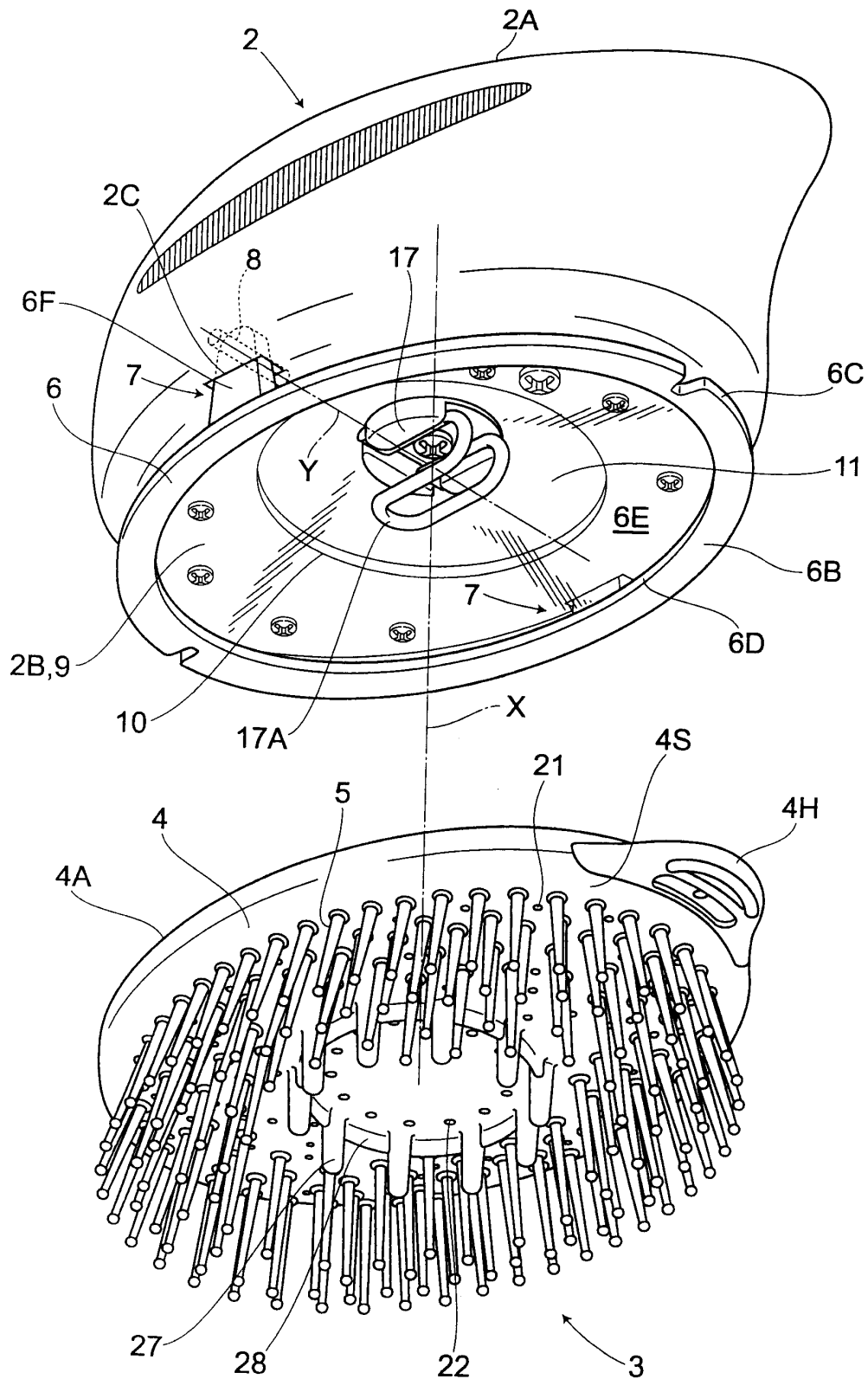


FIG.3

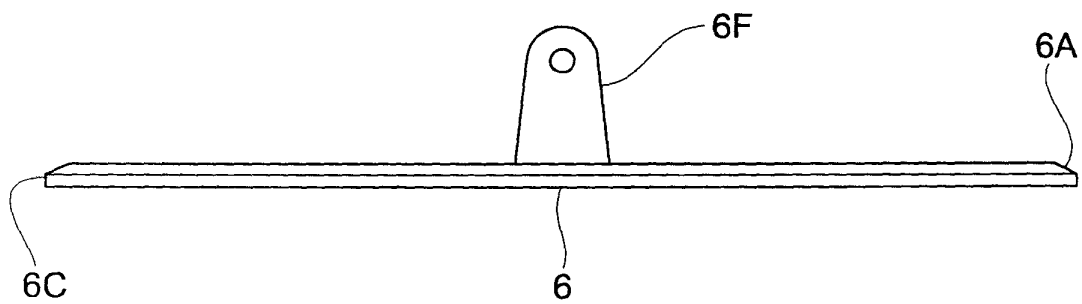


FIG. 4

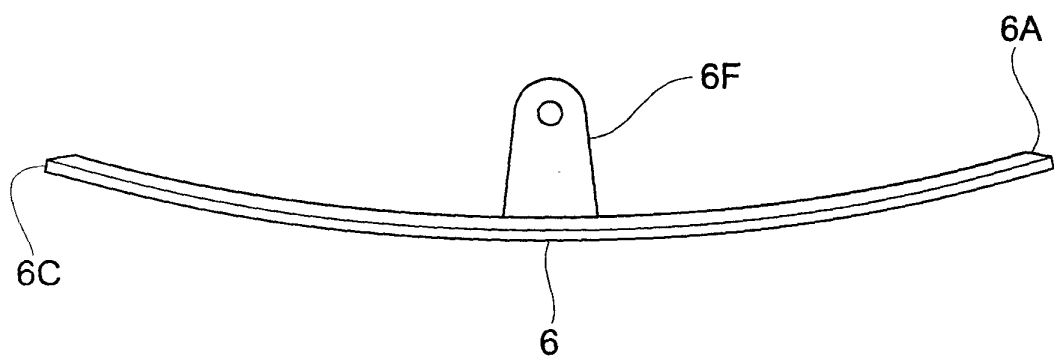


FIG. 5

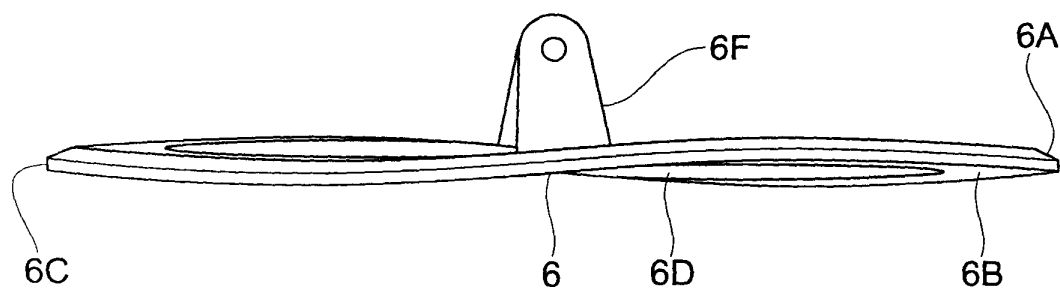
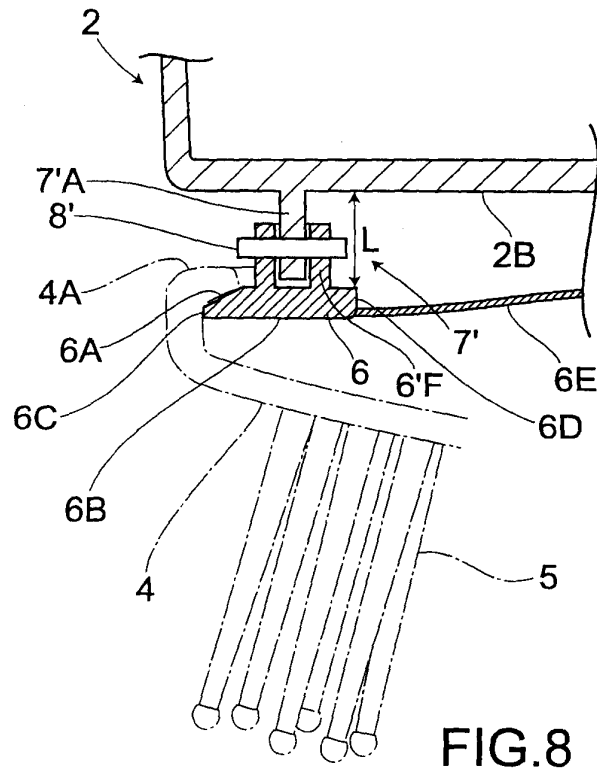
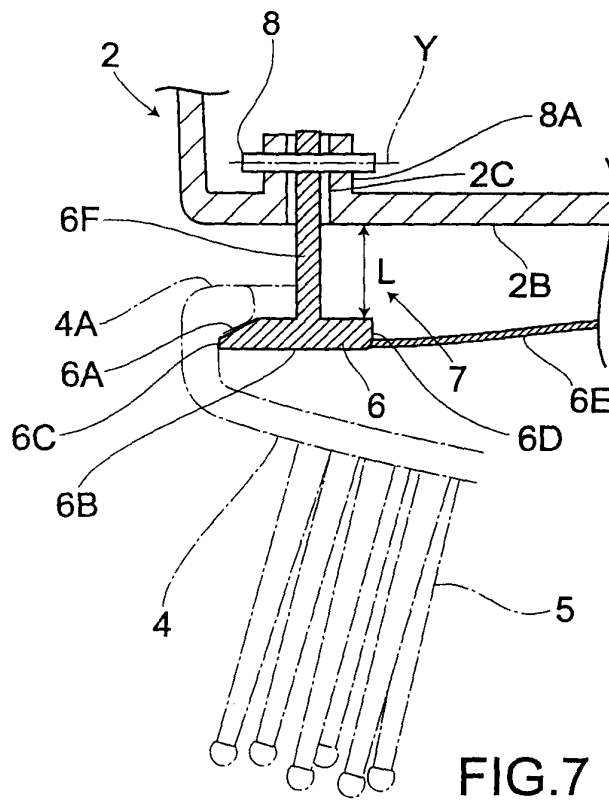
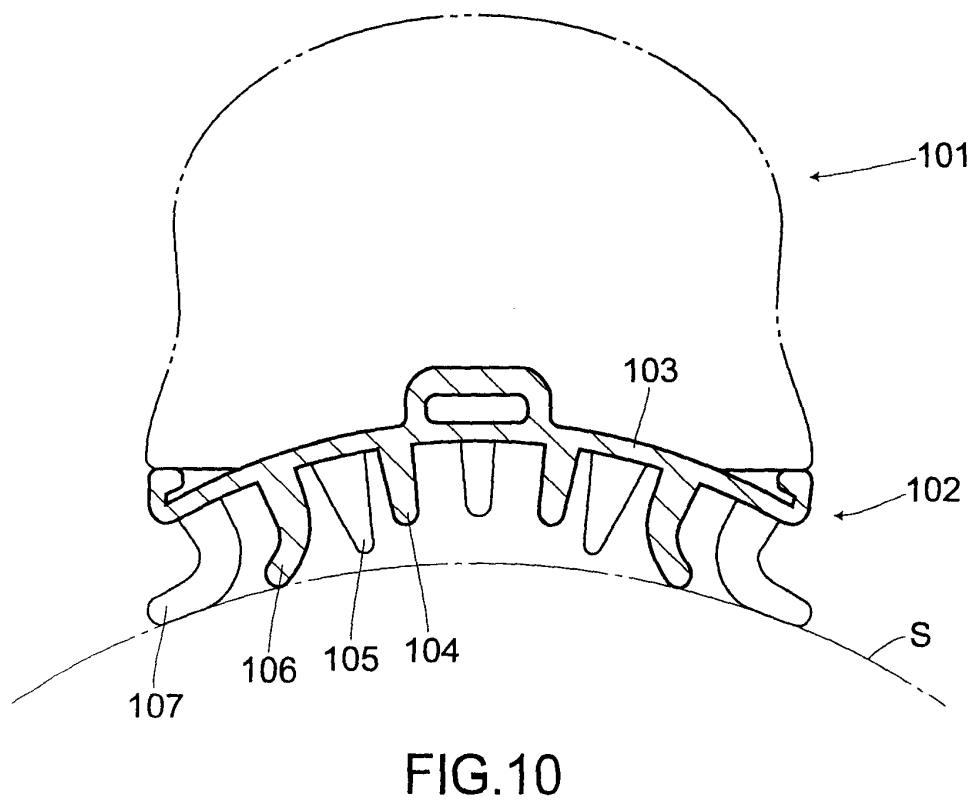
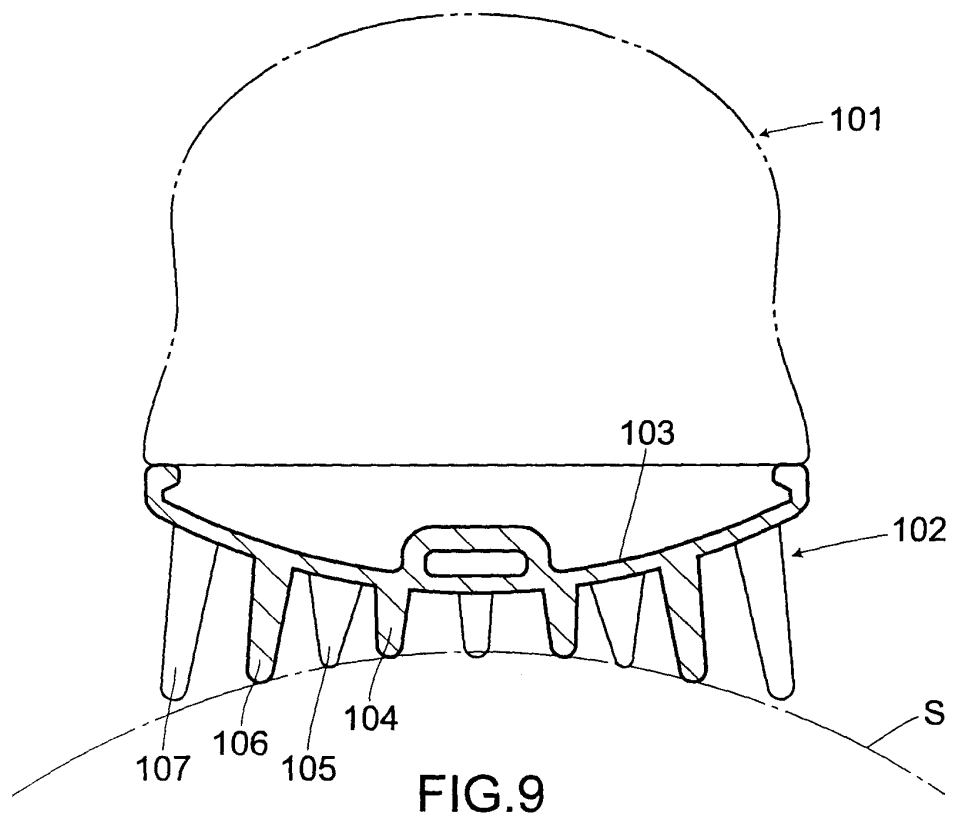


FIG. 6





INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/050603

A. CLASSIFICATION OF SUBJECT MATTER

A61H7/00(2006.01) i, A45D19/02(2006.01) i, A46B13/02(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)

A61H7/00, A45D19/02, A46B13/02

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	1996-2010
Kokai Jitsuyo Shinan Koho	1971-2010	Toroku Jitsuyo Shinan Koho	1994-2010

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 2007-229159 A (Twinbird Corp.), 13 September 2007 (13.09.2007), paragraph [0031]; fig. 1 to 5 & US 2007/0203436 A1 & EP 1825842 A1 & DE 602007002508 D & KR 10-2007-0089589 A & CN 101028224 A & AT 443505 T	1-6
Y	JP 9-299423 A (Sanyo Electric Co., Ltd.), 25 November 1997 (25.11.1997), paragraphs [0004] to [0008]; fig. 8 (Family: none)	1-6
A	JP 2006-187544 A (Twinbird Corp.), 20 July 2006 (20.07.2006), entire text; all drawings (Family: none)	1-6

☒ 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
05 February, 2010 (05.02.10)Date of mailing of the international search report
16 February, 2010 (16.02.10)Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/050603

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 3-133455 A (Kabushiki Kaisha Teranishi Denki Seisakusho), 06 June 1991 (06.06.1991), entire text; all drawings (Family: none)	1-6
A	JP 2008-126059 A (Jung Ki Sung), 05 June 2008 (05.06.2008), entire text; all drawings & US 2008/0119764 A1 & KR 10-0772033 B1 & CN 101181179 A	1-6
A	US 4485807 A (Jean-Louis H.Gueret), 04 December 1984 (04.12.1984), entire text; all drawings & DE 3219835 A & DE 82015358 U & FR 2506579 A & CA 1193164 A	1-6

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2007229159 A [0004]
- JP 2008206902 A [0004]
- JP 2006187544 A [0004]