



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
16.03.2011 Bulletin 2011/11

(51) Int Cl.:
A45D 20/12 (2006.01) A45D 1/00 (2006.01)

(21) Application number: **09734662.1**

(86) International application number:
PCT/JP2009/056617

(22) Date of filing: **31.03.2009**

(87) International publication number:
WO 2009/130978 (29.10.2009 Gazette 2009/44)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA RS

(72) Inventors:
• **KUMODE, Takahiro**
Osaka 571-8686 (JP)
• **KODAMA, Naofumi**
Osaka 571-8686 (JP)
• **SAITOU, Toshihiro**
Osaka 571-8686 (JP)

(30) Priority: **23.04.2008 JP 2008112762**

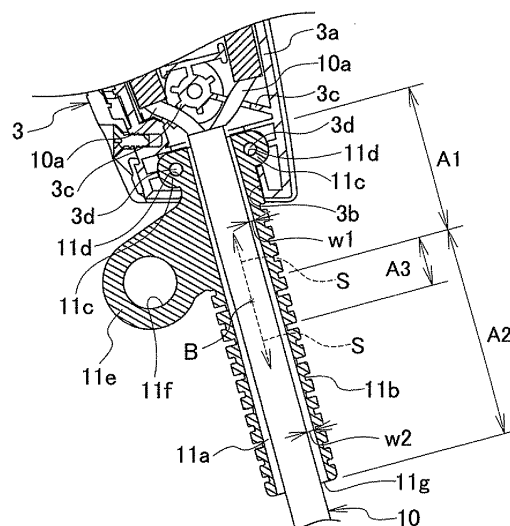
(74) Representative: **Appelt, Christian W.**
Forrester & Boehmert
Pettenkoferstrasse 20-22
80336 München (DE)

(71) Applicant: **Panasonic Electric Works Co., Ltd**
Kadoma-shi
Osaka 571-8686 (JP)

(54) **HAIR CARE DEVICE**

(57) A bushing (11) is provided with a twist regulation portion (A1) to regulate twist of a power cord (10) for setting an expected disconnection portion (A3) for the power cord (10) to be disconnected due to twist of the power cord (10) in a tubular inner space (11a) of the bushing (11) by regulating twist of the power cord (10) by the twist regulation portion (A1), and a spark attenuation portion (A2) is provided at a portion in the tubular inner space (11a) of the bushing (11) nearer to a distal end thereof than the twist regulation portion (A1) to attenuate spark (S) occurred in the tubular inner space due to disconnection of the power cord (10) at the expected disconnection portion (A3).

FIG. 2



Description

Technical Field

[0001] The present invention relates to a hair care device. 5

Background Art

[0002] A hair dryer disclosed in Patent Document 1 10
has been known as a conventional hair care device. In
Patent Document 1, a portion from which a power cord
is let out to the outside is provided with a bushing covering
the portion, and a cover piece partially covering a tubular
inner space of the bushing is provided at a tip portion of
the bushing. With this configuration, when the power cord
is bent and disconnected, sparks occurring in the discon-
nected portion are prevented from leaking to the outside
from the tubular inner space of the bushing. 15
The hair dryer disclosed in Patent Document 1 is config-
ured to cope with disconnection mostly due to bending
of the power cord. 20

[0003] As a result of further studies on the prevention
of spark leakage from the tubular inner space of the bush-
ing, the inventors have found a novel configuration capa-
ble of more effectively preventing leakage of sparks
occurring when the power cord is twisted and discon-
nected. 25

[0004] It is therefore an object of the present invention
to provide a hair care device in which sparks occurring
when a power cord is twisted and disconnected is pre-
vented more effectively from leaking from a tubular inner
space of a bushing. 30

Patent Document 1: Japanese Unexamined Patent Ap-
plication Publication No. 2002-369714 35

Disclosure of Invention

[0005] A hair care device according to the present in-
vention includes: a power cord for power supply to an
internal electrical component having a portion being let
out from a casing and covered with a bushing of tubular
form having a base end fixed to the casing; a twist reg-
ulation portion in the bushing to regulate twist of the pow-
er cord for setting an expected disconnection portion for
the power cord to be disconnected due to twist of the
power cord in a tubular inner space of the bushing; and
a spark attenuation portion at a portion in the tubular inner
space of the bushing nearer to a distal end thereof than
the twist regulation portion to attenuate spark occurred
in the tubular inner space due to disconnection of the
power cord at the expected disconnection portion. 40
45
50

Brief Description of Drawings

[0006] 55

[Fig. 1] Fig. 1 is a cross-sectional view of a hair dryer

as a hair care device according to a first embodiment
of the present invention.

[Fig. 2] Fig. 2 is an enlarged view of a bushing at-
tachment portion in Fig. 1.

[Fig. 3] Fig. 3 is a cross-sectional view of a portion
provided with a bushing of a hair dryer as a hair care
device according to a second embodiment of the
present invention.

[Fig. 4] Fig. 4 is a view (partial cross-sectional view)
showing a hair dryer with brush as a hair care device
according to a modification of the second embodi-
ment of the present invention.

[Fig. 5] Fig. 5 is a view (partial cross-sectional view)
showing a hair iron as a hair care device according
to a modification of the second embodiment of the
present invention.

[Fig. 6] Fig. 6 is a view (partial cross-sectional view)
showing a hair brush as a hair care device according
to a modification of the second embodiment of the
present invention.

Best Mode for Carrying out the Invention

[0007] By referring to the drawings, embodiments of
the present invention will be described in detail below.
Note that the following embodiments include the same
components. Thus, in the following description, the same
components are denoted by common reference numer-
als, and repeated description thereof is omitted.

(First Embodiment)

[0008] Fig. 1 is a cross-sectional view of a hair dryer
as a hair care device according to this embodiment, and
Fig. 2 is an enlarged view of a bushing attachment portion
in Fig. 1. 35

[0009] As shown in Fig. 1, a hair dryer 1 as a hair care
device according to this embodiment has a shape ob-
tained by connecting a main body part 2 and a handle
part 3 into an approximately T-shape. Note that the han-
dle part 3 is foldable using a rotary part R as a bending
base point. Fig. 1 shows an extended state of the handle
part 3.

[0010] A casing 2a of the main body part 2 is formed
into an approximately tubular shape by putting together
left and right mirror-image split bodies each having an
approximately arched cross-section. Inside a tubular in-
ner space of the casing 2a, an air passage 4 extending
from an inlet 4a to an outlet 4b is formed. In the air pas-
sage 4, an electric motor 5 and an axial flow fan 6 driven
by the electric motor 5 are provided. Rotation of the axial
flow fan 6 by the electric motor 5 generates an airflow
from the inlet 4a to the outlet 4b in the air passage 4.

[0011] In addition, a heater 8 is provided on a down-
stream side of the air passage 4 so that heated hot air
may be blasted out from the outlet 4b. Furthermore, a
mist generator 7 that employs electrostatic atomization
is provided so that atomized mist may be discharged from

a mist outlet 7a.

[0012] A handle casing 3a of the handle part 3 is formed by putting together left and right mirror-image split bodies each having an approximately arched cross-section. In the handle casing 3a, lead wires 10b are installed. Moreover, an operation switch 9 is provided in a longitudinal intermediate portion of the handle part 3.

[0013] In the above configuration, the electric motor 5, the mist generator 7 and the heater 8 correspond to electrical components that operate with supplied power. These electrical components are supplied with power through the lead wires 10b. Inner conductors of the lead wires 10b are electrically connected to inner conductors of lead wires 10a which form a power cord 10. Note that, in this embodiment, the power cord 10 has a flat shape obtained by joining two lead wires 10a next to each other.

[0014] In this embodiment, the power cord 10 is let out to the outside from a through-hole 3b formed in the handle casing 3a at a tip portion of the handle part 3, and the let-out portion is covered with a bushing 11.

[0015] The bushing 11 is formed by shaping an insulating resin material into a long and narrow tube. A tubular inner space 11a of the bushing 11 has a flat (e.g., approximately rectangular tubular or approximately oblong) cross-section corresponding to the cross-sectional shape of the power cord 10. The power cord 10 is inserted into the tubular inner space 11a. Moreover, a convex-concave pattern 11b is provided on a longitudinal tip-side outer circumference of the bushing 11, improving flexibility and aesthetic appearance.

[0016] In a portion where a base end side of the bushing 11 is housed in the handle casing 3a, a pair of approximately disk-shaped flared portions 11c are provided in such a way to sandwich the tubular inner space 11a. A through-hole 11d is formed approximately in the center of each of the flared portions 11c. The handle casing 3a has columnar protrusions 3d provided thereto in a protruding manner, and the bushing 11 is fixed to the handle casing 3a by fitting the protrusions 3d into the through-holes 11d, respectively. The power cord 10 as well as the bushing 11 covering the power cord 10 are inserted into the through-hole 3b provided at the tip portion of the handle part 3.

[0017] The lead wires 10a of the power cord 10 are each held between a pair of ribs 3c (Fig. 2 shows only ribs 3c in one of the split bodies) which are provided in the respective split bodies of the handle casing 3a and face each other. The power cord 10 is thus fixed to the handle casing 3a.

[0018] Furthermore, at a portion of the bushing 11 on the base end side thereof and on the outside of the handle casing 3a, an approximately disk-shaped ring portion 11e having a through-hole 11f is provided in a protruding manner.

[0019] Here, in this embodiment, the bushing 11 is provided with a twist regulation portion A1 which regulates twist of the power cord 10. In this embodiment, at the longitudinal base end side of the bushing 11, an amount

of twist of the power cord 10 in the tubular inner space 11a is reduced by setting a clearance w1 between the bushing 11 and the power cord 10 in the tubular inner space 11a to be smaller than a clearance w2 therebetween in a region (a spark attenuation portion A2) closer to the tip side.

[0020] By providing the twist regulation portion A1 as described above, an expected disconnection portion A3 of the power cord 10 is set on the longitudinal tip side of the twist regulation portion A1. In other words, when the power cord 10 is greatly twisted, the twist regulation portion A1 regulates the twist of the power cord 10, and thus the power cord 10 exceeds a twist breakage limit at a position adjacent to the twist regulation portion A1 but closer to the tip side than the twist regulation portion A1 is. The position and length of the expected disconnection portion A3 can be adjusted based on a maximum twist angle in the twist regulation portion A1, a twist breakage limit angle of a covering of the power cord 10, and the like.

[0021] Furthermore, in this embodiment, the spark attenuation portion A2 having a required length is provided in a portion extending from the twist regulation portion A1 to the tip. The spark attenuation portion A2 attenuates and extinguishes sparks S occurring at a disconnection position B of the power cord 10 mostly by natural cooling before the sparks S reach an opening 11g on the tip side. Note that, in the spark attenuation portion A2, the clearance w2 between the bushing 11 and the power cord 10 in the tubular inner space 11a is set larger than the clearance w1 therebetween in the twist regulation portion A1.

[0022] In this embodiment, the clearance between the bushing 11 and the power cord 10 in the tubular inner space 11a of the bushing 11 is gradually increased from the twist regulation portion A1 to the spark attenuation portion A2. Specifically, in this embodiment, the clearance w2 in the spark attenuation portion A2 is set larger than the clearance w1 in the twist regulation portion A1 as described above. For changing the clearance in this manner, the clearance is smoothly and gradually changed without providing a sudden change portion such as a bump. Here, if a bump or the like is formed between the twist regulation portion A1 and the spark attenuation portion A2, the bump serves as a barrier to the sparks S occurring in the expected disconnection portion A3. Accordingly, the bump makes it difficult for the sparks S to travel toward the base end side of the tubular inner space 11a of the bushing 11, in other words, toward the inside of the handle casing 3a from the disconnection position B. This may sometimes increase a probability of the sparks S travelling toward the tip side of the tubular inner space 11a of the bushing 11. In this regard, such a barrier is not formed in this embodiment. Thus, the sparks S can relatively smoothly enter the base end side of the tubular inner space 11a of the bushing 11. For this reason, the sparks S can be further prevented from leaking to the outside from the tip portion side of the tubular inner space 11a. Note that, in the tubular inner space 11a of the bushing 11, the clearance may be gradually increased over

the entire tubular inner space 11a from the base end to the tip. Moreover, in the region to serve as the twist regulation portion A1, the clearance (i.e., an inside tubular diameter) in the tubular inner space 11a may be approximately fixed, whereas the clearance (i.e., the inside tubular diameter) may be gradually increased from the longitudinal tip-side end of the twist regulation portion A1 to the tip side.

[0023] As described above, in this embodiment, the bushing 11 is provided with the twist regulation portion A1 that regulates the twist of the power cord 10. Moreover, by regulating the twist of the power cord 10 by the twist regulation portion A1, the expected disconnection portion A3 is set within the tubular inner space 11a of the bushing 11. The expected disconnection portion A3 is where the power cord 10 is expected to be disconnected due to the twist thereof. Furthermore, the spark attenuation portion A2 for attenuating the sparks S occurring in the tubular inner space due to disconnection of the power cord 10 at the expected disconnection portion A3, is provided in a portion extending from the twist regulation portion toward the tip. Specifically, the disconnection position B due to the twist of the power cord 10 is specified within the tubular inner space 11a of the bushing 11 by providing the twist regulation portion A1. Thus, the sparks S occurring at the disconnection position B can be more reliably attenuated by the spark attenuation portion A2. As a result, the sparks S can be prevented from leaking to the outside from the tip side of the tubular inner space 11a. In other words, with a relatively simple configuration, the sparks S occurring when the power cord 10 is twisted and disconnected can be prevented from leaking from the tubular inner space 11a of the bushing 11.

[0024] Moreover, in this embodiment, the twist regulation portion A1 is provided as the region where the clearance between the bushing 11 and the power cord 10 in the tubular inner space 11a of the bushing 11 is smaller than that in the spark attenuation portion A2 ($w_1 < w_2$). To be more specific, the amount of twist of the power cord 10 in the tubular inner space 11a of the bushing 11 is specified by setting the clearance. Thus, the twist regulation portion A1 can be obtained as a relatively simple configuration.

[0025] Furthermore, in this embodiment, the clearance is gradually increased from the twist regulation portion A1 to the spark attenuation portion A2. Accordingly, it becomes easier for the sparks S occurring in the expected disconnection portion A3 to enter the twist regulation portion A1 side, i.e., the base end side of the tubular inner space 11a of the bushing 11. Thus, the sparks S can be further prevented from leaking to the outside of the tubular inner space from the tip side of the bushing 11.

(Second Embodiment)

[0026] Fig. 3 is a cross-sectional view of a portion provided with a bushing of a hair dryer as a hair care device according to this embodiment.

[0027] A hair dryer 1A according to this embodiment is different from that of the first embodiment in a point that a power cord 10 covered with a tube 12 is inserted into a bushing 11. To be more specific, the tube 12 is a heat-shrinkable tube which is attached by being shrunk by heating. At a tip side of the tube 12 (at the longitudinal tip side of the bushing 11), provided is a heat-shrink region 12a where the heat-shrinkable tube is shrunk. On the other hand, at a base end side of the tube 12, provided is an expansion region 12b where the heat-shrinkable tube is not shrunk. In a state where the power cord 10 covered with the tube 12 is installed by being inserted into the bushing 11, a boundary portion 12c between the heat-shrink region 12a and the expansion region 12b is set in a position shifted from an expected disconnection portion A3 toward the tip. In this event, in the expansion region 12b, an outside diameter of the expansion region 12b (i.e., a diameter of the tube 12 before heat shrink) is set larger than an inside diameter of the bushing 11 in the tubular inner space 11a to such an extent that the expansion region 12b comes into close contact with an inner wall surface of the bushing 11 in the tubular inner space 11a. Thus, the tubular inner space 11a of the bushing 11 is blocked by the boundary portion 12c.

[0028] Therefore, the boundary portion 12c serves as a barrier to prevent sparks S occurring at a disconnection position B from entering the tip side beyond the boundary portion 12c. This causes the sparks S to be within a region 11h extending from the boundary portion 12c of the tube 12 toward the base end (i.e., within a region inward of the expansion region 12b and outward of the power cord 10).

[0029] In other words, according to this embodiment, since the tubular inner space 11a of the bushing 11 is blocked by the tube 12 in a position shifted from the expected disconnection portion A3 to the tip, the sparks S can be more reliably prevented from leaking to the outside of the tubular inner space from an opening 11g at the tip side of the bushing 11. Note that although a spark attenuation portion A2 is preferably provided also in such a configuration, an effect due to the blocking with the boundary portion 12c is achievable even when no spark attenuation portion A2 is provided.

[0030] Although the preferred embodiments of the present invention have been described above, the present invention is not limited to the above embodiments and various modifications can be made thereto. For example, the present invention can be implemented as various hair care devices shown in Figs. 4 to 6.

[0031] A hair dryer 1B with brush shown in Fig. 4 is provided with a brush 14 having bristles 14a at a tip portion of a main body part 13. The brush 14 has outlets 14b formed therein, from which hot air or cold air is blasted out. The hair dryer 1B with brush includes an electric motor for driving a fan, a heater and the like (not shown) as electrical components. Also, the same bushing 11 and tube 12 as those of the second embodiment are provided in a portion where a power cord 10 for supplying power

to those electrical components is let out from a casing of the main body part 13.

[0032] A hair iron 1C shown in Fig. 5 has heating holders 16A and 16B at a tip portion of a main body part 15. The hair iron 1C includes a heater and the like (not shown) as electrical components. Also, the same bushing 11 and tube 12 as those of the second embodiment are provided in a portion where a power cord 10 for supplying power to those electrical components is let out from a casing of the main body part 15.

[0033] A hair brush 1D shown in Fig. 6 is provided with a brush 18 having bristles 18a at a tip portion of a main body part 17. The hair brush 1D includes an electric motor for a hair cutter, a heater and the like (not shown) as electrical components. Also, the same bushing 11 and tube 12 as those of the second embodiment are provided in a portion where a power cord 10 for supplying power to those electrical components is let out from a casing of the main body part 17.

[0034] It goes without saying that a configuration including only the bushing 11 of the first embodiment (without a tube) is applicable to the various hair care devices shown in Figs. 4 to 6, in place of the configuration including both the bushing 11 and the tube 12 of the second embodiment.

[0035] Moreover, specifications of the bushing, the tube and the power cord to which those components are applied, and the like are not limited to the above embodiments, but the present invention can be applied to various other types. Moreover, a rib for preventing twist, or the like may be provided as the twist regulation portion.

[0036] Furthermore, in the tubular inner space of the bushing, the clearance between the power cord and the bushing may be set larger in the portion extending from the twist regulation portion to the base end (i.e., on the handle part side) than that in the twist regulation portion. In this way, sparks can more readily travel toward the base end side.

[0037] It can be easily understood that each of the configurations disclosed above effectively functions against sparks generated by disconnection of the power cord due to bending thereof.

Industrial Applicability

[0038] The present invention is applicable to a hair care device having a bushing provided in a portion from which a power cord is let out to the outside, the bushing covering the portion.

Claims

1. A hair care device with a power cord for power supply to an internal electrical component having a portion being let out from a casing and covered with a bushing of tubular form having a base end fixed to the casing, the hair care device **characterized by**:

a twist regulation portion in the bushing to regulate twist of the power cord for setting an expected disconnection portion for the power cord to be disconnected due to twist of the power cord in a tubular inner space of the bushing; and a spark attenuation portion at a portion in the tubular inner space of the bushing nearer to a distal end thereof than the twist regulation portion to attenuate spark occurred in the tubular inner space due to disconnection of the power cord at the expected disconnection portion.

2. The hair care device according to claim 1, **characterized by** a clearance between the bushing and the power cord in the tubular inner space of the bushing smaller in the twist regulation portion than in the spark attenuation portion.

3. The hair care device according to claim 2, **characterized by** a gradual increase of the clearance from the twist regulation portion to the spark attenuation portion.

4. The hair care device according to claim 1, **characterized by**:

a tube covering the power cord in the tubular inner space of the bushing; and a blockage of the tubular inner space with the tube at a position nearer to the distal end than the expected disconnection portion.

5. A hair care device with a power cord for power supply to an internal electrical component having a portion being let out from a casing and covered with a bushing of tubular form having a base end fixed to the casing, the hair care device **characterized by**:

a twist regulation portion in the bushing to regulate twist of the power cord for setting an expected disconnection portion for the power cord to be disconnected due to twist of the power cord in a tubular inner space of the bushing; a tube covering the power cord in the tubular inner space of the bushing; and a blockage of the tubular inner space with the tube at a position nearer to the distal end than the expected disconnection portion.

6. The hair care device according to any one of claims 4 and 5, **characterized in that** the tube is a heat-shrinkable tube adhering to the power cord.

FIG. 1

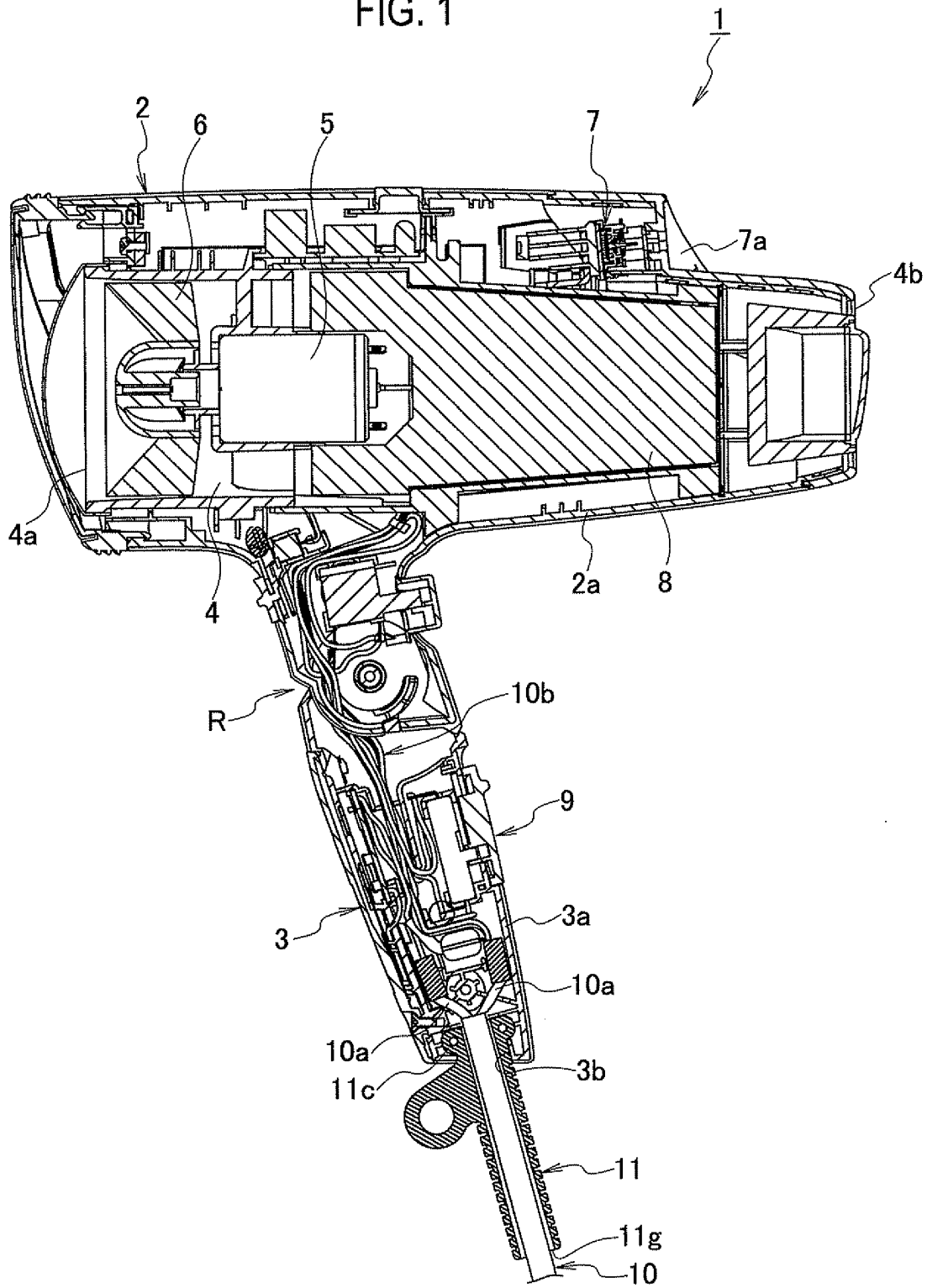


FIG. 2

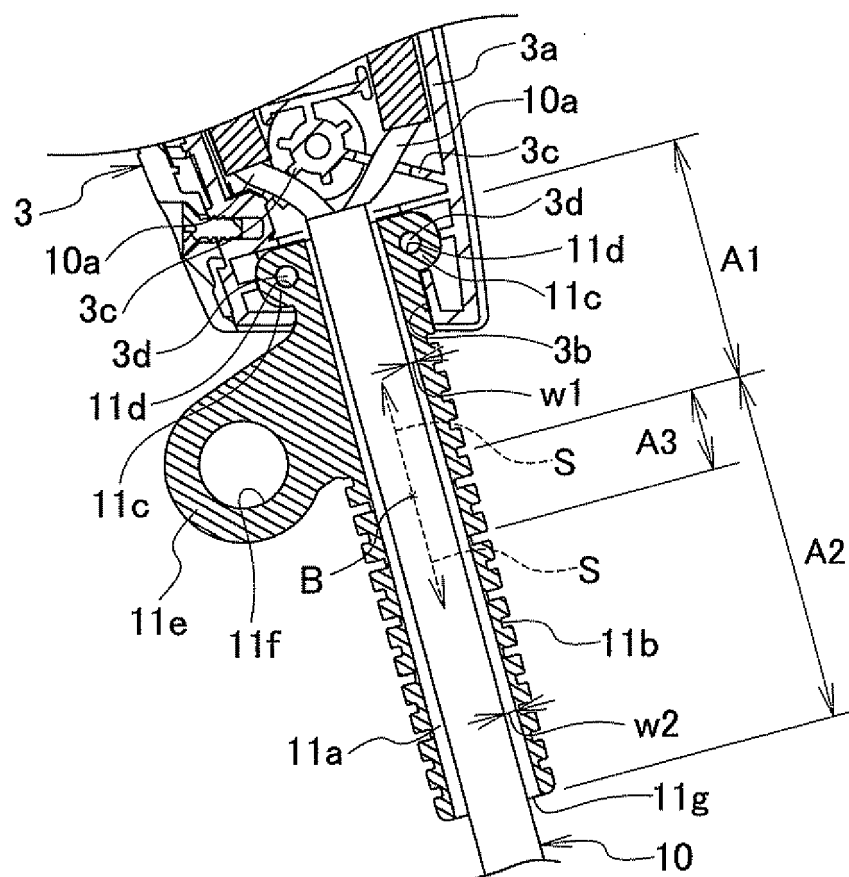


FIG. 3

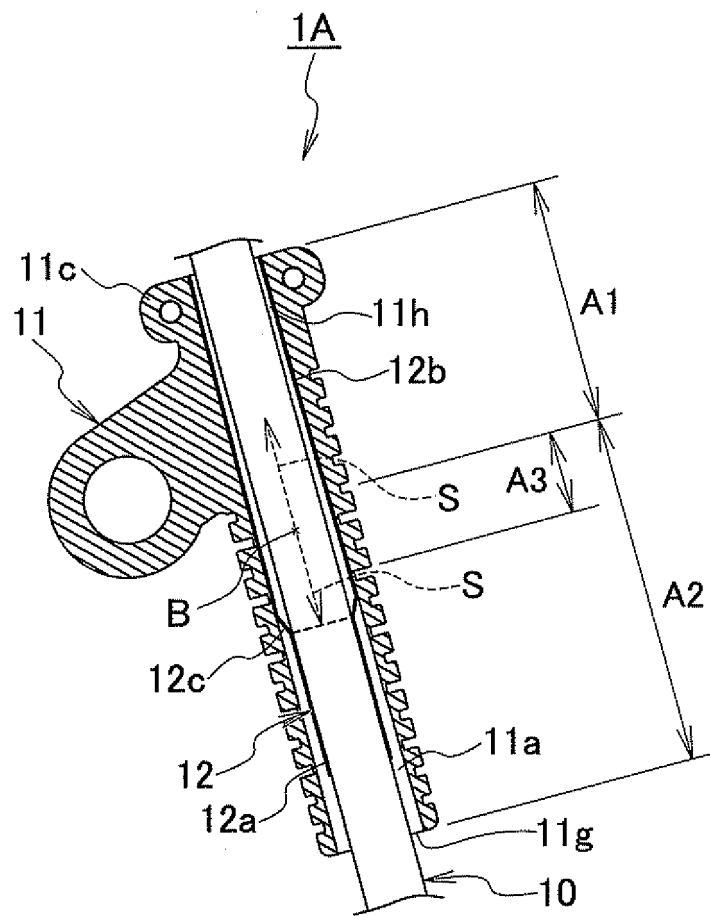


FIG. 4

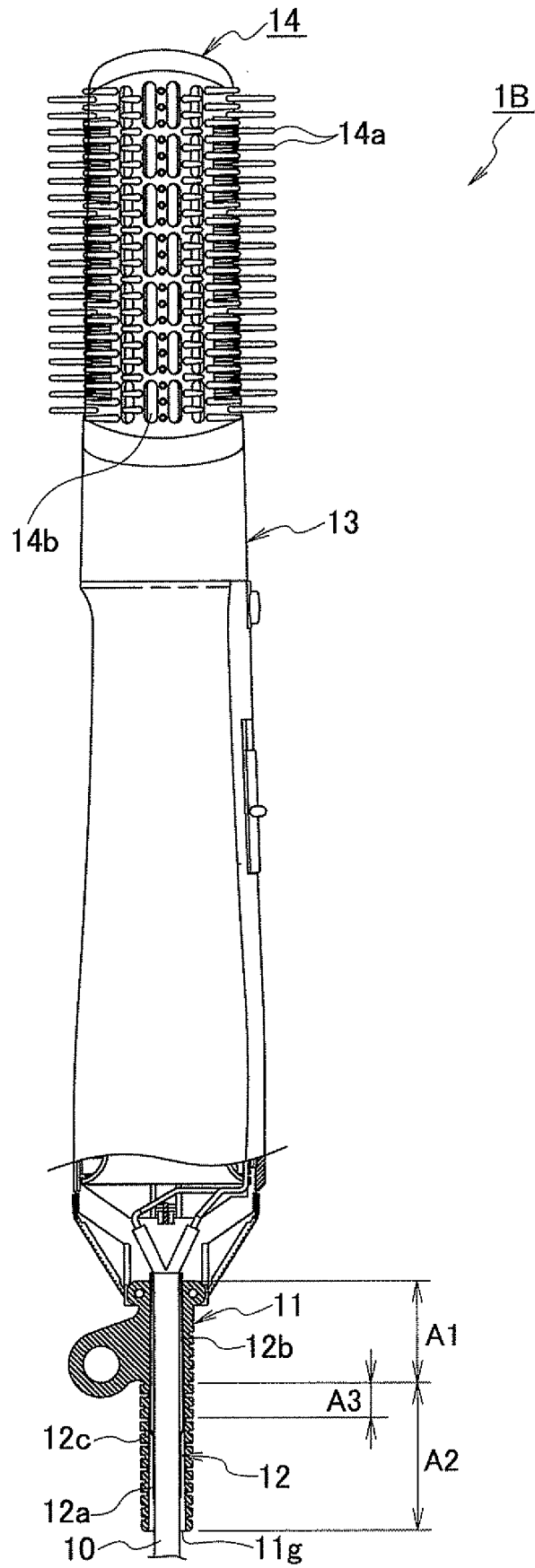


FIG. 5

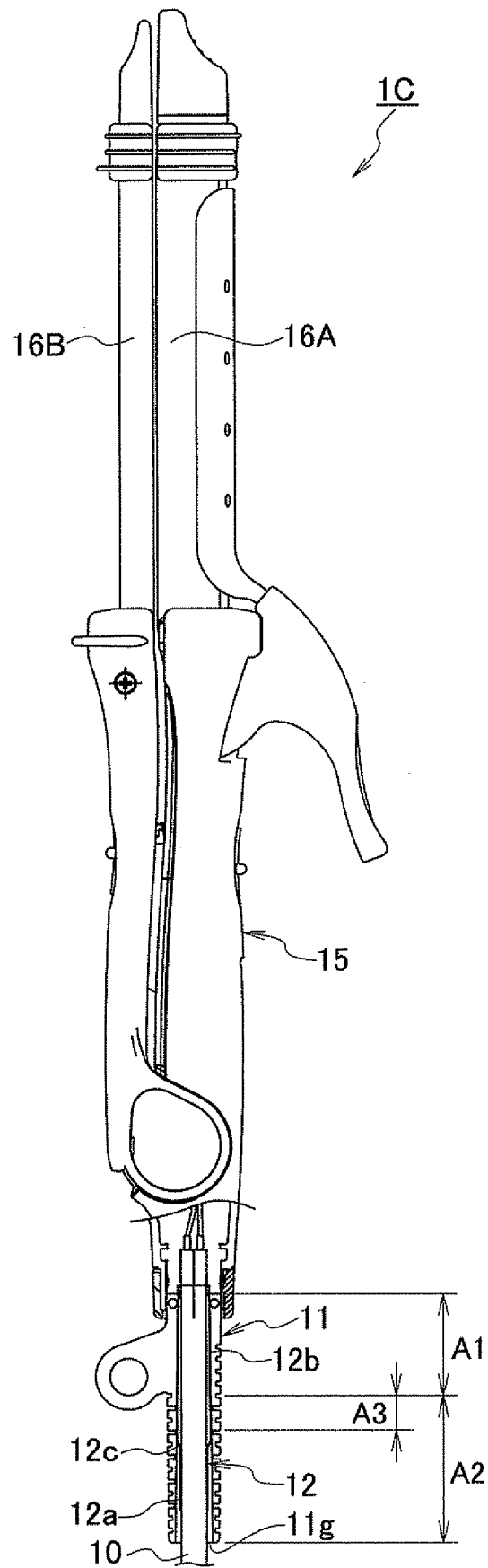
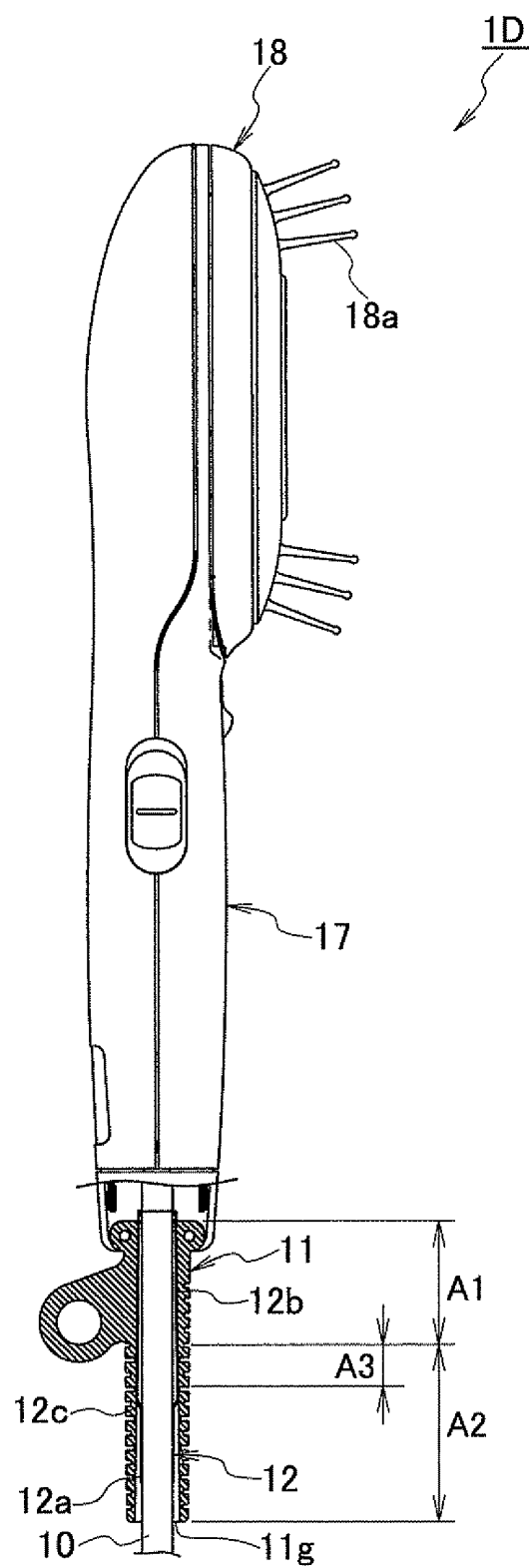


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2009/056617

A. CLASSIFICATION OF SUBJECT MATTER A45D20/12(2006.01) i, A45D1/00(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) A45D20/12, A45D1/00		
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 1996-2009 Kokai Jitsuyo Shinan Koho 1971-2009 Toroku Jitsuyo Shinan Koho 1994-2009		
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. 192424/1982 (Laid-open No. 96878/1984) (Matsushita Electric Works, Ltd.), 30 June, 1984 (30.06.84), Full text; all drawings (Family: none)	1-6
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 22 April, 2009 (22.04.09)		Date of mailing of the international search report 12 May, 2009 (12.05.09)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2002369714 A [0004]