



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

(43) Date of publication:
28.09.2005 Bulletin 2005/39

(51) Int Cl.7: **A45D 2/36, A45D 4/18**

(21) Application number: **03812672.8**

(86) International application number:
PCT/JP2003/009554

(22) Date of filing: **28.07.2003**

(87) International publication number:
WO 2004/052141 (24.06.2004 Gazette 2004/26)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(72) Inventor: **NAKAMURA, Yasue,**
Fuji Company Limited, 5-28
Sakai-shi, , Osaka 590-0079 (JP)

(30) Priority: **09.12.2002 JP 2002356635**

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

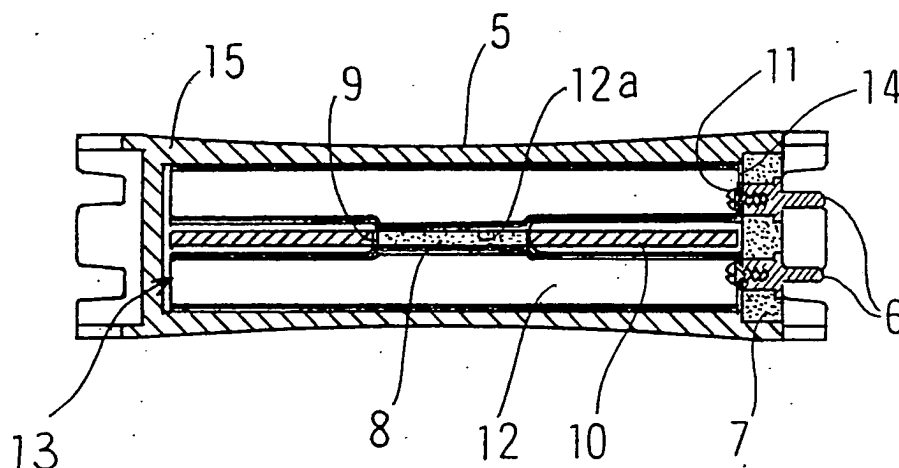
(71) Applicant: **Fuji Company Limited**
Sakai-shi, Osaka 590-0079 (JP)

(54) **HAIR CURLER, HAIR WAVE DEVICE USING THE SAME, AND HAIR WAVE APPLICATION METHOD USING SUCH DEVICE**

(57) A hair curler is provided wherein a heating element 13 is composed of a support plate 10 formed with an opening hole 9 and installed between terminals inside a cap 7 having electric terminals 6 planted therein, a heater 8 fitted in the opening hole 9 in the support plate 10, and heat conductors 12 holding the support plate 10 supporting the heater 8 from both sides and electrically connected to the terminals 6, the heating element 13

being contained in a rod 15 made of a heat resistant plastic having an opening 14 at one end, the opening 14 being sealed by the cap 7. The hair curler is of very simple construction, which, coupled with the rod being made of a heat resistant plastic, attains weight reduction of the hair curler, thus making it possible to connect a plurality of hair curlers to a single cord and to apply waves to the client with the cord loosend and in a relaxing state.

FIG. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to a hair curler, a hair wave device using the same, and a hair wave application method using the device, which are used in applying permanent waves to hair.

BACKGROUND ART

[0002] There has been a conventional hair wave device, in which a hair curler is disconnectably connected to one end of a cord extending from a suspended distributor box, and further, a winding drum is provided for freely putting in or out a suspending string capable of suspending the hair curler to an arbitrary position from the distributor box in the state in which the hair curler is connected to the cord, as disclosed in, for example, Japanese Patent No. 2798374. Here, the hair curler is configured such that a ceramic heater is connected to a terminal of a detachable pin jack via a lead wire, two stays are planted in a body of the pin jack in such a manner as to hold the ceramic heater between the stays, a nut is fixed to tips of the stays, a ceramic pipe is fitted to a reduced diameter cross-sectional portion formed at the body of the pin jack, an opening formed at one end of the ceramic pipe is covered with a cap having a center hole, and further, a screw with a hook having a pressing seat is made to penetrate through the center hole formed at the cap, to be screwed in the nut in a unitarily fixed manner.

[0003] The above-described hair wave device is put above a head of a client, and then, the plurality of hair curlers connected to the cord extending and suspended from the distributor box are set at the hair of the client.

[0004] However, since the ceramic pipe is used in the hair curler in the above-described hair wave device, the weight of the device is heavy. In order to reduce the weight, it is necessary to suspend the hair curler by the string hooked on the hook disposed at the tip of the hair curler. Therefore, there arise problems that operation becomes cumbersome and the cord and the string cross or are entangled with each other, resulting in poor workability. In addition, due to the heavy weight, only one hair curler is suspended from one cord, and therefore, the number of cords becomes large. Furthermore, the above-described strings in addition to the large number of cords leads to not only a more complicated structure, but also the heavier weight of the hair curler.

[0005] In the hair wave device described above, the weight of the hair curler must be prevented from being exerted on the head of the client. In view of this, the winding drum for the suspending strings is disposed in the distributor box arranged above the head of the client. As a consequence, permanent waves are applied with tension in a suspended state achieved by adjusting the length of the string unreel from the winding drum or

hooking the suspending string on the hook(s) disposed at one end or both ends of the hair curler so as to adjust the length of the string in such a manner as to prevent a load from being exerted on the head of the client.

[0006] Thus, if the head of the client is shifted laterally or longitudinally from an originally adjusted position during the hair wave application, the tense state of the cord or the suspending string may be varied out of balance. When the cord or the suspending string is loosened, the weight of the hair curler is exerted directly on the head, thereby giving a pain to the client. In contrast, if the cord or the suspending string is excessively tensed, the hair is pulled, thereby giving an unpleasant feeling to the client. Therefore, the client must keep an original posture from beginning to end of the application in terrible distress without any freedom. Furthermore, the hair curler is of a suspension type, in which the hair curler is suspended from above the head, so that the numerous cords and suspending strings are entangled with each other. The application while preventing such entanglement markedly degrades workability in the real condition.

[0007] The present invention has been accomplished in view of the above-described real conditions in the prior art. Therefore, an object of the present invention is to reduce a weight of a hair curler, so as to reduce the number of cords by connecting a plurality of hair curlers to a piece of cord, dispense with a suspending string, resulting in remarkable reduction of a weight exerted on the hair curler by the cord or string, and further, simplify a device with the small number of cords so as to remarkably enhance workability. In addition, another object of the present invention is to remarkably enhance workability of hair wave application, greatly improve the freedom of a client during the application, in particular, eliminate a heavy pressure above a head, and achieve the hair wave application in a relaxing state by achieving the application not by the suspension system with tension but in the cord loosening state, unlike in the prior art.

DISCLOSURE OF THE INVENTION

[0008] In order to achieve the above-described objects, the present invention of claim 1 provides, in a first aspect, a hair curler wherein a heating element composed of a support plate having a heater fitted into an opening hole bored at the support plate, interposed between terminals inside of a cap having the terminals planted therein, and heat conductors fixed to the terminals in such a manner as to hold the support plate from both sides, is contained inside a rod made of a heat resistant plastic having an opening at one end thereof so as to seal the opening with the cap.

[0009] The present invention of claim 2 provides a hair curler wherein a heating element composed of heat conductors having a heater therebetween fixed to terminals planted inside of a cap is contained inside a rod made of a heat resistant plastic having an opening at one end

thereof so as to seal the opening with the cap.

[0010] The present invention of claim 3 provides the hair curler of claims 1 or 2, wherein the heat conductor is formed of a plate-like member and arcuate portions bent from both ends of the plate-like member.

[0011] The present invention of claim 4 provides the hair curler of any one of claims 1 to 3, wherein a portion of the heat conductor in contact with the heater is formed into a projecting surface.

[0012] The present invention of claim 5 provides the hair curler of any one of claims 1 to 4, wherein the terminals are insert-molded in the cap.

[0013] The present invention of claim 6 provides the hair curler of any one of claims 1 to 5, wherein the heat conductor is screwed in the terminal.

[0014] The present invention of claim 7 provides the hair curler of any one of claims 1 to 6, wherein the heat conductor is made of aluminum.

[0015] The present invention of claim 8 provides the hair curler of any one of claims 1 to 7, wherein the rod made of a heat resistant plastic is formed into an arcuate shape, in which the diameter at the center is smaller than those at both ends.

[0016] The present invention of claim 9 provides the hair curler of any one of claims 1 to 8, wherein at least one row of minute projections formed in a longitudinal direction of the rod made of a heat resistant plastic.

[0017] The present invention of claim 10 provides the hair curler of any one of claims 1 to 9, wherein the cap and the support plate are made of a heat resistant plastic.

[0018] The present invention of claim 11 provides the hair curler of any one of claims 1 to 10, wherein the heat resistant plastic is a glass fiber reinforced polyester.

[0019] The present invention of claim 12 provides the hair curler of any one of claims 1 to 11, wherein the heat resistant plastic contains therein a far infrared radioactive substance and/or a minus ion producing substance.

[0020] The present invention of claim 13 provides, in a second aspect, a hair wave device wherein the hair curler claimed in any one of claims 1 to 12 is disconnectably connected to a cord extending from a distributor.

[0021] The present invention of claim 14 provides the hair wave device of claim 14, wherein the plurality of hair curlers are connected to the cord.

[0022] The present invention of claim 15 provides the hair wave device of claims 13 or 14, wherein a base mount and a controller are disposed under and above a strut, respectively, and at least one container is turnably pivoted between the base mount and the controller.

[0023] The present invention of claim 16 provides, in a third aspect, a hair wave application method performing application by using the hair wave device claimed in any one of claims 13 to 15 in a state in which the cord connected to the hair curlers is kept to be loosened.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

FIG. 1 is a front view showing the outside appearance of a hair curler in a preferred embodiment 1 according to the present invention;

FIG. 2 is a cross-sectional view showing the inside configuration of the hair curler, taken along a line X-X;

FIG. 3 is a perspective view showing a support plate interposed between terminals in the hair curler;

FIG. 4(a) is a perspective view showing a heat conductor provided in such a manner as to hold the support plate in the hair curler from both sides;

FIG. 4(b) is a side view showing the heat conductor;

FIG. 5(a) is a perspective view showing a heat conductor provided in such a manner as to hold the support plate in the hair curler from both sides in another mode;

FIG. 5(b) is a cross-sectional view showing a cutout and a projecting surface formed at the heat conductor;

FIG. 6 is a cross-sectional view showing a hair curler in a preferred embodiment 2 according to the present invention;

FIG. 7 is a top view showing a heating element in the hair curler;

FIG. 8 is a front view showing a rod in the hair curler;

FIG. 9 is a side view showing the entirety of a hair wave device in a preferred embodiment 3 according to the present invention;

FIG. 10 is a top view showing a controller in the hair wave device; and

FIG. 11 is a perspective view explanatory of a hair wave application method in a preferred embodiment 4 according to the present invention.

BEST MODES CARRYING OUT THE INVENTION

[0025] A hair curler claimed in claim 1 according to the present invention is featured in that: a support plate having an opening hole bored thereat and having a heater fitted into the opening hole is interposed between energizing terminals inside of a cap having the terminals planted therein; heat conductors holding the support plate for supporting the heater from both sides and electrically connected to the terminals; the obtained heating element is contained inside of a rod made of a heat resistant plastic having an opening at one end thereof; and the opening is sealed with the cap.

[0026] Moreover, a hair curler claimed in claim 2 according to the present invention is featured in that a heating element composed of heat conductors having a heater therebetween fixed to terminals planted inside of a cap is contained inside a rod made of a heat resistant plastic having an opening at one end thereof so as to seal the opening with the cap.

[0027] With the above-described configuration, the hair curler has a remarkably simple structure, and further, can be greatly reduced in weight in cooperation with the rod made of the heat resistant plastic. In particular, since the hair curler claimed in claim 2 uses no support plate, which is used in the hair curler claimed in claim 1, the hair curler claimed in claim 2 is more reduced in weight by the weight of a support plate. Since the hair curler according to the present invention can be reduced in weight, the plurality of hair curlers can be connected to one piece of cord. In addition, a hairdresser can apply waves with high workability in a state in which the cord is loosened. In the meantime, a client can receive the application in a relaxing state with a great freedom during the application.

[0028] Although descriptions will be given below of preferred embodiments according to the present invention in reference to the attached drawings, it is understood that the present invention should not be limited to the preferred embodiments described below.

Preferred Embodiment 1

[0029] A hair curler according to the present invention will be described in a preferred embodiment in reference to FIGS. 1 to 5.

[0030] FIG. 1 is a front view showing a hair curler. A rubber band hook 4 is formed at each of a left end 2 and a right end 3 in a hair curler 1, and further, a center 5 of the hair curler 1 is formed into an arcuate shape having a reduced diameter at the center less than those at both ends.

[0031] In the inside structure of the hair curler 1, as shown in FIG. 2, two terminals 6 provided for the purpose of electric connection after the hair curler 1 is set at the hair of a client are integrally planted in a cap 7 made of a heat resistant plastic by insert-molding.

[0032] Moreover, as shown in FIG. 3, a support plate 10 made of a heat resistant plastic having an opening hole 9 for allowing a heater 8 to be fitted thereinto is interposed between the two terminals inside of the cap 7 having the terminals 6 planted therein. Additionally, as shown in FIGS. 4(a) and 4(b), there are provided heat conductors 12 made of aluminum electrically fixed to the terminals 6 via screws 11 in such a manner as to hold the support plate 10 from both sides. A heating element 13 including the heater 8, the heat conductors 12, the cap 7 and the like is contained inside of a rod 15 made of a heat resistant plastic having an opening 14 at one end thereof. The opening 14 is completely sealed with the cap 7 via an adhesive (not shown).

[0033] In addition, the heat conductor 12 is constituted of a plate-like member 12b having a projecting surface 12a formed at the center thereof, arcuate portions 16 bent from both ends of the plate-like member 12b, and a fixed portion 18 erected from one end in a longitudinal direction and having a through hole 17, through which the fixed portion 18 is fixed to the terminals 6 via

the screws 11. Moreover, as shown in FIGS. 5(a) and 5 (b), if the heat conductor 12 is cut out at one end on a side opposite to the fixed portion 18 (i.e., a cutout K indicated by a broken line shown in FIG. 5(a)), the end portion is reduced in outer diameter, thereby facilitating insertion of the heating element 13 into the rod 15 through the opening 14 with an attendant merit of enhanced workability.

[0034] Here, the heat resistant plastic used as the material of the cap 7 and the support plate 10 in addition to the rod 15 is not particularly limited. Examples of the heat resistant plastic include polyimide, polybenzimidazole, reinforced plastic such as polyester or epoxy reinforced with a reinforcing material, for example, glass fiber, carbon fiber, mica, a glass ball, calcium carbonate, talc or the like. Among these materials, a glass fiber reinforced polyester produced by preimpregnation (e.g., polybutylene terephthalate and polyethylene terephthalate) is preferable from the viewpoint of a light weight, excellent heat resistance and favorable moldability.

[0035] Besides the above-described carbon fiber, the heat resistant plastic includes carbon powder or one kind or two or more kinds of far infrared radioactive substances such as silicon dioxide (SiO_2), chromium oxide (Cr_2O_3), ferrite ($\text{FeO}_2 \cdot \text{Fe}_3\text{O}_4$), Spinel ($\text{MgO} \cdot \text{Al}_2\text{O}_3$), ceria (CeO_2) and beryllia (BeO) in addition to alumina (Al_2O_3) based substances, magnesia (MgO) based substances, zirconia (ZrO_2) based substances and titania (TiO_2) based substances. As a consequence, heat can be uniformly conducted to the entire hair wound around the hair curlers, and therefore, uniform curls can be applied to the hair.

[0036] Additionally, if the heat resistant plastic includes a minus ion producing substance such as tourmaline, the hair becomes glossy by tensing the surface of the hair. Examples of tourmaline include schorl tourmaline, lithium tourmaline, dravite tourmaline, rubellite tourmaline, pink tourmaline, indicolite tourmaline, paraiba tourmaline, water-melon tourmaline and the like, which are used singly or two or more in combination, as necessary.

[0037] The aforementioned far infrared radioactive substance and minus ion producing substance may be used in combination. The content used singly or in combination is 1 part by weight to 30 parts by weight with respect to 100 parts by weight of the heat resistant plastic and, more preferably, 5 parts by weight to 20 parts by weight. If the content is less than 1 part by weight, an addition effect becomes unsatisfactory. In contrast, if the content exceeds 30 parts by weight, physical properties such as moldability and strength are degraded.

[0038] As described above, the hair curler 1 in the present preferred embodiment can be remarkably reduced in weight by making the rod 15, the cap 7 and the support plate 10 serving as the essential constituent elements of the heat resistant plastic, in particular, a glass fiber reinforced polyester, in addition to the simple structure. The terminals 6 and the heater 8 are connected to

each other via the heat conductors 12 connected by fix-
ingly screwing, thereby obviating connection by solder-
ing a fine wire. In this way, not only the workability at the
time of incorporation is excellent, but also durability is
excellent since no breakage can be caused even if the
hair curler accidentally falls down during the application
and usage.

[0039] Moreover, although the heat conductor 12 may
be made of copper, iron, brass or the like, it is preferably
made of aluminum from the viewpoint of the reduced
weight. Additionally, although the planting of the termi-
nals 6 in the cap 7 is not limited by the insert-molding,
the planting by the insert-molding is preferable from the
viewpoint of sealability, with an attendant effect of pre-
vention of failure or the like caused by impregnation of
a permanent lotion or a cleaning liquid through the plant-
ed portion.

[0040] In addition, the portion of the heat conductor
12 in contact with the heater 8 is formed into the project-
ing surface 12a, so that the heat conductor 12 and the
heater 8 are brought into contact with each other all the
time by elastic deformation of the projecting surface
12a, thereby preventing any deficient contact and en-
hancing a heat conducting efficiency.

[0041] Moreover, the rod 15 is formed into the arcuate
shape, in which the center thereof is reduced in diameter
less than both ends thereof, thereby readily winding the
hair around the rod with excellent workability. A planar
heater or a ceramic heater is preferable as the heater 8.

Preferred Embodiment 2

[0042] In a hair curler 1 in a present preferred embod-
iment, a heating element 13 including heat conductors
12 electrically connected to a cap 7 is contained inside
of a rod 15, as shown in FIGS. 6 to 8. A terminal 6 is
planted outside of the cap 7, and two terminals 6a
project inside of the cap 7.

[0043] In the meantime, the heat conductor 12 (which
is made of copper in the present preferred embodiment)
comprises: a heat conductor 12A including a plate-like
member 12b having a projecting surface 12a formed at
the center thereof and arcuate portions 16 bent from
both ends of the plate-like member 12b and an insertion
hole 20 for a fine wire (i.e., a lead wire) 19 erected from
one end in a longitudinal direction and extending from
the terminal 6a, and a fixing portion 18 for fixing the heat
conductor 12 in abutment against the terminal 6a; and
a heat conductor 12B formed into the same shape as
that of the heat conductor 12A except for formation of a
recessed surface 12c in conformity of the projecting sur-
face 12a at the center, wherein a heater 8 is held in a
space defined by the projecting surface 12a and the re-
cessed surface 12c.

[0044] The fine wire 19 extending from each of the two
terminals 6a projecting inside of the cap 7 is welded (at
a welded portion 21) to each of the plate-like members
12b of the heat conductors 12A and 12B in the vicinity

of the fixed portion 18 through the insertion hole 20 of
the fixed portion 18 of each of the heat conductors 12A
and 12B, and thus, the fine wire 19 is electrically con-
nected. Here, a cutout 22 is formed on a side of the fixed
portion 18 of each of the heat conductors 12A and 12B
in order to facilitate a welding work.

[0045] The above-described heating element 13 is
contained inside of the rod 15, and further, an opening
14 is completely sealed with the cap 7 via an adhesive
(not shown), like in the preferred embodiment 1. In the
present preferred embodiment, at least one row (four
rows in the drawings) of minute projections 23 is dis-
posed at the surface of the rod 15 in the longitudinal
direction, and therefore, the minute projections 23 allow
the hair to be readily wound around the hair curler so as
to enhance the workability. Incidentally, it is preferable
that about two to six rows of the minute projections 23
should be disposed.

20 Preferred Embodiment 3

[0046] A description will be given below of a hair wave
device using the hair curler described in the preferred
embodiment 1 in reference to FIGS. 9 and 10.

[0047] FIG. 9 is a side view showing a hair wave de-
vice. As is clear from FIG. 9, a hair wave device 31 is
configured such that a strut 32 is located eccentrically
rearward of the center, a base mount 33 and a controller
34 are disposed under and above the strut 32, respec-
tively, and at least one container 35 (two containers 35
in FIG. 9) is turnably pivoted between the base mount
33 and the controller 34. Since the container 35 is tur-
nably pivoted on the eccentric strut, its upper portion is
opened for usage by turning the container 35 when an
article is put in or from the container 35. Here, the base
mount 33 and the controller 34 may be fixed.

[0048] Moreover, at the rearward of the controller 34
is provided with a distributor 37 connected to a plurality
of cords 36 for supplying a control electric power to the
hair curler (only one of the cords 36 is shown in FIG. 9).
Additionally, a T-shaped cord holding bar 38, which can
be adjusted in a vertical direction, is disposed at a po-
sition free from any interference with the distributor 37
via a bracket 39.

[0049] At the tip of the cord 36 connected to the dis-
tributor 37 are continuously disposed a plurality of con-
nectors 40 (three connectors in FIG. 9) which are dis-
connectably connected to the terminal of the above-de-
scribed hair curler. The number of cords 36 and the
number of connectors 40 continuously connected to the
cord 36 are determined in consideration of a desired
light weight or workability in view of the size or weight
of the hair curler 1, the length of the cord 36 or the shape
or weight of the connector 40. Preferably, the number of
cords should be 5 to 10, and further, the number of con-
nectors connected to one cord should be 3 to 5.

[0050] Moreover, as shown in FIG. 10, a tray 41 (a
trisected tray in FIG. 10) containing the hair curlers 1,

the cords 36 and the like therein is disposed before the controller 34 disposed above the hair wave device 31, and further, a control panel 42 is disposed at a back half portion. On the control panel 42 are arranged a power source switch, a display lamp for the power source switch, a rod electric power supplying switch, a rod display lamp, a button for setting a temperature and a time in a permanent mode and a setting mode, various kinds of switches required for controlling the display lamp and the like, and various kinds of lamps for displaying a control condition.

[0051] Incidentally, in the hair wave device in the present preferred embodiment, a digital control circuit is mounted, and a control voltage of the rod is limited to 12 V. As a consequence, it is possible to prevent any excessive increase in temperature in the rod by any chance or prevent any electric shock, so as to more enhance safety.

Preferred Embodiment 4

[0052] A description will be given below of a hair wave application method for applying waves while holding the cord connected to the hair curlers in a loose state by using the hair wave device in the above-described preferred embodiment 3 in reference to FIG. 11.

[0053] When the hair of a client is wound around the above-described hair curlers 1, the cord 36 extending from a distributor 25 disposed at the back portion of the hair wave device 31 is set and adjusted in such a manner that a horizontal portion 38a of the cord holding bar 38 is located at a position higher than the head of the client. Thereafter, a part of the cord 36 is supported by the horizontal portion astride the horizontal portion 38a. The connectors 40 branched at the tip of the cord 36 in a loose state are connected to the terminals 6 of the hair curlers 1, respectively. After that, the electric power is supplied to the hair curler 1 in accordance with the condition of the temperature and the time set by the control panel 42.

[0054] As described above, since the hair curler is reduced in weight (down to 1/2 to 1/3) in the present preferred embodiment, the cord above the head need not be suspended in a substantially tense state and the application can be performed in an appropriately loose state, unlike in the prior art. Consequently, it is possible to remarkably improve the workability of the permanent wave application, and further, to release the client from a restricted posture in which the hair is pulled upward during the permanent wave application, that is, to allow the client to freely move his or her head within the looseness of the cord or vary his or her posture, so as to apply the waves to the client in a relaxing state.

INDUSTRIAL APPLICABILITY

[0055] As described above, the hair curler, the hair wave device using the same, and the hair wave appli-

cation method using the device according to the present invention can produce many features and advantages, as described below.

[0056] The hair curler claimed in claim 1 according to the present invention is configured such that the support plate having the heater fitted into the opening hole is interposed between the terminals inside of the cap having the terminals planted therein, and the heating member having the heat conductor fixed to the terminal is contained inside of the rod made of the heat resistant plastic having the opening at one end thereof in such a manner as to hold the support plate on both sides, so as to seal the opening formed at the rod with the cap. With the above-described configuration, the hair curler has the remarkably simple structure, and further, can be greatly reduced in weight in cooperation with the rod made of the plastic.

[0057] The hair curler claimed in claim 2 according to the present invention is configured such that the heating member having the heat conductor holding the heater therein fixed between the terminals inside of the cap having the terminals planted therein is contained inside of the rod made of the heat resistant plastic having the opening at one end thereof, so as to seal the opening with the cap. With the above-described configuration, the hair curler claimed in claim 2 can be simplified in structure more than the hair curler claimed in claim 1 since the hair curler claimed in claim 2 uses no support plate, and can be further reduced in weight.

[0058] Moreover, the heat conductor equipped with both of the function of electric conduction from the terminal to the heater and the function of conducting the heat from the heater to the rod is formed of the plate-like member and the arcuate portions bent from both ends of the plate-like member, thereby achieving the weight reduction and achieving the excellent heat conducting characteristics.

[0059] Additionally, if a part of the heat conductor at the portion in contact with the heater is formed into the projecting surface, that portion is brought into contact with the heater with the elasticity, thereby preventing any deficient contact inside of the rod during the usage and achieving the excellent heat conducting efficiency.

[0060] In addition, the cap with the terminal is molded by the insert-molding, in which the terminal is set in a die, and then, a material is introduced. As a consequence, the contact surface of the cap with the terminal is excellent in sealability. No chemical solution or the like intrudes through the contact surface, thereby preventing any trouble caused by the intrusion.

[0061] Furthermore, the configuration of the heat conductor directly screwed in the terminal can dispense with any lead wire accompanied by a soldering work, and can simplify and ensure the structure, thereby enhancing the reliability.

[0062] Moreover, the heat conductor is made of aluminum, thus further reducing the weight of the hair curler.

[0063] Additionally, there is provided the hair curler, around which the hair can be readily wound, with the excellent workability by forming the rod made of the heat resistant plastic into the arcuate shape in which the center is reduced in diameter less than both ends or aligning the minute projections at the surface of the rod in the longitudinal direction.

[0064] In addition, the cap and the support plate are made of the heat resistant plastic, thereby further reducing the weight of the hair curler.

[0065] Furthermore, machining can be facilitated even in a thin state with a high mechanical strength by using the glass fiber reinforced polyester as the heat resistant plastic, thereby further reducing the weight of the hair curler and further enhancing the heat conducting characteristics.

[0066] The above-described hair curler is disconnectably connected to the cord extending from the distributor in the hair wave device, and further, the plurality of hair curlers are connected to the cord, thereby remarkably reducing the number of cords, simplifying the device, enhancing the workability and eliminating a heavy pressure to be exerted on the client.

[0067] Moreover, the base mount and the controller are disposed under and above the strut in the hair wave device, respectively, and further, at least one container is turnably pivoted between the base mount and the controller. With this configuration, the hair curler, the cord, the chemical solution and the like can be efficiently contained. In particular, the contained article can be taken out merely by readily turning the container, as required, thereby enhancing the workability. In contrast, when not required, the container can be immediately shut by reversely turning the container to the original position, with an attendant advantage of remarkable convenience.

[0068] In addition, the application is performed in the loose state of the cord connected to the hair curlers by using the above-described hair wave device, so that the client can be subjected to the application in a relaxing state since he or she can freely vary his or her posture with the increased freedom.

Claims

1. A hair curler wherein a heating element composed of a support plate having a heater fitted into an opening hole bored at the support plate, interposed between terminals inside of a cap having the terminals planted therein, and heat conductors fixed to the terminals in such a manner as to hold the support plate from both sides, is contained inside a rod made of a heat resistant plastic having an opening at one end thereof so as to seal the opening with the cap.
2. A hair curler wherein a heating element composed of heat conductors having a heater therebetween

fixed to terminals planted inside of a cap is contained inside a rod made of a heat resistant plastic having an opening at one end thereof so as to seal the opening with the cap.

3. The hair curler of claims 1 or 2, wherein the heat conductor is formed of a plate-like member and arcuate portions bent from both ends of the plate-like member.
4. The hair curler of any one of claims 1 to 3, wherein a portion of the heat conductor in contact with the heater is formed into a projecting surface.
5. The hair curler of any one of claims 1 to 4, wherein the terminals are insert-molded in the cap.
6. The hair curler of any one of claims 1 to 5, wherein the heat conductor is screwed in the terminal.
7. The hair curler of any one of claims 1 to 6, wherein the heat conductor is made of aluminum.
8. The hair curler of any one of claims 1 to 7, wherein the rod made of a heat resistant plastic is formed into an arcuate shape, in which the diameter at the center is smaller than those at both ends.
9. The hair curler of any one of claims 1 to 8, wherein at least one row of minute projections formed in a longitudinal direction of the rod made of a heat resistant plastic.
10. The hair curler of any one of claims 1 to 9, wherein the cap and the support plate are made of a heat resistant plastic.
11. The hair curler of any one of claims 1 to 10, wherein the heat resistant plastic is a glass fiber reinforced polyester.
12. The hair curler of any one of claims 1 to 11, wherein the heat resistant plastic contains therein a far infrared radioactive substance and/or a minus ion producing substance.
13. A hair wave device wherein the hair curler claimed in any one of claims 1 to 12 is disconnectably connected to a cord extending from a distributor.
14. The hair wave device of claim 14, wherein the plurality of hair curlers are connected to the cord.
15. The hair wave device of claims 13 or 14, wherein a base mount and a controller are disposed under and above a strut, respectively, and at least one container is turnably pivoted between the base mount and the controller.

- 16.** A hair wave application method performing application by using the hair wave device claimed in any one of claims 13 to 15 in a state in which the cord connected to the hair curlers is kept to be loosened.

5

10

15

20

25

30

35

40

45

50

55

FIG. 1

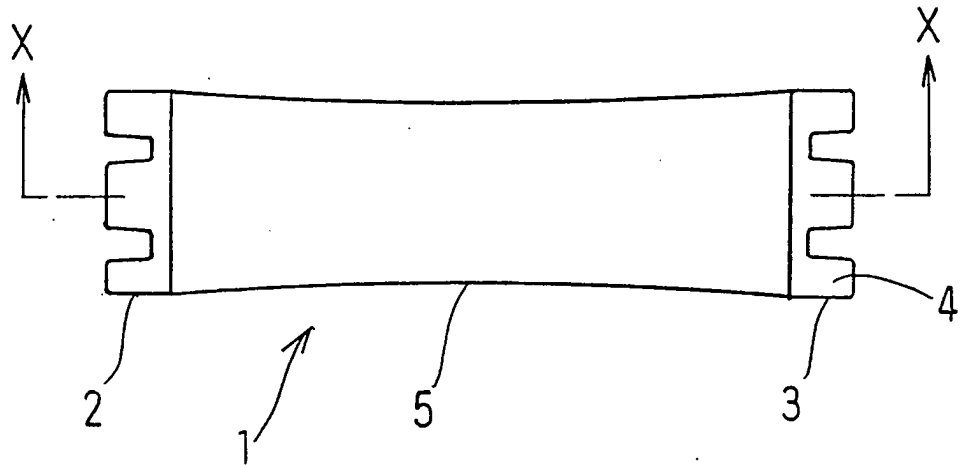


FIG. 2

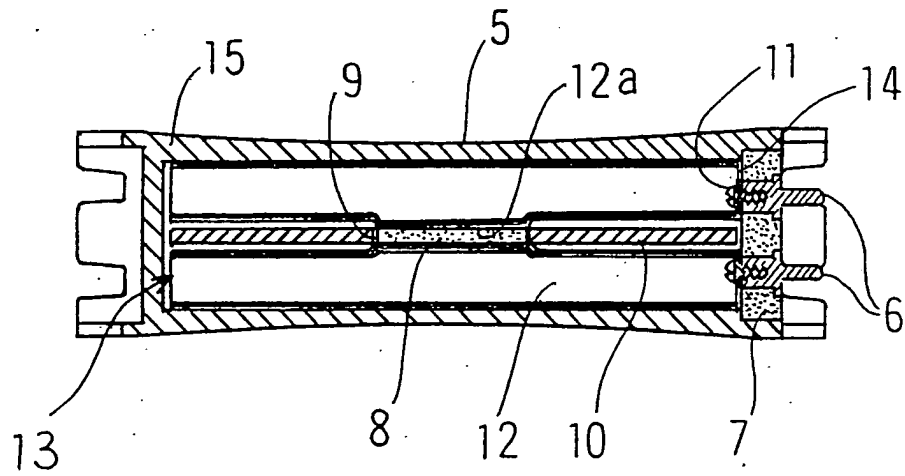


FIG. 3

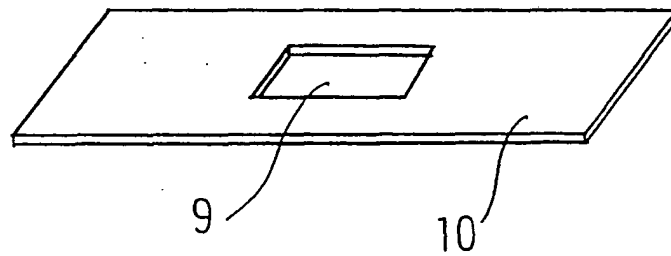


FIG. 4

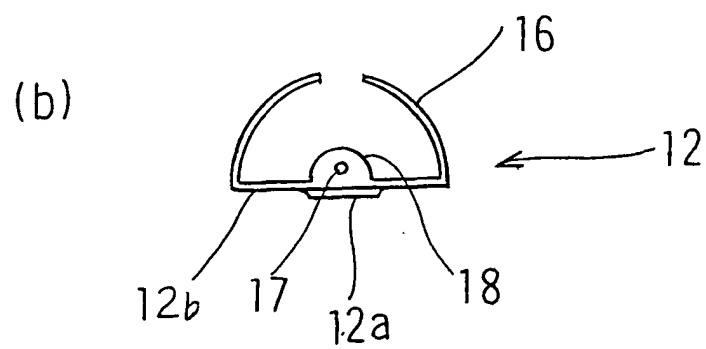
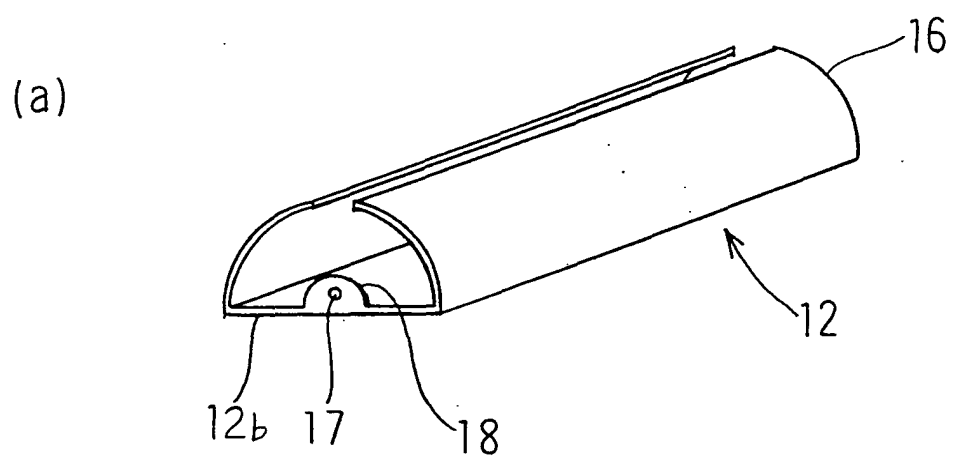


FIG. 5

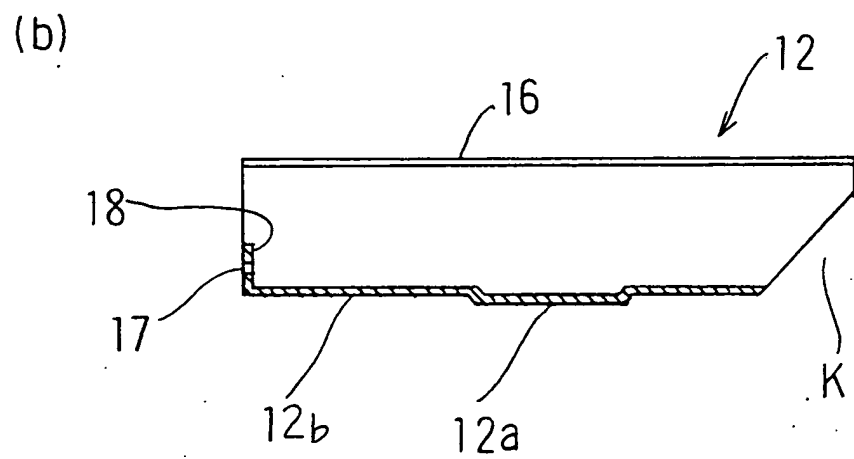
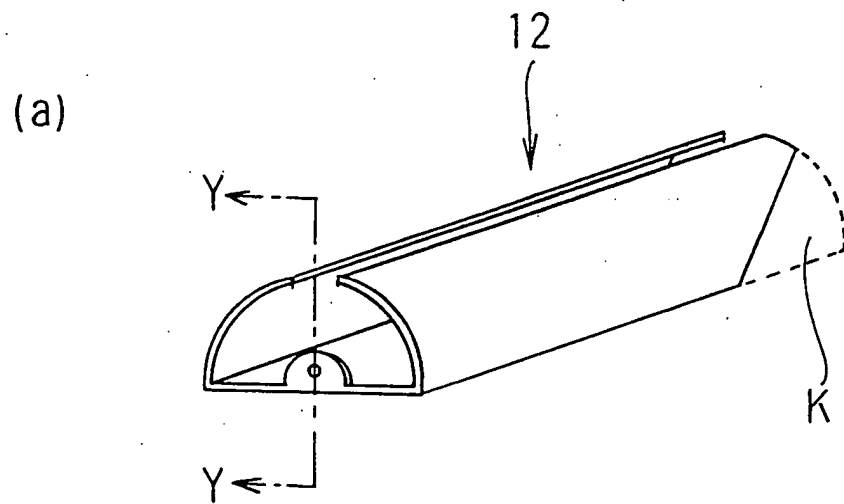


FIG. 6

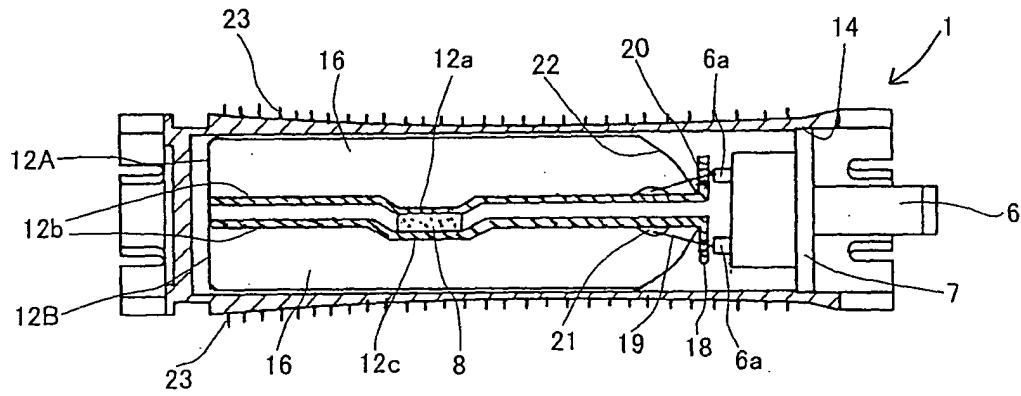


FIG. 7

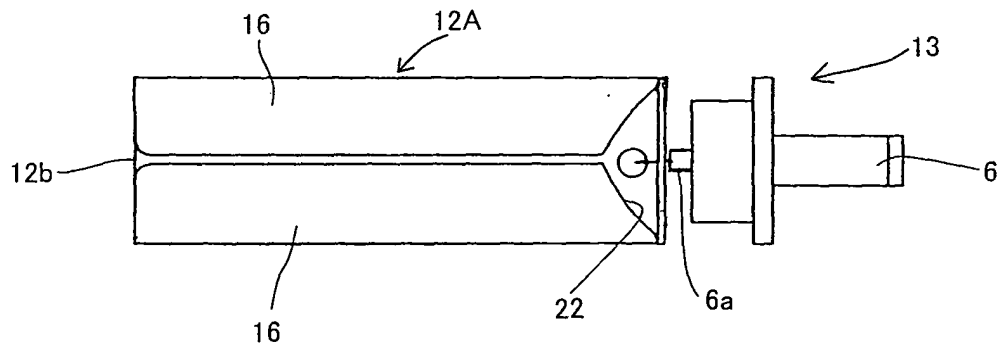


FIG. 8

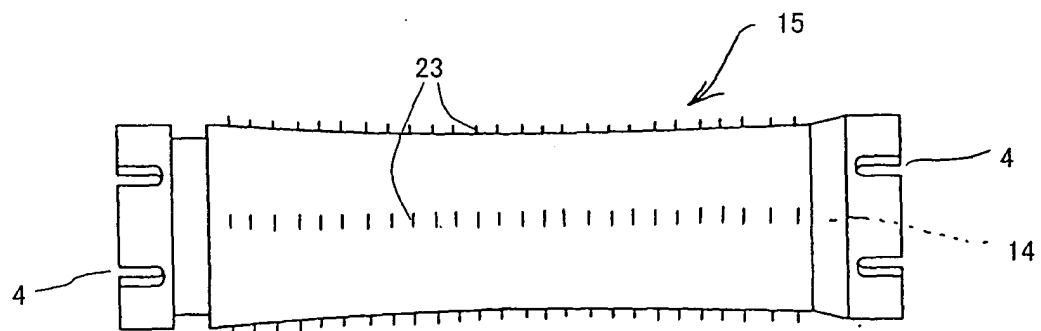


FIG. 9

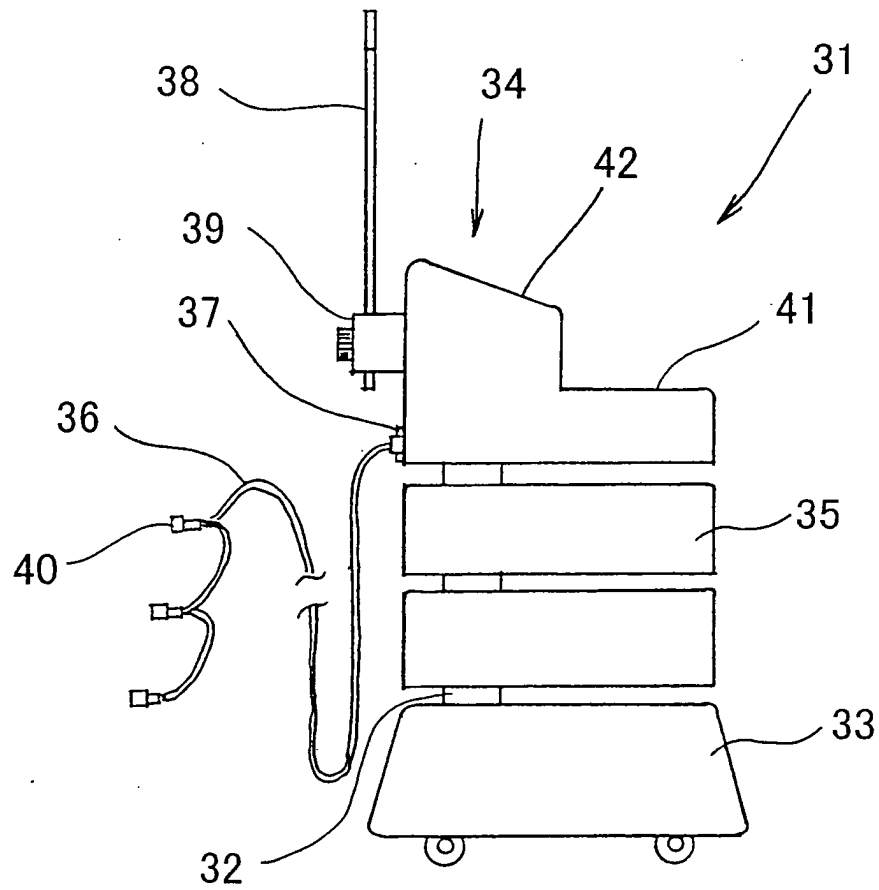


FIG. 10

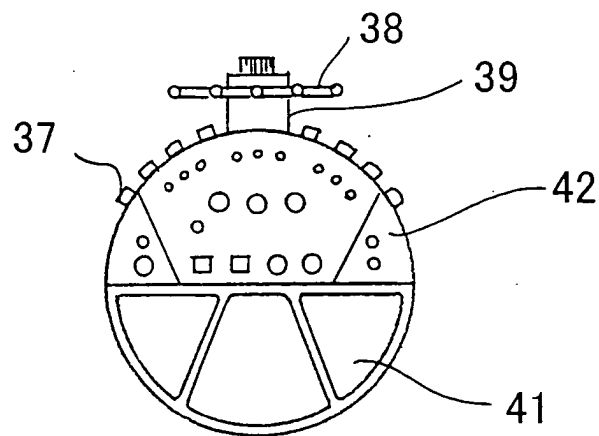
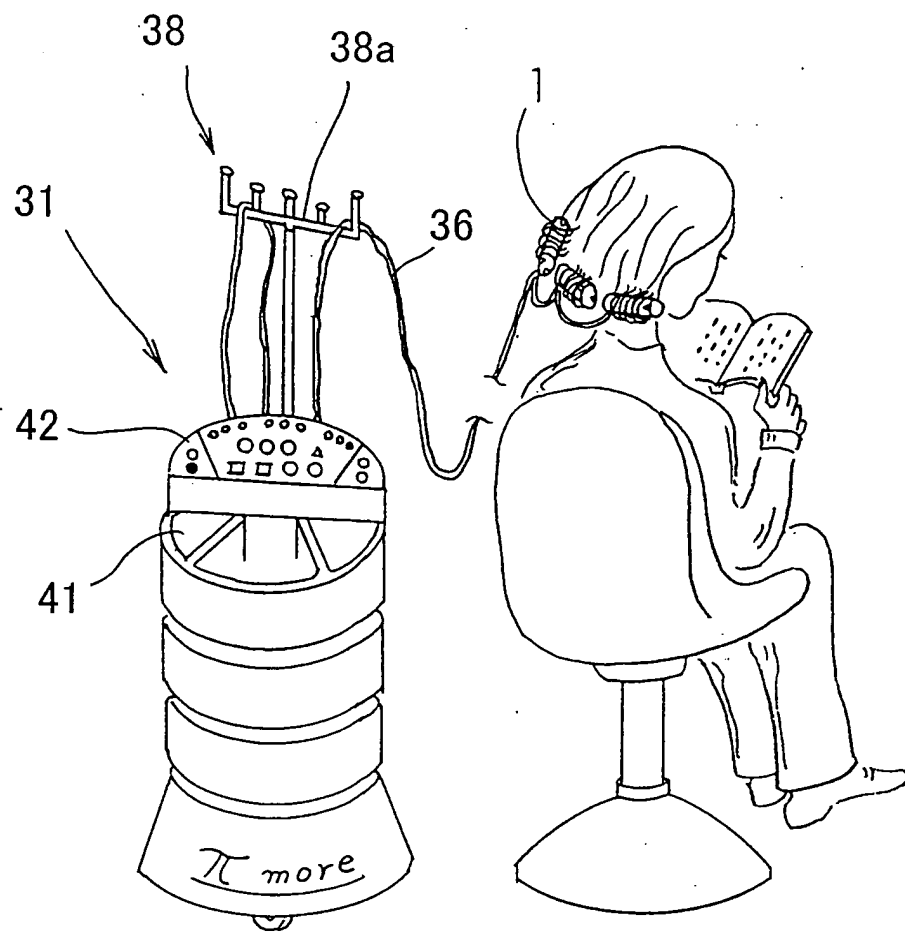


FIG. 11



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/09554

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl⁷ A45D2/36, A45D4/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl⁷ A45D2/36, A45D4/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Toroku Jitsuyo Shinan Koho 1994-2003
Kokai Jitsuyo Shinan Koho 1971-2003 Jitsuyo Shinan Toroku Koho 1996-2003

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	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 10231/1991 (Laid-open No. 108004/1992) (Sekisui Plastics Co., Ltd.), 18 September, 1992 (18.09.92), Full text; Figs. 1 to 4 (Family: none)	1-3, 5-7
Y		4
Y		8-10
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 595/1991 (Laid-open No. 103803/1992) (Sekisui Plastics Co., Ltd.), 08 September, 1992 (08.09.92), Full text; Fig. 1 (Family: none)	4

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"I" 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
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document but published on or after the international filing date	"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
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
20 November, 2003 (20.11.03)

Date of mailing of the international search report
09 December, 2003 (09.12.03)

Name and mailing address of the ISA/
Japanese Patent Office

Authorized officer

Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/09554

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 9-23920 A (Kyushu Hitachi Maxell Kabushiki Kaisha),	8-10
Y	28 January, 1997 (28.01.97), Par. Nos. [0009], [0010]; Figs. 1, 3 (Family: none)	11-12
Y	JP 9-238731 A (Teijin Ltd.), 16 September, 1997 (16.09.97), Par. Nos. [0026], [0029] (Family: none)	11
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 50048/1991 (Laid-open No. 88401/1993) (Yugen Kaisha Wairudo), 03 December, 1993 (03.12.93), Claim 1; Figs. 2 to 4 (Family: none)	12
Y	JP 3045250 Z1 (Kabushiki Kaisha Kureitsu), 05 November, 1997 (05.11.97), Par. No. [0013] (Family: none)	12
X	JP 2798374 B2 (Kabushiki Kaisha Hea Kurieito), 03 July, 1998 (03.07.98), Full text; Figs. 1 to 4 (Family: none)	13-16

Form PCT/ISA/210 (continuation of second sheet) (July 1998)