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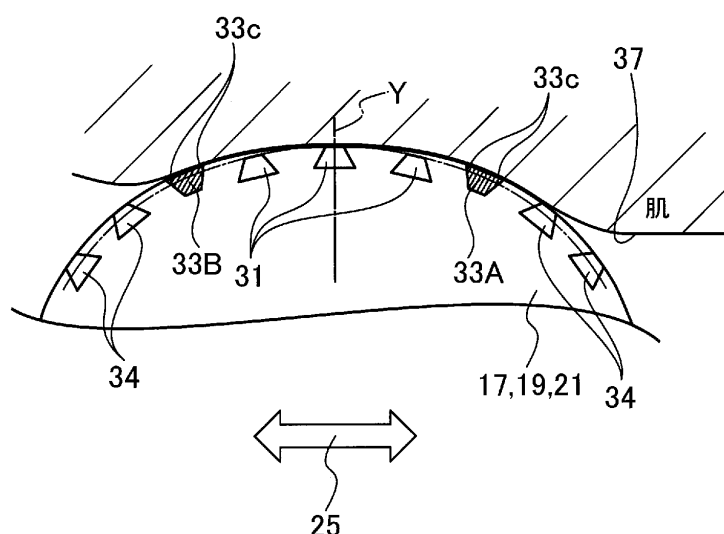
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(54) **ELECTRIC SHAVER**

(57) Second hair lifting frames 33c provided on the rear side in the traveling direction have a hair lifting ability higher than first hair lifting frames 33c provided on the

front side in the traveling direction. Accordingly, the differences in hair lifting ability between the first hair lifting frames 33c and the second hair lifting frames 33c can be reduced, so as to lift body hair up more efficiently.

FIG.11



Description

TECHNICAL FIELD

[0001] The present invention relates to an electric shaver.

BACKGROUND ART

[0002] Various types of electric shavers to shave body hair have been developed. Herein, an angle formed by the extending direction of body hair and a skin surface is called a hair rising angle. Although body hair at a large hair rising angle (for example, 45° to 60°) is easy to shave, it is difficult to shave body hair at a small hair rising angle (for example, 30° or less), that is, lying body hair. Thus, electric shavers provided with hair lifting portions in frames of outer blades having a hair lifting ability higher than conventional hair lifting portions have been developed (for example, refer to Patent Document 1).

CITATION LIST

PATENT LITERATURE

[0003] Patent Document 1: Japanese Patent No. 3083548

SUMMARY OF THE INVENTION

[0004] In the conventional electric shavers, the hair lifting frames provided with the hair lifting portions are uniformly arranged in the outer blades. Generally, outer blades are formed into an arc-like shape projecting toward the skin surface.

[0005] Therefore, during the use of such electric shavers, the skin contact surface located on the front side of the outer blade in the traveling direction on the basis of the top portion of the outer blade comes into contact with the skin in a different manner from the skin contact surface located on the rear side in the traveling direction, in which a hair lifting ability of second hair lifting frames provided on the skin contact surface on the rear side tends to be lower than that of first hair lifting frames provided on the skin contact surface on the front side.

[0006] Thus, it is an object of the present invention to provide an electric shaver capable of lifting body hair up more efficiently by reducing the differences in hair lifting ability between first hair lifting frames provided on the front side and second hair lifting frames provided on the rear side in the traveling direction on the basis of a top portion of an outer blade.

[0007] In order to solve the above-described problem, an electric shaver according to the present invention includes: a shaver main body; an outer blade having blade holes defined by frames; an inner blade provided inside the outer blade to move relative to the outer blade and cut body hair inserted into the blade holes, and hair lifting

portions provided on the frames of the outer blade to come into contact with the body hair and lift the body hair from the skin surface when moving on a skin surface, wherein the outer blade is formed into an arc-like shape projecting toward the skin surface and exposed on a top end surface of the shaver main body, the hair lifting portions include first hair lifting portions provided on a front side in a traveling direction of the shaver main body and second hair lifting portions provided on a rear side in the traveling direction based on a top portion of the outer blade, and the second hair lifting portions have a hair lifting ability higher than the first hair lifting portions.

[0008] According to the present invention, the second hair lifting portions have the hair lifting ability higher than the first hair lifting portions. Therefore, during the use of the electric shaver, the second hair lifting portions, which are provided on the skin contact surface on the rear side in which a contact pressure with the skin surface is low, can come into contact with the skin surface more easily. As a result, the differences in hair lifting ability between the first hair lifting portions and the second hair lifting portions can be reduced, so as to lift the body hair up more efficiently.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009]

[FIG. 1] FIG. 1 is a front view showing an electric shaver according to an embodiment of the present invention.

[FIG. 2] FIG. 2 is a perspective view showing an inner blade of a blade unit shown in FIG. 1.

[FIG. 3] FIG. 3 is a perspective view showing a head unit of FIG. 1.

[FIG. 4] FIG. 4 is an explanatory view of an outer blade of FIG. 3.

[FIG. 5] FIG. 5 is an enlarged perspective view of a part of the outer blade of FIG. 1.

[FIG. 6] FIG. 6 is a cross-sectional view taken along the line A-A in FIG. 5.

[FIG. 7] FIG. 7 is a cross-sectional view taken along the line B-B in FIG. 5.

[FIG. 8] FIG. 8(a) is a cross-sectional view taken along the line C-C in FIG. 5, and

FIG. 8(b) is an enlarged cross-sectional view of a hair lifting portion.

[FIG. 9] FIG. 9 is an enlarged perspective view around a frame in a longitudinal direction of FIG. 8.

[FIG. 10] FIG. 10 is a cross-sectional view taken along the line D-D in FIG. 9.

[FIG. 11] FIG. 11 is an explanatory view showing a state in which the outer blade of FIG. 3 is in contact with skin.

DESCRIPTION OF THE EMBODIMENTS

[0010] Hereinafter, an embodiment according to the

present invention will be described in detail below with reference to the drawings. FIGS. 1 to 11 are views showing an electric shaver according to the embodiment of the present invention.

[0011] As shown in FIG. 1, an electric shaver 1 according to the present embodiment is mainly composed of a shaver main body 3, a blade unit 4 provided on the top of the shaver main body 3, and a driving unit (not shown in the figures.) to drive the blade unit 4.

[0012] The shaver main body 3 according to the present embodiment is divided into a grip portion 7 held by a user, and a head unit 5 connected to the upper end of the grip portion 7. The head unit 5 is provided with the blade unit 4 to remove body hair, and the grip portion 7 is provided with a push-button switch 9 to control the driving unit to operate (turn on and off) the blade unit 4.

[0013] As shown in FIGS. 2 and 3, the blade unit 4 includes outer blades 11 exposed on the top end surface of the shaver main body 3, and inner blades 13 provided inside the outer blades 11 (below the outer blades 11) and configured to reciprocate in a longitudinal direction 23.

[0014] The outer blades 11 according to the present embodiment include a first net blade 17, a second net blade 19 and a third net blade 21, which are arranged parallel to each other in a short-side direction 25 that is the traveling direction (the shaving direction) of the electric shaver 1. In particular, the first to third net blades 17, 19 and 21 extend in the longitudinal direction 23 perpendicular to the short-side direction 25. The first net blade 17 and the second net blade 19 are located on both sides (on one side and the opposite side) in the short-side direction 25, and the third net blade 21 is located between the first net blade 17 and the second net blade 19.

[0015] The first to third net blades 17, 19 and 21 composing the outer blades 11 are each formed into an arc-like shape projecting toward the skin of a user (toward the upper side in the present embodiment) as shown in FIG. 4. According to the present embodiment, the first to third net blades 17, 19 and 21 are formed into an inverted U-shape in cross-section in the short-side direction 25 each having a top portion 27 and both side surfaces 29 and 29. The inner blades 13 are formed to conform to the inner shape of the respective net blades 17, 19 and 21.

[0016] As shown in FIG. 5, the outer blades 11 are provided with a number of blade holes 36 that introduce body hair thereinto. The inner blades 13 move relative to the outer blades 11 (reciprocate in the longitudinal direction 23) so that the inner blades 13 cut the introduced body hair in cooperation with the outer blades 11.

[0017] The blade holes 36 are defined by frames 32. In other words, the frames 32 of the outer blades 11 include transverse frames 35 extending in an inverted U-shaped manner in the short-side direction 25 and vertical frames 30 extending in the longitudinal direction 23, and the blade holes 36 are defined by the transverse frames 35 and the vertical frames 30. The blade holes 36 have

the dimension sufficient to introduce the body hair thereinto. Note that, in the figure, a dashed-dotted line Y is a center line (the top) passing through the middle of the top portion 27 in the short-side direction 25.

[0018] The vertical frames 30 according to the present embodiment include first frames 31 having the cross-sectional shape shown in FIG. 6, second frames 34 having the cross-sectional shape shown in FIG. 7, and hair lifting frames 33 having the cross-sectional shape shown in FIG. 8(a).

[0019] As shown in FIG. 6, each first frame 31 includes a surface (a skin contact surface) 31a formed into an approximately flat shape located on the skin side (on the upper side in the figure) to come into contact with the skin, a bottom surface 31b formed into a flat shape located on the inner blade 31 side (on the lower side in the figure), and side surfaces 31c and 31c smoothly connecting the surface (the skin contact surface) 31a and the bottom surface 31b in the short-side direction. The first frame 31 is thus formed into a barrel-vaulted shape. In addition, sliding contact portions 31e projecting toward the inner blade 13 are formed on both sides of a bottom portion 31d in the short-side direction of the first frame 31 to cut the body hair together with the inner blade 13. According to the present embodiment, each short-side edge 31 g of an upper portion 31 f of the first frame 31 is formed into a semicircular shape in cross-section having a radius of curvature of R1. The R1 is preferably 10 μm , for example. Note that a surface 37 of the transverse frame 35 is located closer to the skin than the surface 31a of the first frame 31, and the vertical distance between the surface 31a of the first frame 31 and the surface 37 of the transverse frame 35 is set to L1.

[0020] Meanwhile, as shown in FIG. 7, each second frame 34 is formed into substantially the same outer shape as the first frame 31, and includes a surface (a skin contact surface) 34a formed into an approximately flat shape, a bottom surface 34b, and side surfaces 34c and 34c smoothly connecting the surface 34a and the bottom surface 34b in the short-side direction. The second frame 34 is thus formed into a barrel-vaulted shape. The surface 34a of the second frame 34 is located closer to the skin than the surface 31a of the first frame 31, and the vertical distance between the surface 34a of the second frame 34 and the surface 37 of the transverse frame 35 is set to L3.

[0021] As shown in FIG. 8(a), each hair lifting frame 33 is formed into an approximately V-shape in cross-section. In particular, a plate portion 33a formed into an approximately flat plate is formed in the middle portion in the short-side direction, and inclined portions 33b provided on both sides of the plate portion 33a in the short-side direction inclined upward in the short-side direction from the flat plate portion 33a. The inclined portions 33b are formed into a tapered shape tapering toward the both ends in the short-side direction from the plate portion 33a. Both short-side edges 331 of the inclined portions

33b are provided with hair lifting portions 33c to lift the body hair up. The hair lifting portions 33c have a function to efficiently lift the body hair at a small angle to the skin surface (that is, the lying body hair). Namely, according to the present embodiment, each hair lifting frame 33 is provided with one hair lifting portion 33c (on the right side in FIG. 8) to function to lift the body hair up when moving mainly in one direction of the shaving direction (from left to right in FIG. 3), and the other hair lifting portion 33c (on the left side in FIG. 8) to function to lift the body hair up when moving mainly in the opposite direction of the shaving direction (from right to left in FIG. 3).

[0022] In addition, each hair lifting frame 33 is composed of an upper flat surface 33d of the plate portion 33a, upper inclined surfaces 33e of the inclined portions 33b, a bottom surface 33f of the plate portion 33a, and lower inclined surfaces 33g of the inclined portions 33b. The vertical distance between the short-side edge 331 of each hair lifting portion 33c and the surface 37 of the transverse frame 35 is set to L2. Thus, the hair lifting frames 33 are arranged in an offset manner so as to satisfy the magnitude relation of $L2 < L3 < L1$.

[0023] Further, as shown in FIG. 8(b), the short-side edge 331 of each inclined portion 33b is formed into a semicircular shape in cross-section having a radius of curvature of R2. The magnitude relation among R1, R2 and R3 is set to be $R2 < R1 = R3$. The R2 is preferably 3 μm , for example. Here, a clearance angle α formed by the upper inclined surface 33e and a reference line 57 in the short-side direction indicated by the chain double-dotted line is set larger than the clearance angle formed by the surface 31a of the first frame 31 and the reference line 57 in the short-side direction (that is 0°) and the clearance angle formed by the surface 34a of the second frame 34 and the reference line 57 in the short-side direction (that is 0°).

[0024] As shown in FIGS. 8 and 9, each longitudinal end portion 33j of the hair lifting frame 33 extends substantially linearly in cross-section from a side wall 59 of the transverse frame 35 in the longitudinal direction. Each longitudinal end portion 33j is connected to a longitudinal center portion 33k via a gently-curved boundary 33m. A radius of curvature of the boundary 33m is preferably 10 μm , for example.

[0025] As described above, the vertical frames 30 include the hair lifting frames 33 provided with the hair lifting portions 33c having a hair lifting ability higher than the first and second frames 31 and 34, the first frames 31 provided in such a manner that the surface 31a is located closer to the inner blade 13 than the short-side edges 331 of the hair lifting portions 33c, and the second frames 34 provided in such a manner that the surface 34a is located closer to the skin than the surface 31a of the first frame 31.

[0026] According to the present embodiment, the hair lifting portions (second hair lifting portions) 33c provided on the rear side in the traveling direction on the basis of the top Y of the respective outer blades 11 have a hair

lifting ability higher than the hair lifting portions (first hair lifting portions) 33c provided on the front side.

[0027] In particular, according to the present embodiment, as shown in FIGS. 5 and 11, a pair of hair lifting frames 33A and 33B (the hair lifting frames 33 described above) having the identical shape are provided on one side (on the right side in FIG. 11) and on the other side (on the left side in FIG. 11) in the traveling direction on the basis of the top Y of the outer blade 11. The first frames 31 are provided between the pair of the hair lifting frames 33A and 33B.

[0028] Therefore, when the right side in FIG. 11 is defined as the front side in the traveling direction, for example, the first frames 31 are arranged in front of the hair lifting frame 33B having the second hair lifting portions 33c and adjacent to the hair lifting frame 33B. Note that the second frames 34 are provided on the outer sides of the pair of the hair lifting frames 33A and 33B. Thus, since the first frames 31 are provided on the front side of the hair lifting frame 33B, the space in front of the second hair lifting portion (the hair lifting portion located on the right side of the hair lifting frame 33B in FIG. 11) 33c is increased so that the skin surface 37 is more strongly pressed to the inner blade 13 side. Therefore, during the use of the electric shaver 1, the second hair lifting portions 33c can easily come into contact with the skin surface 37. As a result, the differences in hair lifting ability between the first hair lifting portions 33c and the second hair lifting portions 33c can be reduced, so as to lift the body hair up more efficiently.

[0029] In addition, according to the present embodiment, since the first frames 31 are provided between the pair of the hair lifting frames 33A and 33B, even when the shaving direction of the electric shaver 1 is reversed (that is, in the case in which the left side is defined as the front side in the traveling direction in FIG. 11), the above-described effects can also be achieved.

[0030] As described in detail above, in the electric shaver 1 according to the present embodiment, the second hair lifting portions 33c provided on the rear side in the traveling direction on the basis of the top Y of the respective outer blades 11 have the hair lifting ability higher than the first hair lifting portions 33c provided on the front side.

[0031] Therefore, during the use of the electric shaver 1, the second hair lifting portions 33c, which are provided on the skin contact surface on the rear side having a low contact pressure with the skin surface 37, can come into contact with the skin surface 37 more easily. As a result, the differences in hair lifting ability between the first hair lifting portions 33c and the second hair lifting portions 33c can be reduced, so as to lift the body hair up more efficiently. In addition, due to the increase in hair lift efficiency, it is possible to improve performance of introduction of the lying body hair into the outer blades 11, and enhance the shaving ability of the electric shaver 1.

[0032] Further, according to the present embodiment, the frames 32 of the outer blades 11 include the pair of

the hair lifting frames 33A and 33B provided with the first and second hair lifting portions 33c and 33c having the identical shape, and the first frames 31 provided in such a manner that the skin contact surface 31a that comes into contact with the skin is provided closer to the inner blade 13 than the first and second hair lifting portions 33c and 33c, in which the first frames 31 are provided between the pair of the hair lifting frames 33A and 33B and adjacent to these hair lifting frames.

[0033] Accordingly, the second hair lifting portions 33c can easily come into contact with (can be easily pressed to) the skin surface 37, and the hair lifting ability of the second hair lifting portions 33c can be increased with respect to the first hair lifting portions 33c.

[0034] Still further, according to the present embodiment, each hair lifting frame 33 is provided with one hair lifting portion 33c (on the right side in FIG. 8) to function to lift the body hair up when moving mainly in one direction of the shaving direction (from left to right in FIG. 3), and the other hair lifting portion 33c (on the left side in FIG. 8) to function to lift the body hair up when moving mainly in the opposite direction of the shaving direction (from right to left in FIG. 3). In addition, the hair lifting frames 33 are provided on one side and the other side on the basis of the top Y of the respective outer blades 11, and the first frames 31 are provided between the pair of the hair lifting frames 33A and 33B.

[0035] Therefore, regardless of whether the electric shaver 1 moves forward or backward in the shaving direction, the effect that the second hair lifting portions 33c located on the rear side in the traveling direction can have the hair lifting ability higher than the first hair lifting portions 33c located on the front side is achieved. Thus, the differences in hair lifting ability between the first hair lifting portions 33c and the second hair lifting portions 33c can be reduced so as to lift the body hair up more efficiently whichever direction the electric shaver 1 moves, forward or backward in the shaving direction. Accordingly, the effect of improving usability for a user can be achieved.

[0036] Still further, according to the present embodiment, the frames 32 include the vertical frames 30 extending in the longitudinal direction 23 of the outer blades, and the transverse frames 35 extending in the short-side direction 25, in which the hair lifting frames 33 having the hair lifting portions 33c are provided in the vertical frames 30. Thus, the body hair lifted by the hair lifting frames 33 is easily inserted into the blade holes 36 so as to shave the body hair easily.

[0037] Still further, according to the present embodiment, the hair lifting portions 33c of the hair lifting frames 33 are formed into a tapered shape inclined upward and extending toward the outer surfaces of the outer blades 11 (in the upper direction in the figure). Since the short-side edges 331 are formed into a tapered shape in cross-section, the hair lifting portions 33c having a simple configuration can be provided. In addition, the tapered shape of the hair lifting portions 33c inclined upward and extending toward the outer surfaces of the outer blades 11

(in the upper direction in the figure) can prevent the body hair at a small hair rising angle from entering the gap between the hair lifting portions 33c and the skin, and can lift the lying body hair up more reliably.

[0038] Still further, according to the present embodiment, the longitudinal end portions 33j of the hair lifting frames 33 are formed into an approximately linear shape in cross-section, the inclined portions 33b are provided in the longitudinal center portions 33k, and the longitudinal end portions 33j located on both sides are respectively connected to the longitudinal center portions 33k via the gently-curved boundaries 33m. Due to the gently-curved boundaries 33m connecting the respective longitudinal end portions 33j located on both sides and the longitudinal center portions 33k of the hair lifting frames 33, an influence (damage) on the skin surface 37 caused by the boundaries 33m can be prevented when sliding the outer blades 11 along the skin surface 37.

[0039] Although the preferred embodiment has been described above, the present invention is not limited to the foregoing embodiment, and various modifications can be made. For example, in the embodiment described above, the first frames 31 having the lower skin contact surfaces 31a are provided between the pair of the hair lifting frames 33A and 33B having the identical shape so that the second hair lifting portions 33c have the hair lifting ability higher than the first hair lifting portions 33c. Alternatively, the first hair lifting portions 33c and the second hair lifting portions 33c may have different shapes and configurations in order to increase the hair lifting ability of the second hair lifting portions.

INDUSTRIAL APPLICABILITY

[0040] According to the present invention, the differences in hair lifting ability between the first hair lifting portions provided on the front side in the traveling direction and the second hair lifting portions provided on the rear side in the traveling direction on the basis of the top of the respective outer blades can be reduced. Accordingly the electric shaver capable of lifting the body hair up more efficiently can be obtained.

Claims

1. An electric shaver, comprising:

- a shaver main body;
- an outer blade having blade holes defined by frames;
- an inner blade provided inside the outer blade to move relative to the outer blade and cut body hair inserted into the blade holes, and
- hair lifting portions provided on the frames of the outer blade to come into contact with the body hair and lift the body hair from the skin surface when moving on a skin surface,

wherein the outer blade is formed into an arc-like shape projecting toward the skin surface and exposed on a top end surface of the shaver main body,

the hair lifting portions include first hair lifting portions provided on a front side in a traveling direction of the shaver main body and second hair lifting portions provided on a rear side in the traveling direction based on a top portion of the outer blade, and
the second hair lifting portions have a hair lifting ability higher than the first hair lifting portions.

2. The electric shaver according to claim 1, wherein:

each of the frames of the outer blade includes a pair of hair lifting frames including the first and second hair lifting portions that are formed into an identical shape, and a first frame having a contact surface that comes into contact with a skin and is located closer to the inner blade than the first and second hair lifting portions; and the first frame is provided between and adjacent to the pair of the hair lifting frames.

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FIG.1

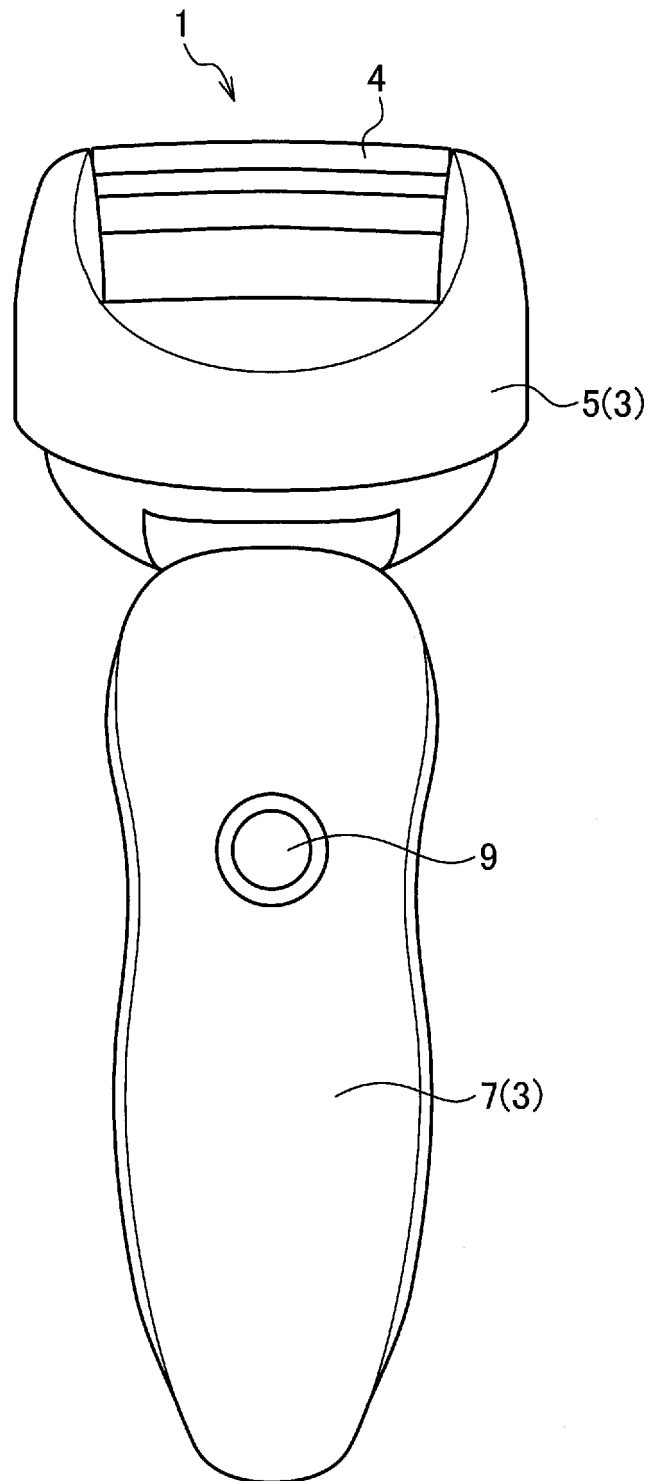


FIG.2

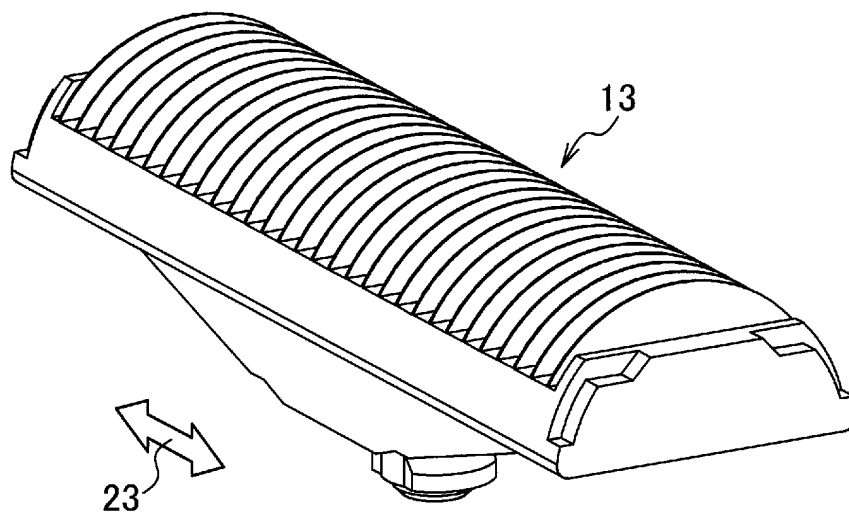


FIG.3

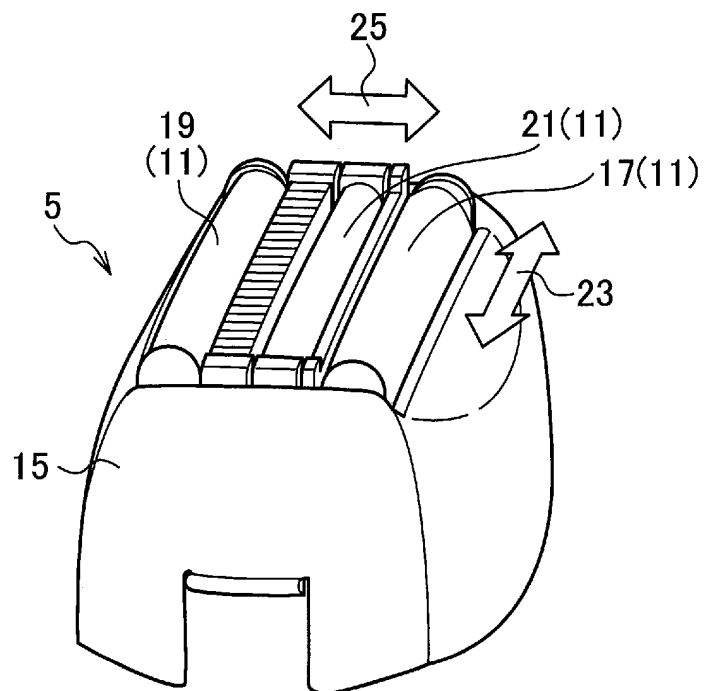


FIG.4

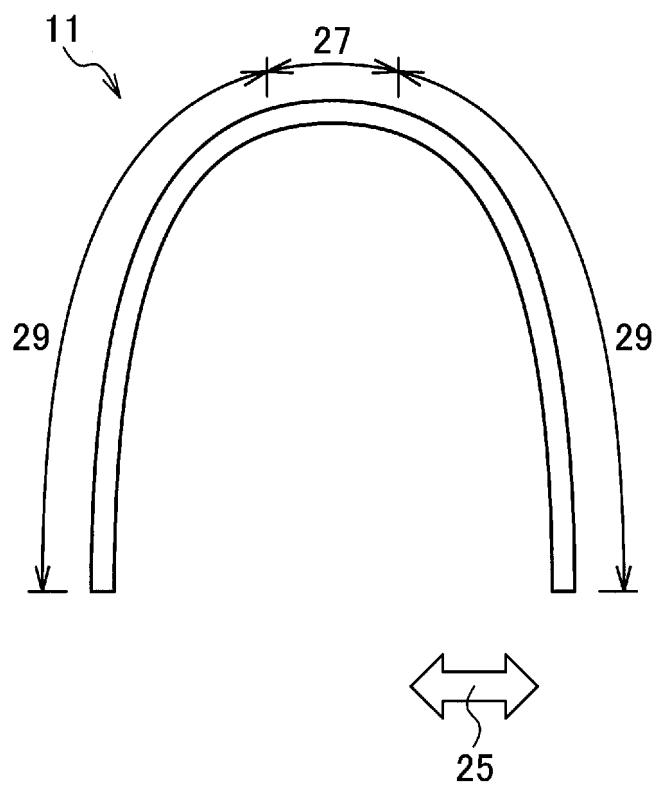


FIG.5

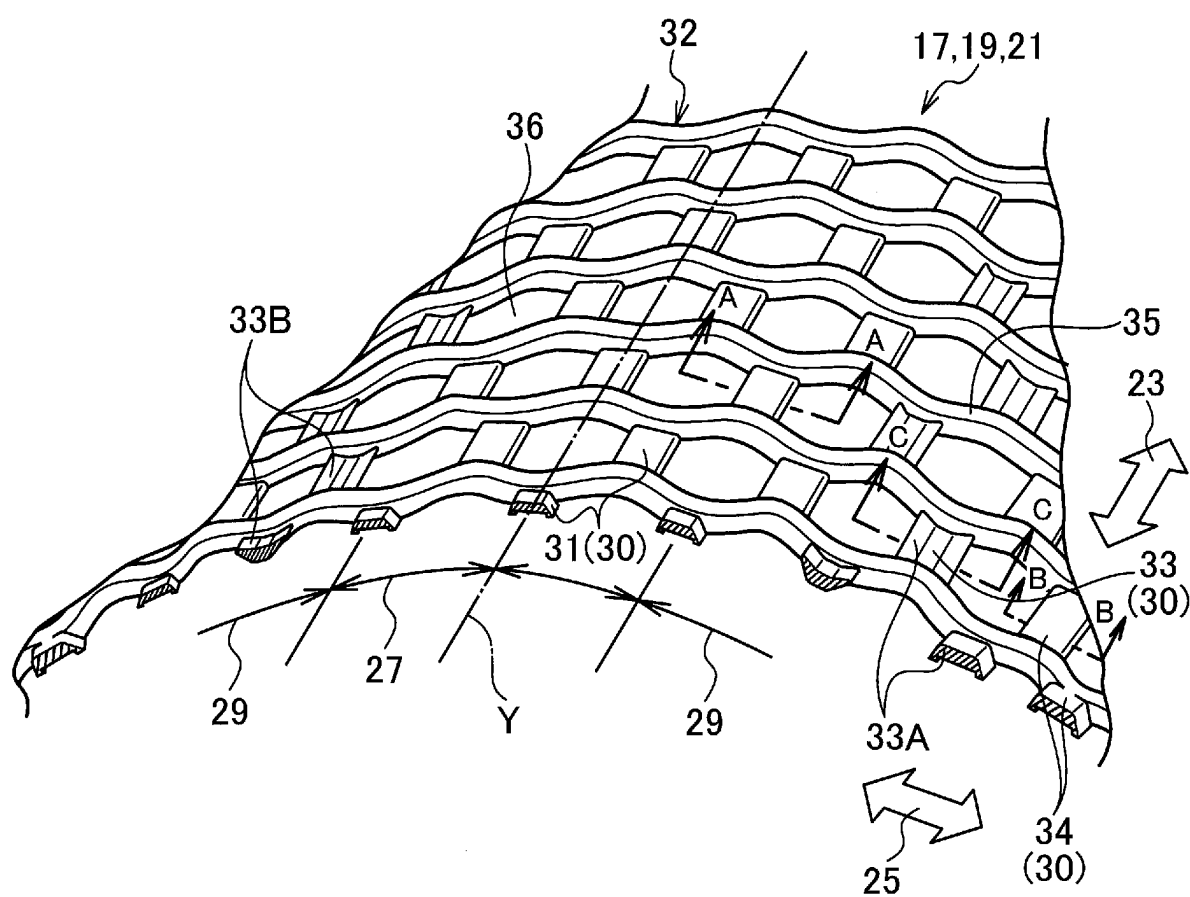


FIG.6

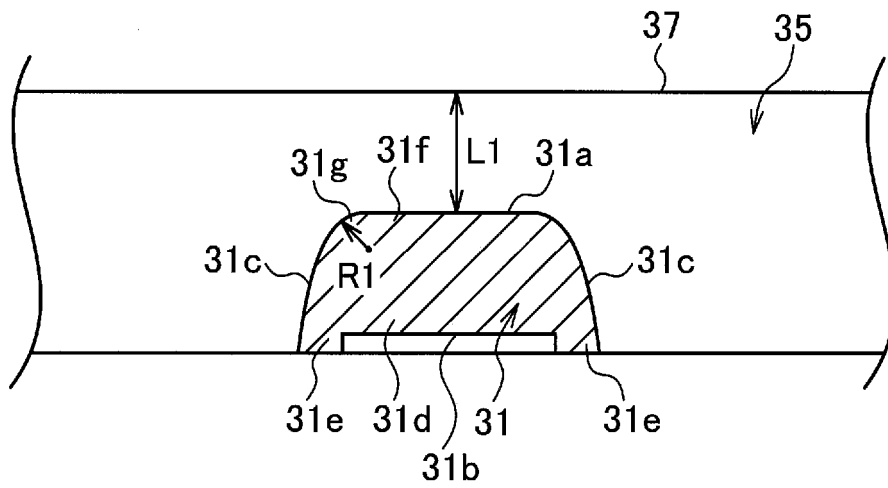


FIG.7

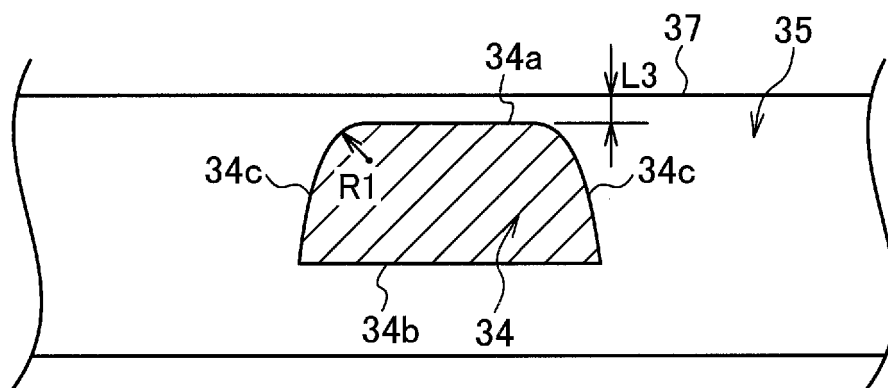
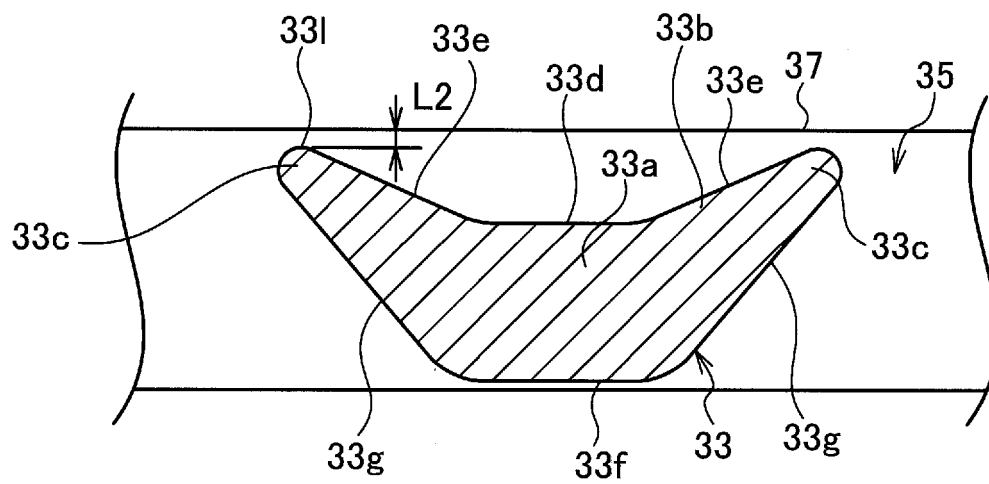


FIG.8

(a)



(b)

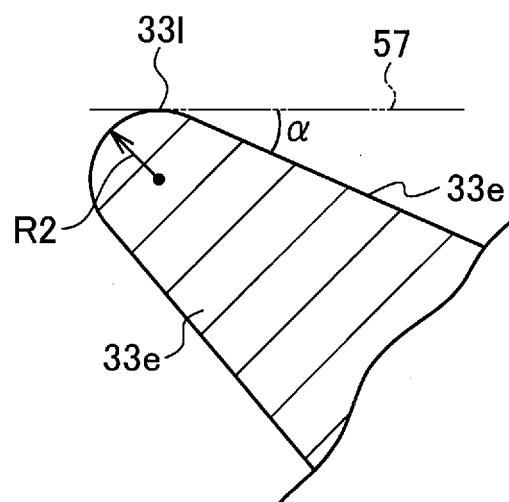


FIG. 9

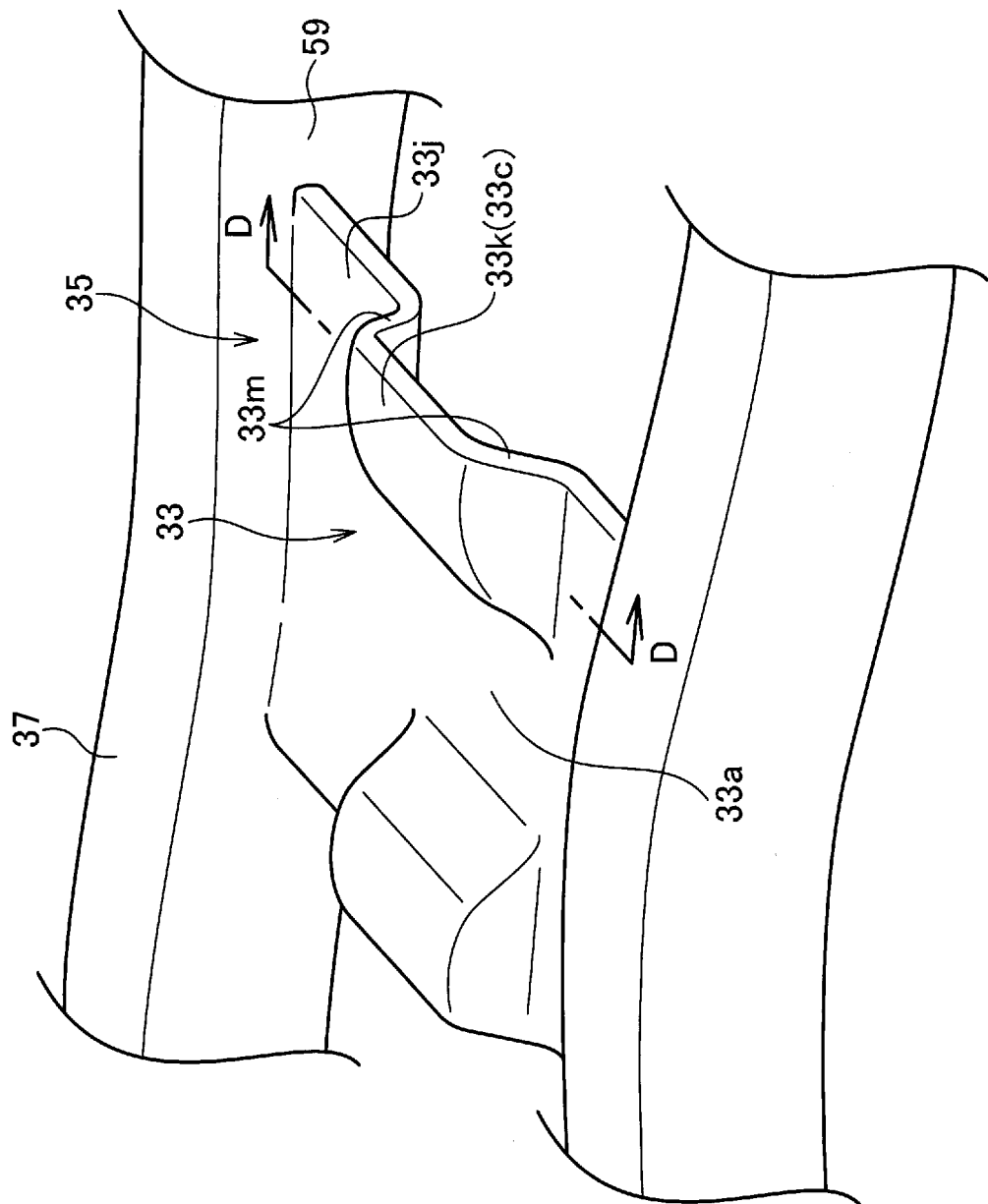


FIG.10

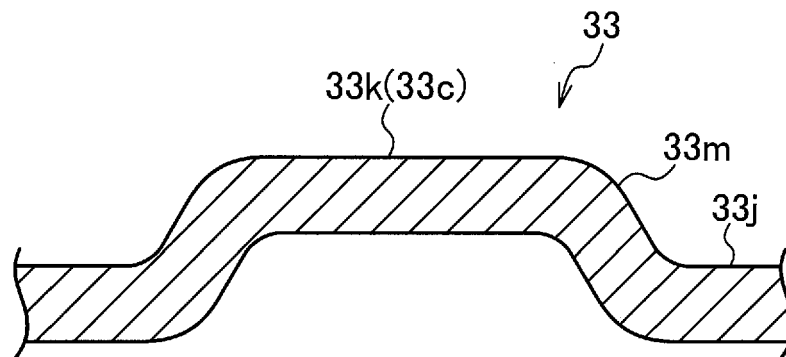
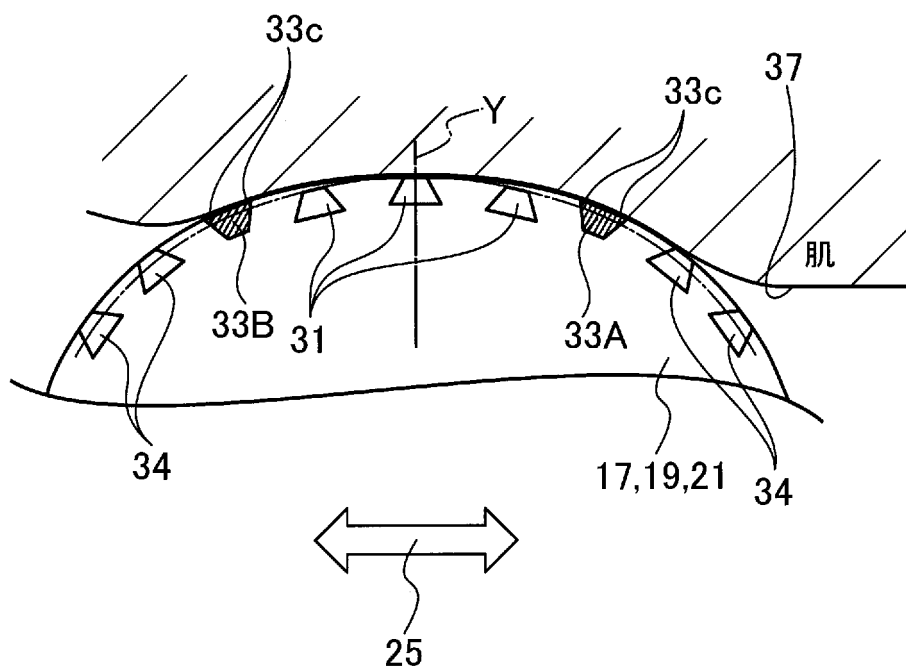


FIG.11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/057144

A. CLASSIFICATION OF SUBJECT MATTER

B26B19/04 (2006.01) i, B26B19/00 (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)

B26B19/04, B26B19/00

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	1996-2011
Kokai Jitsuyo Shinan Koho	1971-2011	Toroku Jitsuyo Shinan Koho	1994-2011

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.
X	JP 57-39871 A (Kyushu Hitachi Maxell, Ltd.), 05 March 1982 (05.03.1982), entire text; all drawings (Family: none)	1-2
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 133186/1981 (Laid-open No. 37871/1983) (Sanyo Electric Co., Ltd.), 11 March 1983 (11.03.1983), entire text; all drawings (Family: none)	1-2



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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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

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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

24 May, 2011 (24.05.11)

Date of mailing of the international search report

07 June, 2011 (07.06.11)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2011/057144

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 134619/1983 (Laid-open No. 44765/1985) (NEC Home Electronics Ltd.), 29 March 1985 (29.03.1985), entire text; all drawings (Family: none)	1-2
A	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 153108/1981 (Laid-open No. 58469/1983) (Tokyo Electric Co., Ltd.), 20 April 1983 (20.04.1983), entire text; all drawings (Family: none)	1-2

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 3083548 B [0003]