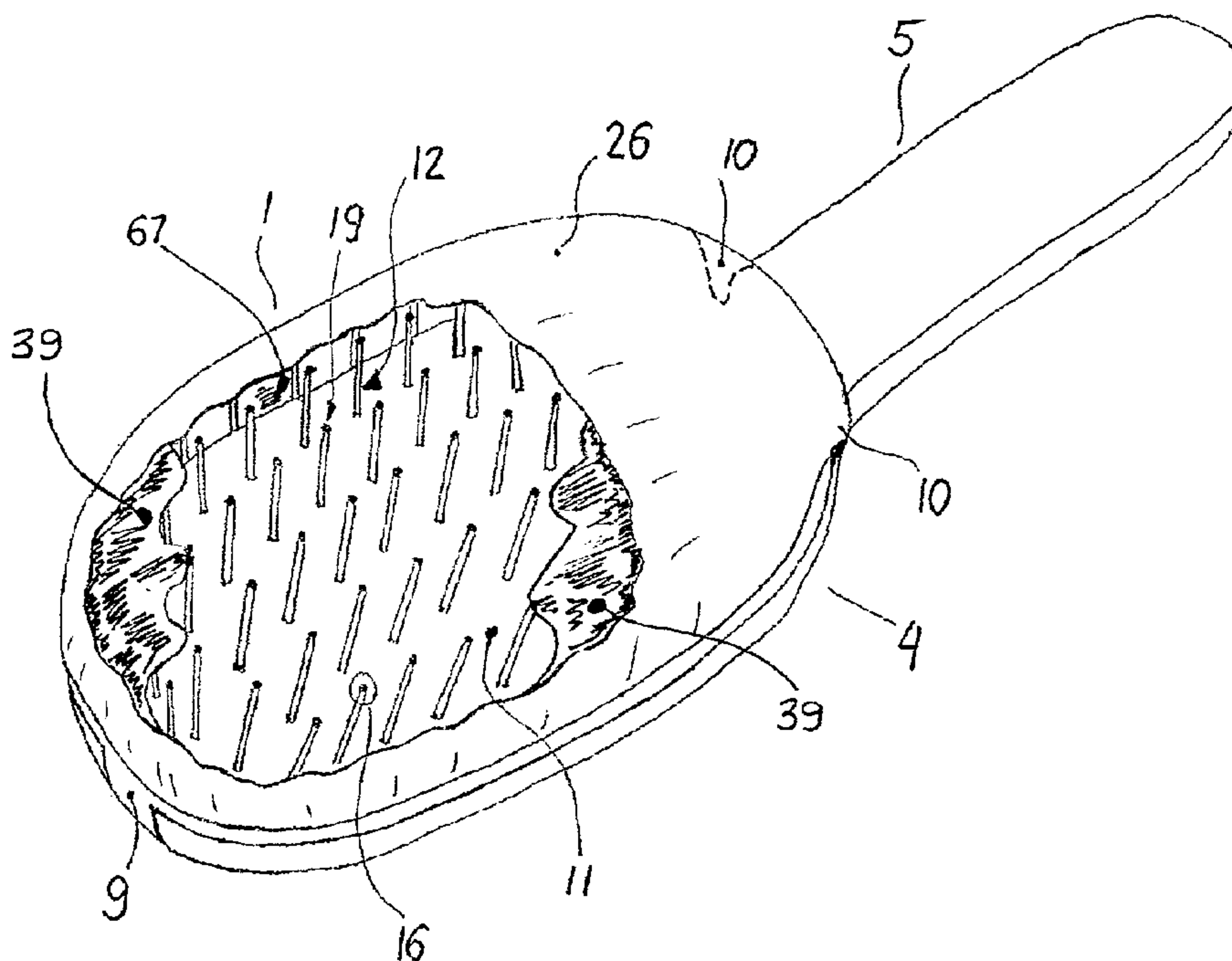




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 (54) Title: LIQUID-RESERVOIR HAIRBRUSH SYSTEM



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A liquid-reservoir hairbrush (1) that is capable of evenly dispersing water-based solutions and other thin and non-viscous liquids over the user's scalp and/or through the user's hair during routine hair brushing. Absorbent filler unit(s) (6) are placed into a chamber (58) of the hairbrush body (4) and absorbent feed rods (15) are placed into bores (13) of the hairbrush bristles (12). The hairbrush (1) can be provided with roller-ball (19) or felt-tipped nozzles (20) mounted at distal ends of the hairbrush bristles (12), or with side nozzles located at the bristle's side walls. The absorbent feed rods (15) interconnects the absorbent filler unit(s) (6) and the nozzles, and the liquid from the absorbent filler unit(s) (6) is supplied through the absorbent feed rods (15) to the nozzles. The chamber (58) of the hairbrush body (4) can be divided into multiple, hermetically isolated sections. The hairbrush body (4) can have an optional filler inlet (57) and can come with an optional liquid refilling unit (30) which can hold a predetermined volume of the liquid. The hairbrush (1) comes with a removable bristle lid (26) to keep the bristles enclosed when the hairbrush is not in use and to help prevent the nozzles from drying out.

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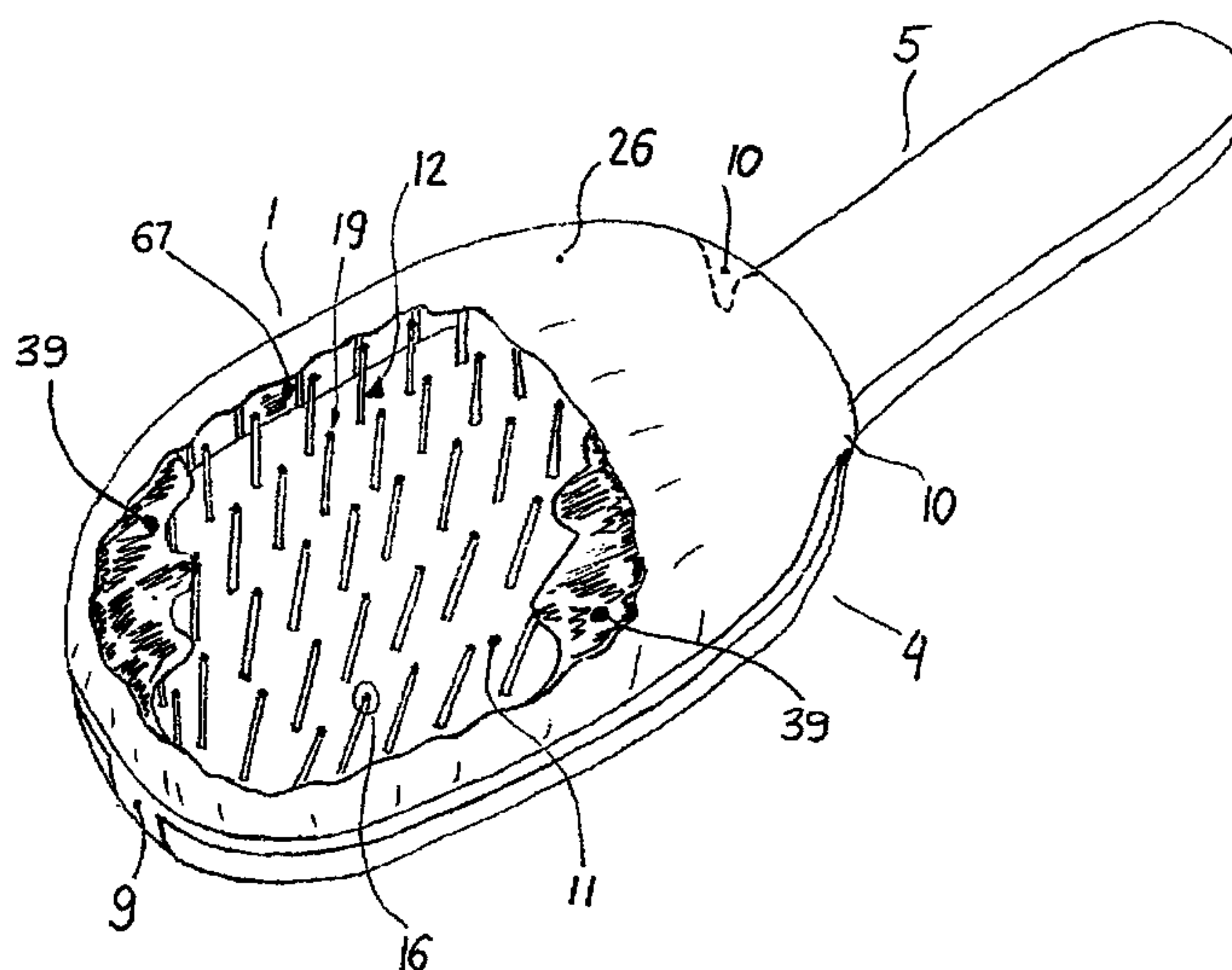
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(54) Title: LIQUID-RESERVOIR HAIRBRUSH SYSTEM



(57) **Abstract:** A liquid-reservoir hairbrush (1) that is capable of evenly dispersing water-based solutions and other thin and non-viscous liquids over the user's scalp and/or through the user's hair during routine hair brushing. Absorbent filler unit(s) (6) are placed into a chamber (58) of the hairbrush body (4) and absorbent feed rods (15) are placed into bores (13) of the hairbrush bristles (12). The hairbrush (1) can be provided with roller-ball (19) or felt-tipped nozzles (20) mounted at distal ends of the hairbrush bristles (12), or with side nozzles located at the bristle's side walls. The absorbent feed rods (15) interconnects the absorbent filler unit(s) (6) and the nozzles, and the liquid from the absorbent filler unit(s) (6) is supplied through the absorbent feed rods (15) to the nozzles. The chamber (58) of the hairbrush body (4) can be divided into multiple, hermetically isolated sections. The hairbrush body (4) can have an optional filler inlet (57) and can come with an optional liquid refilling unit (30) which can hold a predetermined volume of the liquid. The hairbrush (1) comes with a removable bristle lid (26) to keep the bristles enclosed when the hairbrush is not in use and to help prevent the nozzles from drying out.

WO 01/62119 A1

1 LIQUID - RESERVOIR HAIRBRUSH SYSTEM

FIELD OF THE INVENTION

5 The present invention relates to the liquid-reservoir hairbrushes particularly well designed for dispersing low viscosity water-based solutions and other thin and non-viscous liquids over the user's scalp and through the hair.

BACKGROUND OF THE INVENTION

10 Liquid-reservoir hairbrushes and combs have been available for years. In addition to combing and brushing, these devices allow a user to distribute water and oil-based solutions over the user's scalp and/or through hair. In some of these devices, liquid outlets (viz., nozzles) are mounted at distal ends of teeth or bristles. In other devices, the nozzles are located near proximal ends of the teeth or bristles (usually between them) or at a body of the hair device. However, these prior art devices have a variety of shortcomings.

15 For example, if the user wants to disperse the liquid only over the scalp, and the nozzle(s) are located at a bristle area of the body of the brush (e.g. U.S. Patent No. 5,927,290 to Thiruppathi) or between the comb teeth (e.g. U.S. Patent No. 3,964,501 to Matchett), the liquid dispensed from the nozzle initially deposits on the user's hair and wets the hair and only thereafter contacts the user's scalp. This can makes the user's hair excessively wet and uncomfortable. Even more, although the
20 above hair devices allow the user to distribute water-based and other thin and non-viscous liquids through the hair, none of them disperse the liquid evenly. The main reason why the above devices are not able to disperse the liquids evenly through the hair is because it is extremely difficult to control a direct liquid flow through any type of nozzle.

25 Moreover, because a diameter of the nozzle is much smaller than a size of a liquid reservoir, different types of pumps are used to force the liquid flow through the nozzle. Accordingly, a person using this type of device has to adjust the liquid flow dispensed through the nozzle by operating different types of control mechanisms (e.g. U.S. Patent No. 3,721,250 to Walter and U.S. Patent No. 5,927,290 to Thiruppathi). Since the user usually has to perform the above procedure during hair
30 brushing or combing, the prior art liquid-reservoir hairbrushes and combs with pumps are relatively complicated to operate.

Furthermore, there are other problems associated with the dispersion of water-based solutions and other thin and non-viscous liquids over the user's scalp for the devices with pumps. If the nozzles are mounted within the ends of the brush bristles or comb teeth (e.g. U.S. Patent No. 3,101,086 to

1 Di Vito). it would appear to be troublesome to control the liquid flow through the nozzles. Since
most of the above devices have open-end teeth or bristles, the liquid will come out from the nozzles
whether or not there is a contact with the user's scalp. Because all brush bristles or comb teeth cannot
entirely contact the user's scalp simultaneously, the excessive liquid disperses between the user's hair
5 and makes them wet. Others have attempted to devise ways to work around this problem. For
example, U.S. Patent No. 4,055,195 to Moses discloses a fluid-reservoir hair comb with roller-balls
mounted within the end of each comb tooth. Although the roller-ball installed within the nozzle can
partially control a high viscosity liquid flow of the oil-based solutions dispensed from the particular
nozzle, the Moses construction is absolutely not acceptable for the low viscosity water-based
10 solutions and other thin and non-viscous liquids. A well-known effect (previously described for
ballpoint pens) of natural outflow of liquid through a gap between the roller-ball and an internal wall
of the roller-ball seat, a so-called direct-flow phenomenon, in which air flows in through the gap to
allow the liquid to flow out from the liquid reservoir, is liable to take place. Even more, there are
another two potential problems for the users of the Moses device. First, the Moses reference notes
15 that the roller-ball installed within the nozzle of the comb tooth can release the liquid only upon
moving contact of the roller-ball with the user's scalp. Since the human head is curved, just a few
comb teeth usually contact the user's scalp with each pass of the comb through the person's hair.
Therefore, it is very likely that the user of the Moses device will not be able to evenly dispense a
sufficient amount of the liquid over the scalp during routine hair combing. Second, because of the
20 high viscosity of the oil-based solutions, the person using the Moses comb has to apply an additional
abnormal pressure to the comb to be able move the roller-balls inside of the nozzles while combing.
There are certain cases where a user will desire to distribute a liquid evenly through his or her hair,
for example, for styling purposes. There may be other situations where a user would like to be able
to disperse at the same time one liquid only over the scalp (e.g. a medicated solution), and another
25 liquid evenly through the hair (e.g. a styling solution). None of the prior art devices allow the person
to do either of these effectively. Accordingly, there is a need for a liquid-reservoir hair device that
is capable of evenly dispersing water-based solutions and other thin and non-viscous liquids through
the user's hair and/or over the scalp during routine hair combing or brushing.

30 BRIEF DESCRIPTION OF THE INVENTION

It is a first object of the invention to provide a liquid-reservoir hairbrush that is capable of
dispersing water-based solutions and other thin and non-viscous liquids over the user's scalp during
routine hair combing or brushing.

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1 The first object is achieved by locating at least one absorbent filler unit (*viz.*, liquid absorbent)
in a chamber of the hairbrush body and absorbent feed rods in bores of the hairbrush bristles. The
hairbrush bristles are preferably mounted to a flexible base and the absorbent filler unit(s) are
preferably made from a sufficiently spongy and/or springy material. The absorbent filler unit(s) are
5 placed into the chamber of the hairbrush body and covered by the flexible base. Liquid outlets (*viz.*,
nozzles) are mounted at distal ends of the hairbrush bristles and have a roller-ball liquid distribution
mechanism, in which roller-balls are rotatably mounted within each nozzle to disperse the liquid over
the user's scalp only during rolling contact of the roller-ball with the user's scalp. The absorbent feed
rods interconnect the absorbent filler unit(s) and the roller-balls, and the liquid from the absorbent
10 filler unit(s) is supplied to the roller-balls, by means of the liquid passing through the absorbent feed
rods to feed a surface of each roller-ball. When the user brushes his or her hair, the hairbrush bristles
push on the flexible base and pressurize the absorbent filler unit(s). This pressure helps to move the
liquid from the absorbent filler unit(s) down to the absorbent feed rods. The hairbrush body can have
an absorbent filler divider which separates the chamber of the hairbrush body into multiple,
15 hermetically isolated sections, and multiple absorbent filler units can be placed into these sections.
A purpose of the separation is to keep the hairbrush in an overall workable condition, even if some
of the nozzles and /or the hairbrush bristles leak and the liquid starts to drain or vaporize from the
absorbent filler unit(s). The hairbrush can be provided with a removable bristle lid to keep the
hairbrush bristles enclosed when the hairbrush is not in use, and to prevent the roller-balls from
20 drying out. A body of the hairbrush will preferably have a filler inlet, so that the user can refill the
absorbent filler unit(s) with the liquid with or without an optional liquid refilling unit which can hold
a predetermine volume of the liquid.

It is another object of the invention to provide a hairbrush with bristles having roller-ball
nozzles, wherein an intermediate transitional absorbent unit is mounted between an absorbent feed
25 rod and a roller-ball. A main purpose of the intermediate absorbent unit is to adjust provide a
transition between the absorbent feed rod 50 (with diameter 62) and the roller-ball 44 with a possibly
dissimilar sized diameter 47.

It is further object of the invention to provide a hairbrush with bristles having felt-tipped
nozzles mounted at distal ends of the brush bristles. The felt-tipped nozzles can have two different
30 designs, wherein in a first possible design an absorbent dispersing unit is mounted within each
nozzle, and wherein an absorbent feed rod extends outwardly beyond the distal end of each hairbrush
bristle and extends into the absorbent dispersing unit. Liquid from an absorbent filler unit is supplied
through the absorbent feed rod in a direction of the absorbent dispersing unit to feed a surface of a

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1 distal end of the absorbent dispersing unit. The liquid from the felt-tipped nozzle disperses over the
user's scalp upon contact of the distal end of the absorbent dispersing unit with the scalp during
brushing. In a second possible design, a portion of an absorbent feed rod extends outwardly beyond
a distal end of the hairbrush bristle to be able to contact with the user's scalp during brushing. Liquid
5 from the absorbent feed rods will disperse over the user's scalp upon contact of the distal ends of the
absorbent feed rods with the scalp during brushing. The felt-tipped nozzle design may provide a
softer feeling brush for the users with a sensitive scalp.

It is yet another object of the invention to provide a hairbrush with bristles having side
nozzles at side walls of the bristles. The absorbent feed rods extend outwardly beyond the side walls
10 of the bristles and can contact the user's hair during brushing. The above type of construction of the
hairbrush bristles can be very useful to evenly disperse different type of liquids through the user's
hair during brushing.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The invention is set forth in greater detail, with reference to the drawings, but is not so
limited.

FIG. 1 is a perspective view of a first embodiment of the hairbrush in accordance with the
invention. A bristle lid is partially open and a bristle area is shown:

20 FIG. 2 is a perspective view of the hairbrush of FIG. 1 with the bristle lid closed and partially
exposed to show the bristle area:

FIG. 3 is a perspective view of the hairbrush of FIG. 1 shown without the bristle lid;

FIG. 4 is an exploded perspective view of the hairbrush of FIG. 1 with a bristle frame
removed to show a partially exposed absorbent filler unit:

25 FIG. 5 is an exploded perspective view of the hairbrush of FIG. 1 with the bristle frame
removed to show bores of the hairbrush bristles:

FIG. 6 is a perspective view of a second embodiment of the hairbrush in accordance with the
invention. A filler cap is removed from a filler inlet and an absorbent filler unit is shown:

FIG. 6a is a perspective view of an optional liquid refilling unit;

30 FIG. 7 is an exploded perspective view of a third embodiment of the hairbrush in accordance
with the invention with a bristle frame removed to show a divider for an absorbent filler unit:

FIG. 8 is a perspective view of the hairbrush of FIG. 7 with a filler cap removed from a filler
inlet to show the absorbent filler divider and the absorbent filler unit:

1 FIG. 9 is a cross-sectional view of a first embodiment of the hairbrush bristle showing a roller-ball nozzle and a connection between the absorbent filler unit and an absorbent feed rod;

FIG. 10 is a cross-sectional view of a second embodiment of the hairbrush bristle showing an optional roller-ball nozzle, wherein an intermediate transitional absorbent unit is mounted within
5 the nozzle between a roller-ball and an absorbent feed rod;

FIG. 11 is a cross-sectional view of a third embodiment of the hairbrush bristle showing a first possible design of a felt-tipped nozzle, wherein a portion of an absorbent feed rod extends outwardly beyond a distal end of the brush bristle;

FIG. 12 is a cross-sectional view of a fourth embodiment of the hairbrush bristle showing a
10 second possible design of a felt-tipped nozzle, wherein an absorbent dispersing unit is mounted within the felt-tipped nozzle in order to contact the user's scalp during brushing;

FIG. 13 is a cross-sectional view of a fifth embodiment of the hairbrush bristle showing side nozzles:

FIG. 14 is a perspective view of the hairbrush bristle of FIG. 13:

15 FIG. 15 is a cross-sectional view of a sixth embodiment of the hairbrush bristle showing the bristle having a felt-tipped nozzle at a distal end of the bristle and side nozzles:

FIG. 16 is a cross-sectional view of a seventh embodiment of the hairbrush bristle showing the bristle having a roller-ball nozzle and side nozzles:

FIG. 17 is a cross-sectional view of a proximal end of a hairbrush bristle showing an
20 alternative type of connection between an absorbent filler unit and an absorbent feed rod, wherein the absorbent filler unit partially extends into the bristle's bore;

FIG. 18 is a cross-sectional view of a proximal end of a hairbrush showing an alternative type of an absorbent filler unit:

25 DETAILED DESCRIPTION OF THE INVENTION

The major goal of the present invention is to provide a liquid-reservoir hairbrush that will allow a user to conveniently and evenly disperse water-based solutions and other thin and non-viscous liquids over the scalp and/or through the hair during routine hair combing or brushing. One great advantage of a hairbrush or comb with liquid outlets (viz., nozzles) located at distal ends
30 of comb teeth or hairbrush bristles and having a roller-ball liquid distribution mechanism is that the liquid from each particular nozzle will be released only upon moving contact of the roller-ball mounted within that nozzle with the user's scalp.

1 To prevent a natural outflow of a liquid through the roller-ball nozzles mounted at the distal
ends of the hairbrush bristles, and/or to transport the liquid from the liquid reservoir down to the
roller-ball nozzles, for all embodiments of the hairbrush of the invention an absorbent filler unit(s)
will be placed into the hairbrush's liquid reservoir, and absorbent feed rods will be placed into bores
5 of the hairbrush bristles. With respect to the above described design, there are two main reasons why
a hairbrush construction is more preferable than a comb construction for efficiently dispersing of the
liquid over the user's scalp from the roller-ball nozzles. First, usually just a few comb teeth can
contact the user's scalp with each pass of the comb through the person's hair. Thus, it will be very
likely, that if the roller-ball nozzles are mounted at the ends of the comb teeth, the user of this type
10 of comb will not be able to evenly disperse a sufficient amount of the liquid over the scalp during
typical hair combing. The hairbrush construction will have a greater number of bristles in contact
with the user's scalp at any given time. Second, the hairbrush construction permits the bristles to be
mounted to a base that can be formed from a flexible material. When pressure is applied to the
hairbrush bristles while brushing, the flexible base moves upwardly, thereby pressurizing the
15 absorbent filler unit (if the absorbent filler unit is made from sufficiently spongy and/or springy
material) and helps to move the liquid from the absorbent filler unit down to the absorbent feed rods
located in the bores of the hairbrush bristles.

The following features are combined in one device in the present invention to accomplish
convenient and even dispersion of water-based solutions and other thin and non-viscous liquids over
20 the user's scalp and/or through the user's hair during routine hair combing or brushing:

- (a) The device will have at least two and preferably several rows of the hairbrush bristles
preferably mounted to a flexible base;
- (b) The device will have a liquid reservoir at least partially filled with at least one absorbent filler
unit;
- 25 (c) At least one bore will be formed through at least some of the hairbrush bristles, and at least
one absorbent feed rod will be placed into each bore;
- (d) Liquid outlets (viz., nozzles) will be mounted:
 - at distal ends of the hairbrush bristles to accomplish even dispersion of the liquid over
the user's scalp, and/or
 - 30 - at side walls of the hairbrush bristles to accomplish even dispersion of the liquid
through the user's hair;
- (e) The nozzles located at the distal ends of the hairbrush bristles can have:
 - a roller-ball liquid distribution mechanism; or

- 1 - a felt-tipped design, wherein:
2 - the absorbent feed rod will extend outwardly from the distal end of each
3 hairbrush bristle and contacts an absorbent dispersing unit mounted within
4 each nozzle, and wherein the liquid from the felt-tipped nozzle disperses over
5 the user's scalp upon contact of a distal end of the absorbent dispersing unit
6 with the scalp during brushing; or
7 - the absorbent feed rod located in the bristle bore will extend outwardly
8 beyond a distal end of each hairbrush bristle to form a felt-tipped nozzle
9 available for contact with the user's scalp during brushing; and
10 (f) The absorbent filler unit(s) and the absorbent feed rods will be used to transport the liquid
11 from the liquid reservoir to the nozzles located at the distal ends of the hairbrush bristles or to the
12 side nozzles located at the side walls of the hairbrush bristles, and to prevent a natural outflow of the
13 liquid through the roller-ball nozzles.

Three different embodiments of the hairbrush of the invention are presented.

15 A first embodiment (FIGS. 1 - 5) is shown in general as 1. A second embodiment (FIG. 6) is shown
16 in general as 2. A third embodiment (FIGS. 7 - 8) is shown in general as 3.

Referring to the first embodiment (FIGS. 1 - 5), a hairbrush 1 has a body 4, a handle 5 and
17 a bristle lid 26. The body 4 has a chamber 58 (FIG. 4), an absorbent filler unit 6, a hairbrush frame
18 7 and a bristle frame 8 (FIGS. 4-5). The bristle lid 26 has a catch clip 9 and two holders 10 which
19 engage with the hairbrush body 4 near the handle 5 to permit detachable engagement of the bristle
20 lid 26 with the body 4 of the hairbrush 1. The bristle frame 8 has a flexible base 11 with a plurality
21 of bristles 12. A diameter 56 (FIG. 9) of each bristle 12 is preferably between 1.5 mm and 2.8 mm,
22 and a length 60 is preferably between 1.5 cm and 3 cm, however other sizes can be provided as well.
23 All of the above hairbrush parts are preferably made from plastic, but can also be made from other
24 known materials. The flexible base 11 is preferably made from a flexible material, such as rubber
25 or plastic. The absorbent filler unit 6 is placed into the chamber 58 and covered by the bristle frame
26 8. The bristle frame 8 is preferably hermetically attached (e.g. by adhesives, welding, etc) to the
27 hairbrush frame 7. The plurality of the bristles 12 extend outwardly from the flexible base 11 held
28 in the bristle frame 8. The flexible base 11 is preferably hermetically attached to the bristle frame
29 8 (e.g. by adhesives, welding, etc). Referring to a first embodiment of the hairbrush bristles 12, each
30 bristle 12 (FIG. 9) has a bore 13, a bristle ring 14, an absorbent feed rod 15 and a roller-ball nozzle
31 16. Each bristle 12 is preferably hermetically attached (e.g. by adhesives, welding, etc) to the flexible
32 base 11 by inserting the bristle ring 14 into the flexible base 11. The roller-ball nozzle 16 is mounted
33

1 at a distal end 17 of the bristle 12. The bore 13 is fully filled by the absorbent feed rod 15 and the
absorbent feed rod 15 extends into the hairbrush body 4 and into the absorbent filler unit 6 and
contacts the absorbent filler unit 6. The absorbent filler unit 6 can be formed from a mass or bundles
of fibers with a preferable porosity of about 60%, although other porosities will also function. The
5 absorbent filler unit 6 can also be formed from plastic or other known materials. The absorbent filler
unit 6 is preferably made from a sufficiently spongy and/or springy material. The size of the
absorbent filler unit 6 may preferably be between 80 cm³ and 120 cm³, so the total amount of the
liquid which can be retained by the absorbent filler unit 6 will be approximately between 48 ml and
72 ml, however other sizes can be provided as well. The absorbent feed rod 15 can be formed from
10 a bundle of resin-bonded fibers, however other known material can be used as well. A diameter 43
of the absorbent feed rod 15 may preferably be between 1 mm and 2.5 mm, however other sizes can
be provided as well. The roller-ball nozzle 16 is mounted at the distal end 17 of the bristle 12 and
comprises a roller-ball seat 18 and a roller-ball 19. The roller-ball seat 18 has a rim structure 20 to
retain the roller-ball 19 within the roller-ball seat 18. The roller-ball 19 partially extends outwardly
15 beyond the roller-ball nozzle 16 in order to contact the user's scalp during brushing. The roller-ball
19 and the roller-ball seat 18 can be made from stainless steel or other known materials. The
roller-ball 19 can also be made from a porous composite material, porous stainless steel or other
known porous material. Use of a porous roller-ball 19 can improve the dispersion of the liquid from
the roller-ball nozzle 16. A diameter 22 of the roller-ball 19 is preferably between 1.5 mm - 2.5 mm,
20 however other sizes can be provided as well. An internal diameter 21 of the roller-ball seat 18 is
preferably 0.075 mm - 0.15 mm larger than the diameter 22 of the roller-ball 19, however other size
difference can be provided as well. An axial hole 23 is formed through the roller-ball seat 18, and
a distal end 24 of the absorbent feed rod 15 extends inwardly into the axial hole 23 and contacts the
roller-ball 19 for supplying the liquid to a surface 25 of the roller-ball 19. The absorbent feed rod 15
25 interconnects the absorbent filler unit 6 and the roller-ball 19. The hairbrush 1 can come pre-filled
with a liquid 61 (e.g. a water-based medicated solution). The liquid 61 from the absorbent filler unit
6 is supplied to the roller-ball 19 by means of the liquid 61 passing through the absorbent feed rod
15 to feed the surface 25 of the roller-ball 19. The roller-ball 19 is mounted within the roller-ball seat
18 for rotational movement to transfer the liquid 61 from the distal end 24 of the absorbent feed rod
30 15 to the user's scalp upon rotational contact of the roller-ball 19 with the user's scalp. Since the
bristles 12 are connected to the flexible base 11, when the user brushes his or her hair, the flexible
base 11 moves upwardly, thereby pressurizing the absorbent filler unit 6 and helps to move the liquid
61 from the absorbent filler unit 6 down to the absorbent feed rods 15. The bristle lid 26 (FIGS. 1

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1 - 2) is provided to keep the hairbrush bristles 12 enclosed when the hairbrush 1 is not in use and
helps prevent the roller-balls 19 from drying out. The bristle lid 26 can be provided with an optional
cleaning pad 39 (FIG. 2). The cleaning pad 39 is attached (e.g. by adhesives, welding, etc) to an
inside surface 67 of the bristle lid 26. The cleaning pad 39 is preferably made from a sufficiently
5 spongy plastic material with a textured surface. The cleaning pad 39 covers and contacts the
roller-ball nozzles 16 when the bristle lid 26 is closed and therefore cleans the roller-ball nozzles 16
after every brushing when the user closes the bristle lid 26 onto the bristles 12. The bristle lid 26 is
conveniently removably mounted to the hairbrush body 4 by the catch clip 9 and two holders 10.

Referring to FIG. 6, the second embodiment of the hairbrush 2 is similar to the first
10 embodiment 1 (FIGS. 1 - 5), except that the hairbrush body 27 has a filler inlet 57 and a filler cap
28, so the user can refill the absorbent filler unit 29 with or without an optional liquid refilling unit
30 (FIG. 6a). The liquid refilling unit 30 has a syringe construction and can hold a predetermine
volume of the liquid depending on the particular design of the hairbrush 2 and the liquid capacity
of the absorbent filler unit 29. The liquid refilling unit 30 is preferably made from a plastic material
15 and has a body 31 and a cap 32. The liquid refilling unit 30 can be pre-filled with the liquid.

The third embodiment of the hairbrush 3 (FIGS. 7 - 8) is similar to the second embodiment
2 (FIG. 6), except that a hairbrush body 33 has an absorbent filler divider 34 which separates a
chamber 35 of the hairbrush body 33 into multiple (e.g. eight) sections 36. The absorbent filler
divider 34 is preferably made from the same material as a hairbrush body 33. Absorbent filler units
20 37 are placed into each section 36, and when a filler inlet 51 is closed by a filler cap 59, the above
sections 36 are preferably hermetically isolated from one another. A purpose of the absorbent filler
divider 34 is to keep the hairbrush 3 in an overall workable condition, even if some of the roller-ball
nozzles 16 and/or the bristles 12 leak and the liquid starts to drain or vaporize from the absorbent
filler units 37.

Referring to FIG. 10, a second embodiment of a hairbrush bristle 38 can be provided for all
25 three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 38 is similar to
the bristle 12 (FIG. 9), except that the bristle 38 has an optional type of a roller-ball nozzle 40. A
diameter 68 of the bristle 38 is preferably between 1.5 mm and 2.5 mm, and a length 80 is preferably
between 1.5 cm and 3 cm, however other sizes can be provided as well. The roller-ball nozzle 40
30 comprises a roller-ball seat 41, an intermediate transitional absorbent unit 42 and a roller-ball 44.
The roller-ball seat 41 has a rim structure 45 to retain the roller-ball 44 within the roller-ball seat 41.
The roller-ball 44 partially extends outwardly beyond the roller-ball seat 41 in order to contact the
user's scalp during brushing. The roller-ball 44 and the roller-ball seat 41 can be made from stainless

1 steel or other known materials. The roller-ball 44 can also be made from a porous composite
material, porous stainless steel or other known porous material. The diameter 47 of the roller-ball
44 is preferably between 2.5 mm and 4 mm, however other sizes can be provided as well. An internal
5 diameter 46 of the roller-ball seat 41 is preferably 0.075 mm - 0.15 mm larger than a diameter 47 of
the roller-ball 44, however other size difference can be provided as well. An axial hole 48 is formed
through the roller-ball seat 41, and a distal end 49 of an absorbent feed rod 50 extends inwardly into
the axial hole 48 and is adjacent to or contacts the intermediate transitional absorbent unit 42. A
10 diameter 62 of the absorbent feed rod 50 is preferably between 1 mm and 2.2 mm, however other
sizes can be provided as well. The intermediate transitional absorbent unit 42 is mounted within the
roller-ball nozzle 40 between the absorbent feed rod 50 and the roller-ball 44 and is adjacent to or
contacts the roller-ball 44. The intermediate transitional absorbent unit 42 preferably has a cylindrical
configuration with a preferable diameter 63 equal to the diameter 47 of the roller-ball 44, however
other sizes can be provided as well. An amount of liquid 52 that the user can disperse over the scalp
15 from the roller-ball nozzle 40 partially depends from the size (viz., the diameter 47) of the roller-ball
44. Since the diameter 62 of the absorbent feed rod 50 is limited by the diameter 68 of the bristle 38
(the brush bristle with a relatively large diameter will be very inconvenient for brushing), the main
purpose of the intermediate transitional absorbent unit 42 is to provide a transition between the
absorbent feed rod 50 (with diameter 62) and the roller-ball 44 with a possibly dissimilar sized
20 diameter 47. The liquid 52 from an absorbent filler unit 53 is supplied to the roller-ball 44 by means
of the liquid 52 passing through the absorbent feed rod 50 and through the intermediate transitional
absorbent unit 42 to feed a surface 54 of the roller-ball 44. The roller-ball 44 is mounted within the
roller-ball seat 41 for rotational movement to transfer the liquid 52 from a distal end 49 of the
intermediate transitional absorbent unit 42 to the user's scalp upon rotational contact of the roller-ball
44 with the user's scalp.

25 Referring to FIG. 11, a third embodiment of a hairbrush bristle 82 can be provided for all
three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 82 is similar to
the bristle 12 (FIG. 9) except that the bristle 82 has a distal opening 83 at a distal end 84. A portion
85 of an absorbent feed rod 86 extends outwardly beyond the distal opening 83 to form a first
embodiment of a felt-tipped nozzle 87 available for contact with the user's scalp during brushing.
30 A diameter 88 of the bristle 82 is preferably between 1.5 mm and 2.5 mm, and a length 89 is
preferably between 1.5 cm and 3 cm, however other sizes can be provided as well. A diameter 90
of the absorbent feed rod 86 is preferably between 1 mm and 2 mm, however other sizes can be
provided as well. Liquid 91 from an absorbent filler unit 92 is supplied to a distal end 93 of the

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1 absorbent feed rod 86, by means of the liquid 91 passing through the absorbent feed rod 86 to feed
a surface 96 of the distal end 93 of the absorbent feed rod 86. The liquid 91 disperses from the distal
end 93 of the absorbent feed rod 86 over the user's scalp upon contact of the distal end 93 of the
absorbent feed rod 86 with the scalp during brushing.

5 Referring to FIG. 12, a fourth embodiment of a hairbrush bristle 69 can be provided for all
three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 69 is similar to
the bristle 12 (FIG. 9) except that the bristle 69 has a second embodiment of a felt-tipped nozzle 70
mounted at a distal end 55 of the bristle 69. A diameter 65 of the bristle 69 is preferably between 1.5
mm and 2.2 mm, and a length 81 is preferably between 1.5 cm and 3 cm, however other sizes can
10 be provided as well. The felt-tipped nozzle 70 consists of a seat 71, a distal portion 72 of an absorbent
feed rod 73 and an absorbent dispersing unit 74. The absorbent dispersing unit 74 preferably has a
cylindrical configuration with a preferable diameter 66 between 2.5 mm and 3.5 mm and can be
formed from bundles of fiber or other known materials. A diameter 64 of the absorbent feed rod 73
is preferably between 1 mm and 2 mm, however other sizes can be provided as well. The absorbent
15 dispersing unit 74 is mounted within the seat 71. The distal portion 72 of the absorbent feed rod 73
extends outwardly through a distal opening 75 of the bristle 69 and extends into (adjacent to or into
contact) the absorbent dispersing unit 74. A distal end 76 of the absorbent dispersing unit 74 extends
outwardly beyond the seat 71 in order to contact the user's scalp during brushing. The seat 71 is
preferably made from stainless steel, plastic or other known materials and preferably is hermetically
20 attached (e.g. by adhesives, welding, etc) to the distal end 55 of the bristle 69. Liquid 77 from an
absorbent filler unit 78 is supplied to the distal end 76 of the absorbent dispersing unit 74, by means
of the liquid 77 passing through the absorbent feed rod 73 to feed a surface 79 of the distal end 76
of the absorbent dispersing unit 74. The liquid 77 disperses from the distal end 76 of the absorbent
dispersing unit 74 over the user's scalp upon contact of the distal end 76 with the scalp during
25 brushing. Referring back to FIG. 11, an amount of the liquid 91 that the user can disperse over the
scalp from the felt-tipped nozzle 87 partially depends on the size (viz., the diameter 90) of the
absorbent feed rod 86 of the bristle 82. Since the diameter 90 of the absorbent feed rod 86 is limited
by the diameter 88 of the bristle 82 (the brush bristle with a relatively large diameter will be very
inconvenient for brushing), the main purpose of the absorbent dispersing unit 74 (FIG. 12) mounted
30 within the felt-tipped nozzle 70 is to increase a dispersion of the liquid 77 from the bristle 69 without
enlargement of the diameter 65 of the bristle 69.

The felt-tipped nozzles 70 and 87 (FIGS. 11 and 12) have a shortcoming compared to the
roller-ball nozzles 16 and 40 (FIGS. 9 and 10), because the liquid from the felt-tipped nozzles 70 and

1 87 can disperse through the user's hair as well as over the scalp. The liquid 77 (FIG. 12) from the
absorbent dispersing unit 74 and the liquid 91 (FIG. 11) from the distal end 93 of the absorbent feed
rod 86 will disperse through the user's hair when the distal end 76 (FIG. 12) of the absorbent
dispersing unit 74 and the distal end 93 of the absorbent feed rod 86 will contact the hair, and can
5 therefore make the hair uncomfortably wet. Notwithstanding this possible shortcoming, the
felt-tipped nozzles 70 and 87 may provide a softer feeling brush for users with a sensitive scalp.

Referring to FIGS. 13 and 14, a fifth embodiment of a hairbrush bristle 94 can be provided
for all three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 94 is
similar to the bristle 12 (FIG. 9) except that the bristle 94 has a plurality of side openings 97 at a side
10 wall 95. Side portions 100 of an absorbent feed rod 98 extend outwardly beyond the side openings
97 to form side nozzles 101. A diameter 102 of the bristle 94 is preferably between 1.5 mm and 2.5
mm, and a length 103 is preferably between 1.5 cm and 3 cm, however other sizes can be provided
as well. A diameter 104 of the absorbent feed rod 98 is preferably between 1 mm and 2 mm, however
other sizes can be provided as well. The side portions 100 of the absorbent feed rod 98 can contact
15 the user's hair during brushing for dispersing liquid 105 through the hair during brushing. The liquid
105 from an absorbent filler unit 106 is supplied to the side nozzles 101, by means of the liquid 105
passing through the absorbent feed rod 98 to feed surfaces 99 of the side portions 100 of the
absorbent feed rod 98. A distal end 107 of the bristle 94 is closed, therefore liquid from the side
nozzles 101 will generally disperse only through the user's hair, and only thereafter can contact the
20 scalp. This type of bristle's construction can be very useful for users who wish to evenly disperse the
liquid (e.g. styling solution) only through the hair during brushing.

Referring to FIG. 15, a sixth embodiment of a hairbrush bristle 108 can be provided for all
three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 108 is similar to
the bristle 12 (FIG. 9) except that the bristle 108 has a plurality of side openings 110 at a side wall
25 109. Side portions 113 of an absorbent feed rod 111 extend outwardly beyond the side openings 110
to form side nozzles 114, and a distal end 115 of the absorbent feed rod 111 extends outwardly
beyond a distal opening 116 to form a felt-tipped nozzle 117 at a distal end 118 of the bristle 108.
A diameter 119 of the bristle 108 is preferably between 1.5 mm and 2.5 mm, and a length 120 is
preferably between 1.5 cm and 3 cm, however other sizes can be provided as well. A diameter 121
30 of the absorbent feed rod 111 is preferably between 1 mm and 2 mm, however other sizes can be
provided as well. Liquid 122 from an absorbent filler unit 123 is supplied to the felt-tipped nozzle
117 and to the side nozzles 114, by means of the liquid 122 passing through the absorbent feed rod
111 to feed a surface 124 of the distal end 115 and surfaces 125 of the side portions 113 of the

1 absorbent feed rod 111. The liquid 122 disperses from the felt-tipped nozzle 117 over the user's scalp
upon contact of the distal end 115 of the absorbent feed rod 111 with the scalp during brushing. The
liquid 122 also disperses from the side nozzles 114 through the user's hair upon contact of the side
portions 113 of the absorbent feed rod 111 with the user's hair during brushing.

5 Referring to FIG. 16, a seventh embodiment of a hairbrush bristle 126 can be provided for
all three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the bristle 126 is similar
to the bristle 12 (FIG. 9) except that the bristle 126 has a plurality of side openings 128 at a side wall
127. Side portions 131 of an absorbent feed rod 129 extend outwardly beyond the side openings 128
to form side nozzles 132, and a roller-ball nozzle 133 is mounted at a distal end 134 of the bristle
10 126. The roller-ball nozzle 133 is similar to the roller-ball nozzle 16 (FIG. 9). A diameter 135 of the
bristle 126 is preferably between 1.5 mm and 2.2 mm, and a length 136 is preferably between 1.5
cm and 3 cm, however other sizes can be provided as well. A diameter 137 of the absorbent feed rod
129 is preferably between 1 mm and 2 mm, however other sizes can be provided as well. Liquid 138
from an absorbent filler unit 139 is supplied to the roller-ball nozzle 133 and to the side nozzles 132,
15 by means of the liquid 138 passing through the absorbent feed rod 129 to feed a surface 140 of a
roller-ball 141 and to feed surfaces 142 of the side portions 131 of the absorbent feed rod 129. The
liquid 138 disperses from the roller-ball nozzle 133 over the user's scalp upon rotational contact of
the roller-ball 141 with the scalp during brushing. The liquid 138 also disperses from the
side-nozzles 132 through the user's hair upon contact of the side portions 131 of the absorbent feed
rod 129 with the user's hair during brushing.

20 The sixth 108 (FIG. 15) and the seventh 126 (FIG. 16) above described bristle's embodiments,
wherein the nozzles are located at the distal ends and at the side walls of the hairbrush bristles 108
and 126 will allow the user to evenly disperse the liquid through the hair as well as over the scalp.

25 Referring back to the third embodiment of the hairbrush 3 (FIGS. 7 - 8), the absorbent filler
divider 34 separates the chamber 35 (viz., the absorbent filler unit 37) of the hairbrush 3 into eight
hermetically isolated sections 36. This allows the different sections 36 to be filled with different
liquids. Moreover, depending on what liquid reservoir (viz., absorbent filler unit) is in contact with
which type of bristle, different bristles will be able to disperse different liquids over the user's scalp
or through the hair during brushing. Thus, it is possible to provide a liquid reservoir hair brush
30 capable of dispersing at the same time one liquid (e.g. a medicated solution) only over the user's
scalp (e.g. from the roller ball nozzles mounted at the ends of the hairbrush bristles) and another
liquid (e.g. a styling solution) evenly through the user's hair (from the side nozzles located at the
sides of the hairbrush bristles).

1 Referring back to all three embodiments of the hairbrush 1, 2 and 3 of the invention, an
alternative type of connection between absorbent filler unit(s) and absorbent feed rods can be
provided for all three embodiments of the hairbrush 1, 2 and 3 of the invention, wherein the
absorbent filler unit partially extends into the bristle's bores. The above connection is shown in FIG.
5 17, where an absorbent filler unit 143 partially extends into a bore 144 of a bristle 145 and contacts
an absorbent feed rod 146.

Referring to FIG. 18, multiple absorbent filler units 147 can be provided for all three
embodiments of the hairbrush 1, 2 and 3 of the invention, wherein an absorbent feed rod 148 of a
bristle 149 extends inwardly into and contacts the separate absorbent filler unit 147, and can also
10 extend beyond the separate absorbent filler unit 147 into a liquid reservoir 150. Liquid 151 from the
liquid reservoir 150 can thus travel through the absorbent filler unit 147 down to the absorbent feed
rod 148. Each absorbent filler unit 147 is preferably formed from a high-porosity plastic material,
but can also be formed from other known materials. Multiple absorbent filler units 147 retain the
liquid 151 from the liquid reservoir 150 and keep the hairbrush in an overall workable condition,
15 even when the liquid 151 is not in contact with the absorbent feed rods 148 and/or the absorbent
filler unit(s) 147.

The aforementioned embodiments of the hairbrush of the present invention are relatively
inexpensive to produce and can provide a convenient and efficient hairbrush device that is capable
of evenly dispersing low viscosity water-based solutions and other thin and non-viscous liquids over
20 the user's scalp and/or through the user's hair during routine hair brushing.

1 I. CLAIM

1 1. A liquid-reservoir hairbrush adapted for dispersing water-based solutions and other thin
and non-viscous liquids over a user's scalp during hair brushing, comprising:

5 (a) a hairbrush body having a chamber:

(b) at least one absorbent filler unit adapted to retain liquid and placed into the chamber:

and

(c) a plurality of hairbrush bristles, each having a proximal end and a distal end, the
hairbrush bristles being mounted in the vicinity of their proximal ends to the hairbrush body, wherein
10 at least some of the hairbrush bristles comprise:

an elongate body with a side wall and with at least one bore formed therethrough,

at least one absorbent feed rod placed into the at least one bore, and

a roller-ball nozzle mounted at the distal end of each hairbrush bristle comprising at least one
rotatably mounted roller-ball, wherein the liquid from the at least one absorbent filler unit is supplied
15 through the at least one absorbent feed rod in the direction of the at least one roller-ball, and wherein
the liquid will exit the roller-ball nozzle when the roller-ball makes rolling contact with the user's
scalp.

2. A liquid-reservoir hairbrush adapted for dispersing water-based solutions and other thin
20 and non-viscous liquids over a user's scalp during hair brushing, comprising:

(a) a hairbrush body having a chamber:

(b) at least one absorbent filler unit adapted to retain liquid and placed into the chamber:

and

(c) a plurality of hairbrush bristles, each having a proximal end and a distal end, the
25 hairbrush bristles being mounted in the vicinity of their proximal ends to the hairbrush body, wherein
at least some of the hairbrush bristles comprise:

an elongate body with a side wall and with at least one bore formed therethrough,

at least one absorbent feed rod, each having a proximal end and a distal end, and placed into
the at least one bore, and

30 a distal opening located at the distal end of the hairbrush bristles, wherein the distal end of
the at least one absorbent feed rod extends outwardly beyond the distal opening to form a felt-tipped
nozzle available for contact with the user's scalp during brushing, and wherein the liquid from the

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1 at least one absorbent filler unit is supplied through the at least one absorbent feed rod in the
direction of the distal end of the at least one absorbent feed rod.

5 3. A liquid-reservoir hairbrush adapted for dispersing water-based solutions and other thin
and non-viscous liquids through a user's hair during hair brushing, comprising:

(a) a hairbrush body having a chamber;

(b) at least one absorbent filler unit adapted to retain liquid and placed into the chamber;
and

10 (c) a plurality of hairbrush bristles, each having a proximal end and a distal end, the
hairbrush bristles being mounted in the vicinity of their proximal ends to the hairbrush body, wherein
at least some of the hairbrush bristles comprise:

an elongate body with a side wall and with at least one bore formed therethrough,

at least one absorbent feed rod, each having a proximal end and a distal end, and placed into
the at least one bore, and

15 at least one side opening located at the side wall of the elongated body, wherein the at least
one absorbent feed rod extends outwardly beyond the at least one side opening to form at least one
side nozzle available for contact with the user's hair during brushing, and wherein the liquid from
the at least one absorbent filler unit is supplied through the at least one absorbent feed rod in the
direction of the at least one side nozzle.

20 4. The hairbrush of Claim 1, wherein at least one intermediate transitional absorbent unit
is mounted between the at least one absorbent feed rod and the at least one roller-ball, and wherein
the liquid from the at least one absorbent feed rod is supplied through the at least one intermediate
transitional absorbent unit in the direction of the at least one roller-ball.

25 5. The hairbrush of Claim 2, wherein the felt-tipped nozzle further comprises at least one
absorbent dispersing unit, and wherein the liquid from the at least one absorbent filler unit is
supplied through the at least one absorbent feed rod in the direction of the at least one absorbent
dispersing unit.

30 6. The hairbrush of Claims 1, 2 and 3, wherein the absorbent filler unit is pre-filled with
the liquid.

1 7. The hairbrush of Claims 1, 2 and 3, further comprising a flexible base mounted to the
hairbrush body, wherein the hairbrush bristles are mounted to the flexible base.

5 8. The hairbrush of Claims 1, 2 and 3, further comprising a bristle lid to keep the hairbrush
bristles enclosed when the hairbrush is not in use and to help prevent the roller- balls from drying
out.

10 9. The hairbrush of Claim 8, wherein the bristle lid has a cleaning pad, and wherein the
cleaning pad provides cleaning to the nozzles when the bristle lid is closed on the brush bristles.

15 10. The hairbrush of Claims 1, 2 and 3, wherein the chamber is divided into at least two
separate sections, and wherein these sections are preferably hermetically isolated from one another,
and wherein at least one absorbent filler unit is placed into each section.

20 11. The hairbrush of Claims 1, 2 and 3, wherein the hairbrush body has a filler inlet to
permit the user to refill the absorbent filler unit with liquid.

25 12. The hairbrush of Claim 11, further comprising a liquid refilling unit that is adapted to
place liquid into the absorbent filler unit when the filler inlet is opened.

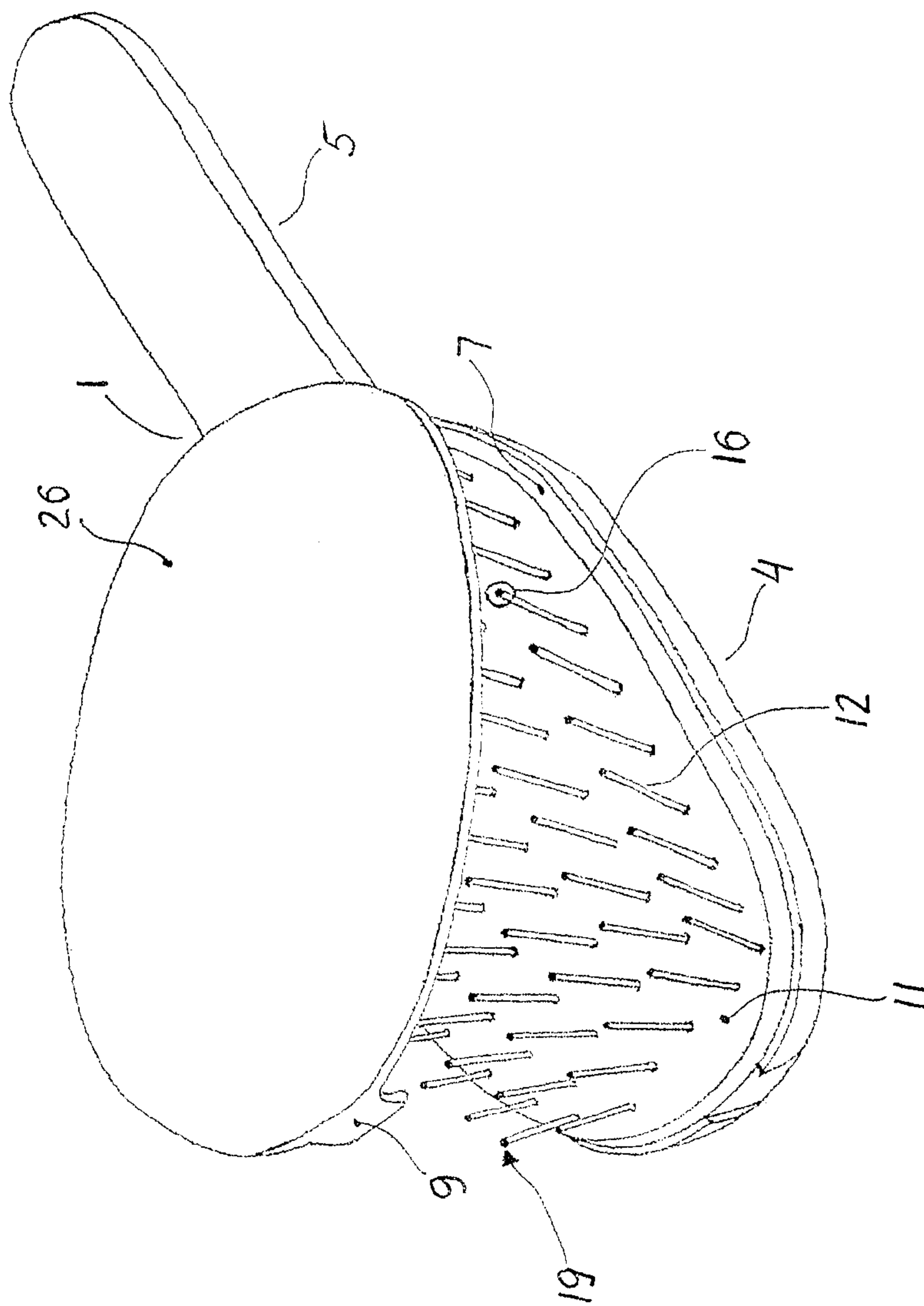
30 13. The hairbrush of Claim 12, wherein the liquid refilling unit is pre-filled with the liquid
and is adapted to engage with the hairbrush body when the filler inlet is opened.

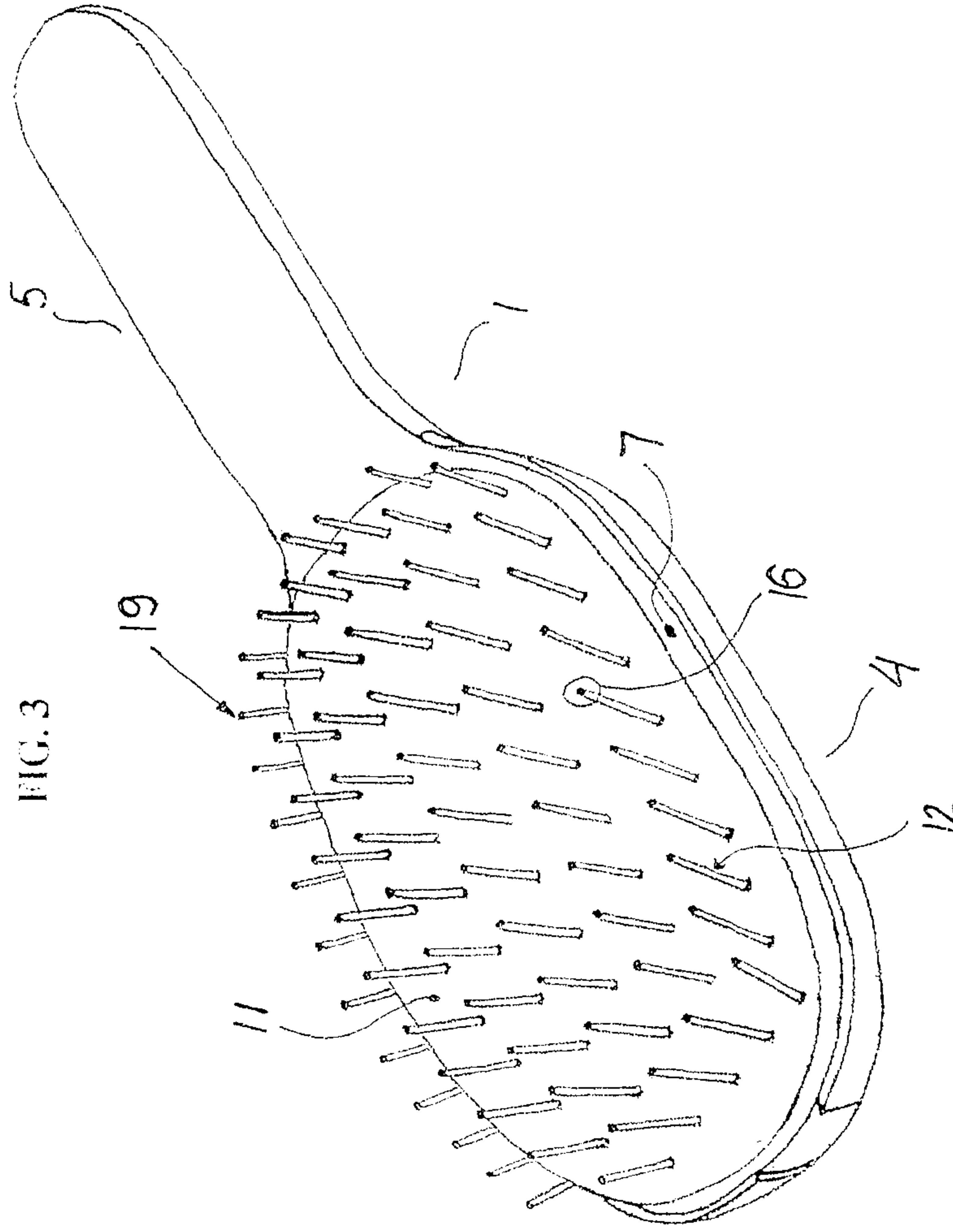
35 14. The hairbrush of Claims 1, 2 and 3, wherein the absorbent feed rods of the hairbrush
bristles extend into the hairbrush body and into the absorbent filler unit and contact the absorbent
filler unit.

40 15. The hairbrush of Claims 1, 2 and 3, wherein the absorbent filler unit partially extends
into the bores of the hairbrush bristles and contacts the absorbent feed rods located therein.

45 16. The hairbrush of Claims 1 and 2, wherein at least some of the hairbrush bristles have
at least one side opening at the side wall of the elongated body, and wherein the at least one
absorbent feed rod extends outwardly beyond the at least one side opening to form at least one side
nozzle available for contact with the user's hair during brushing.

FIG. 1





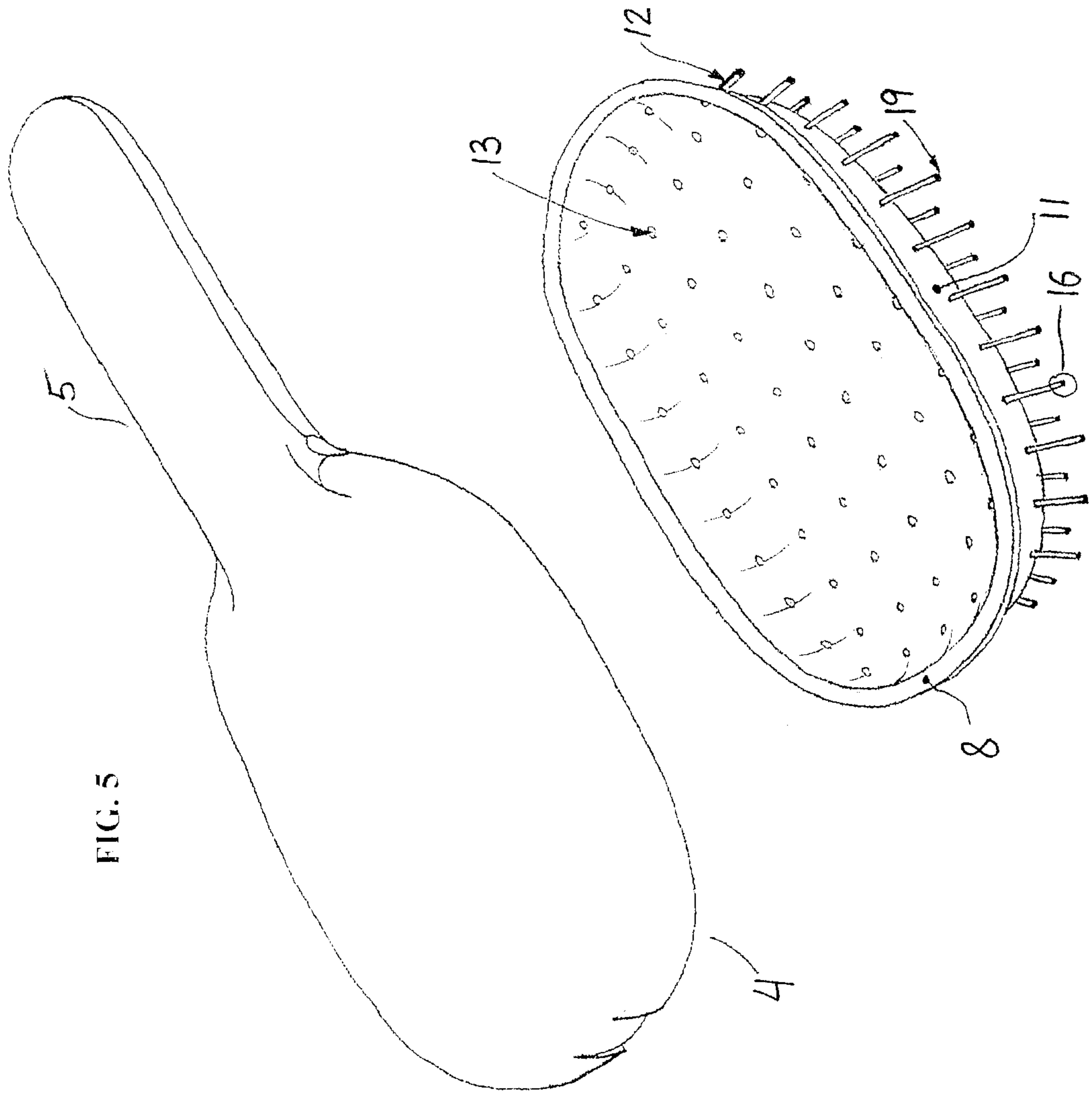


FIG. 5

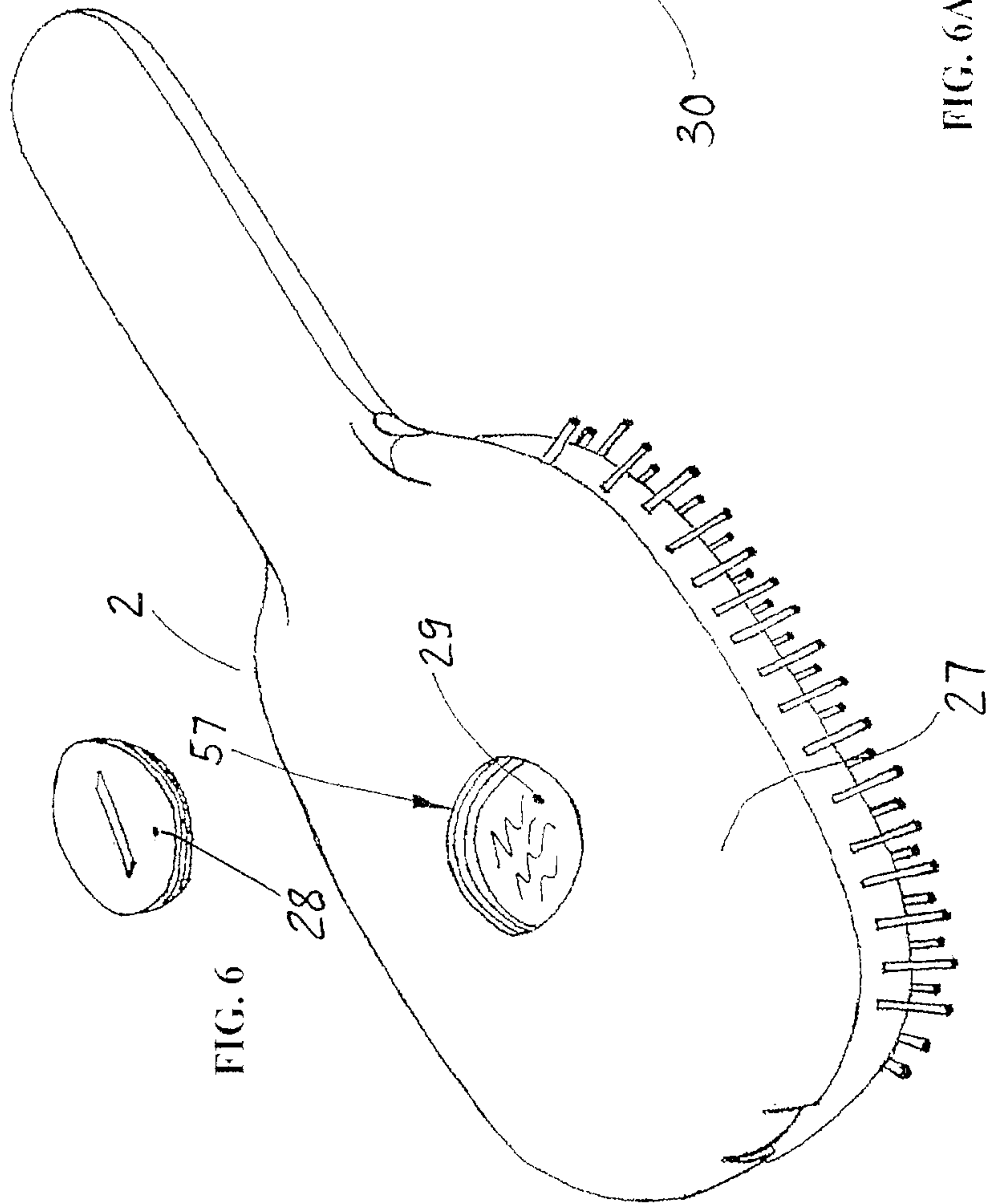
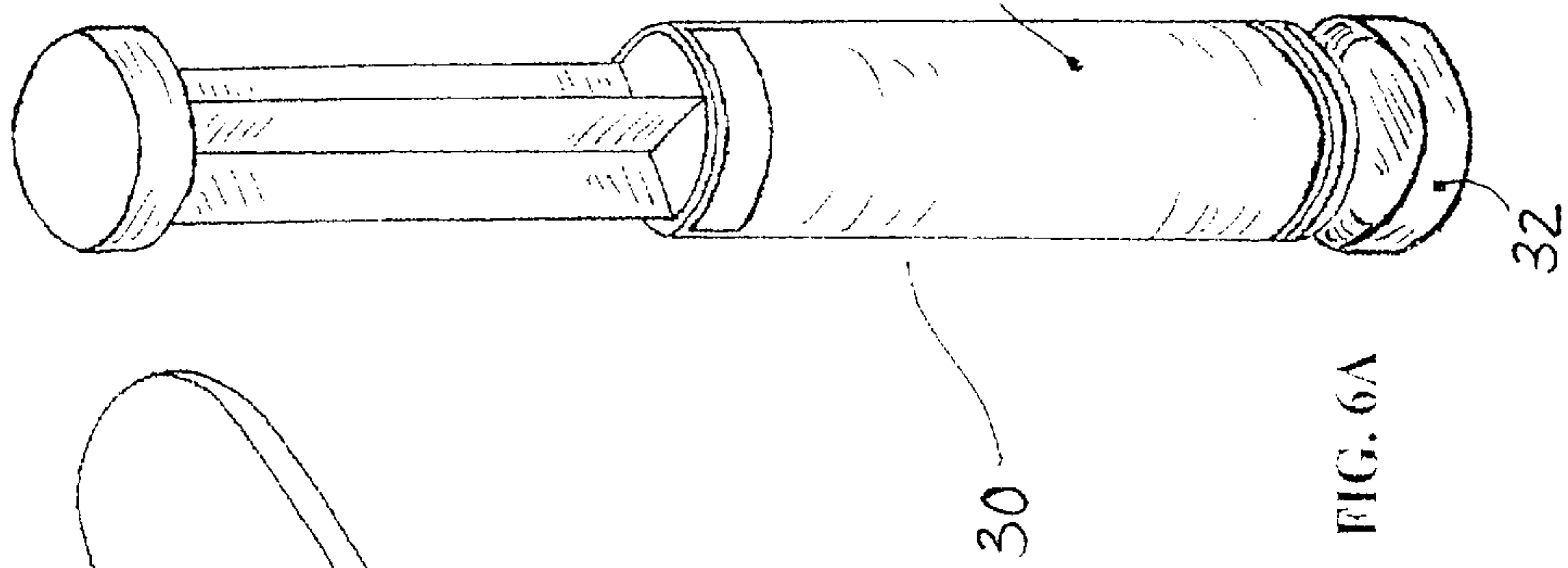
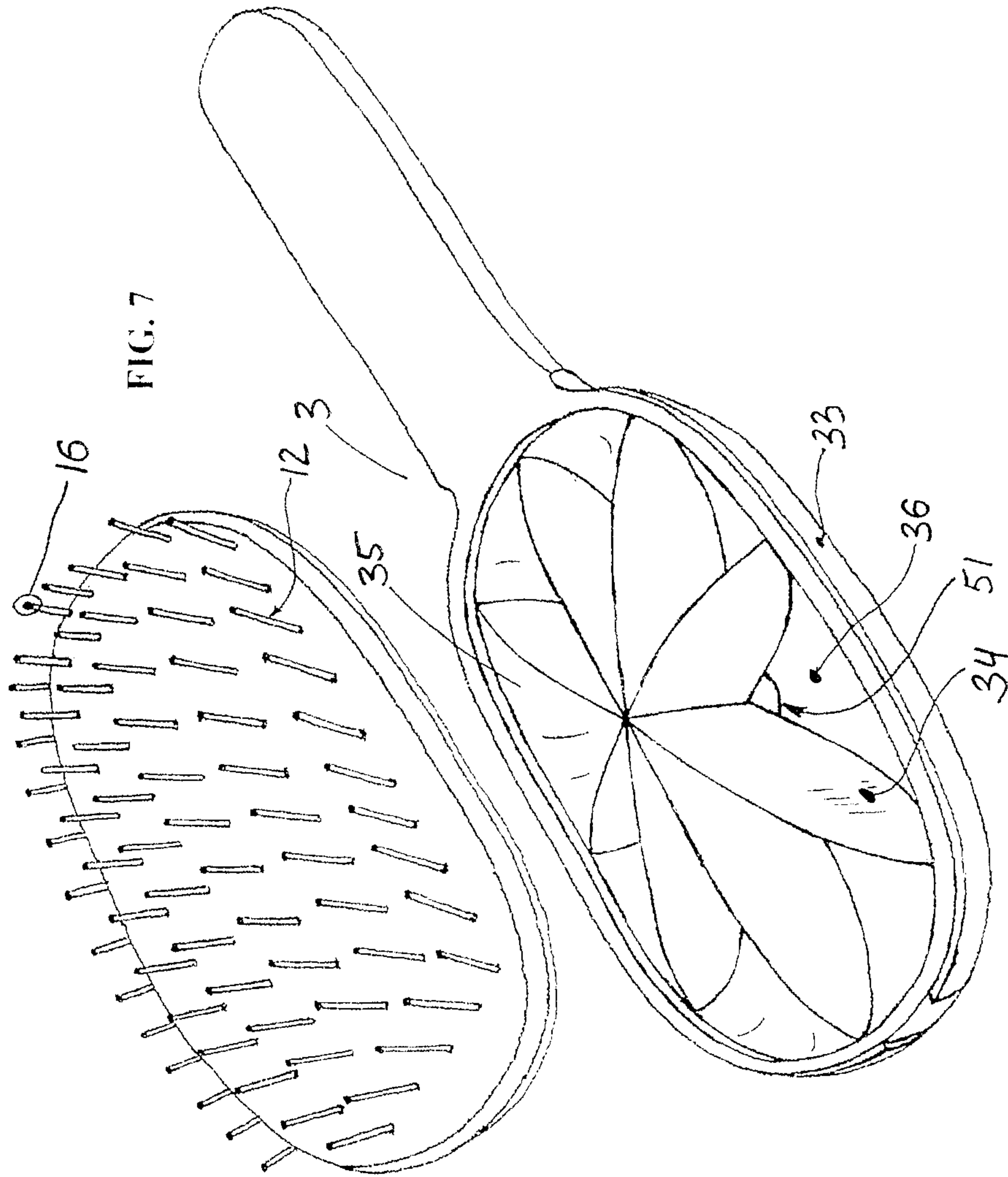
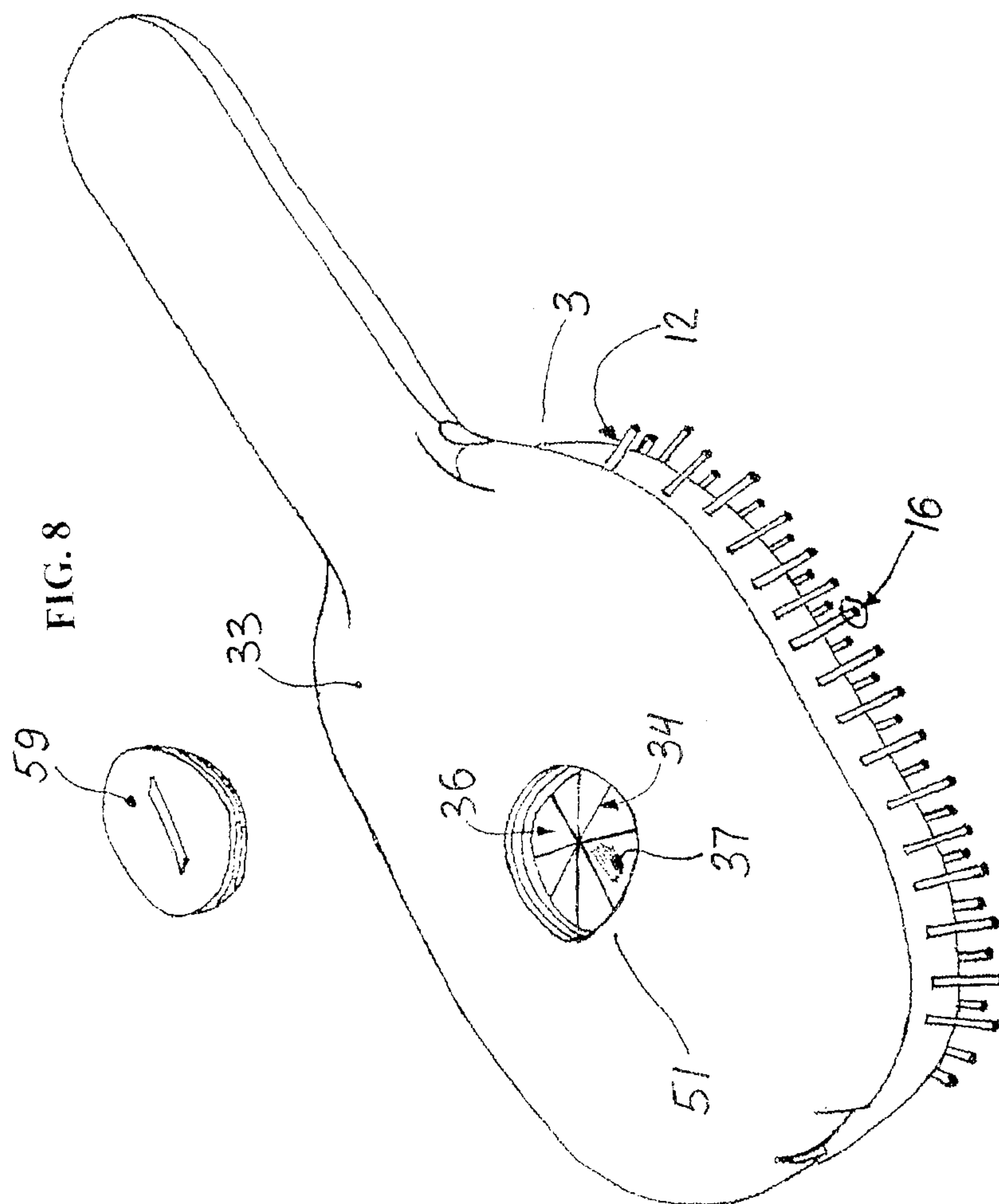
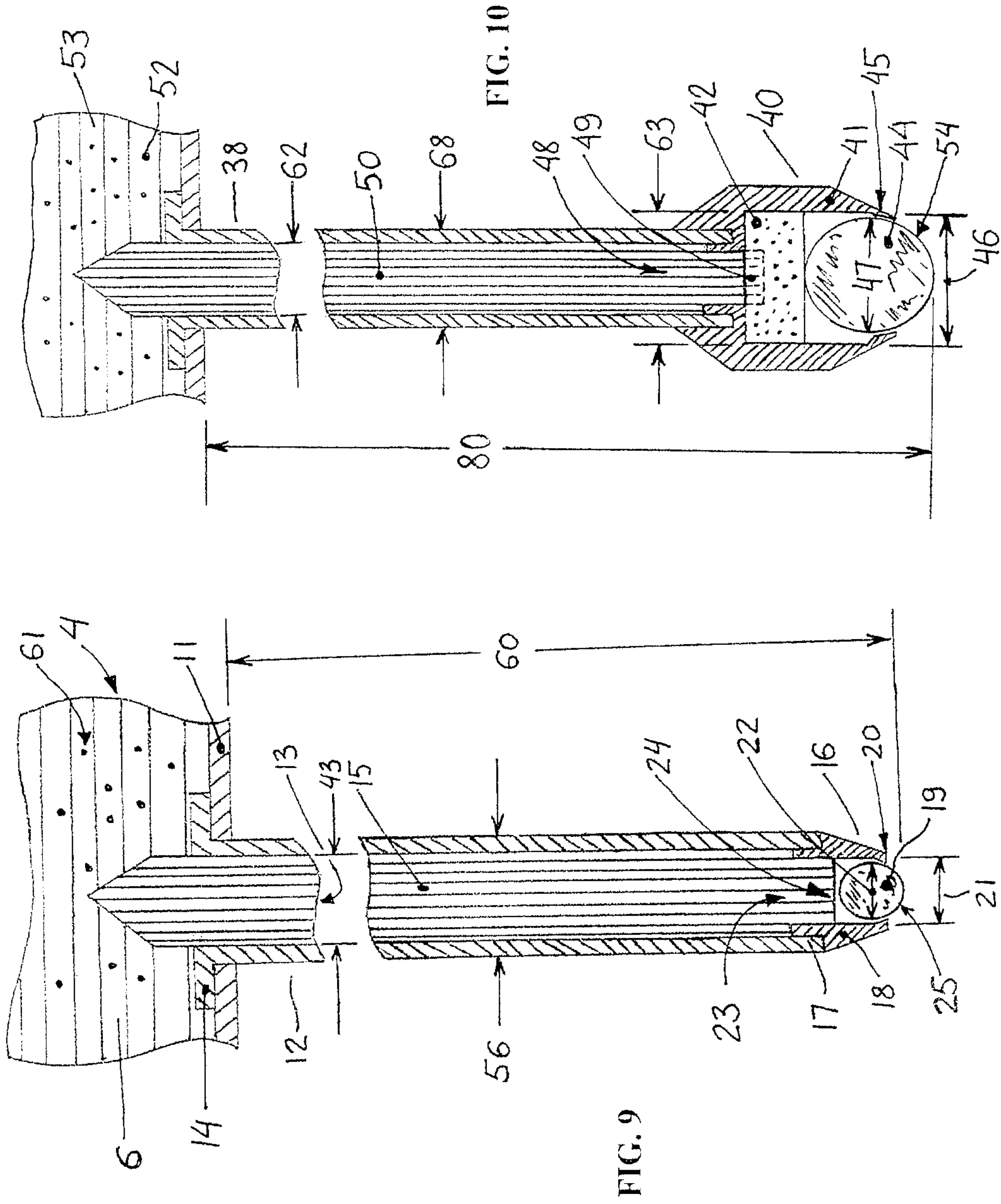


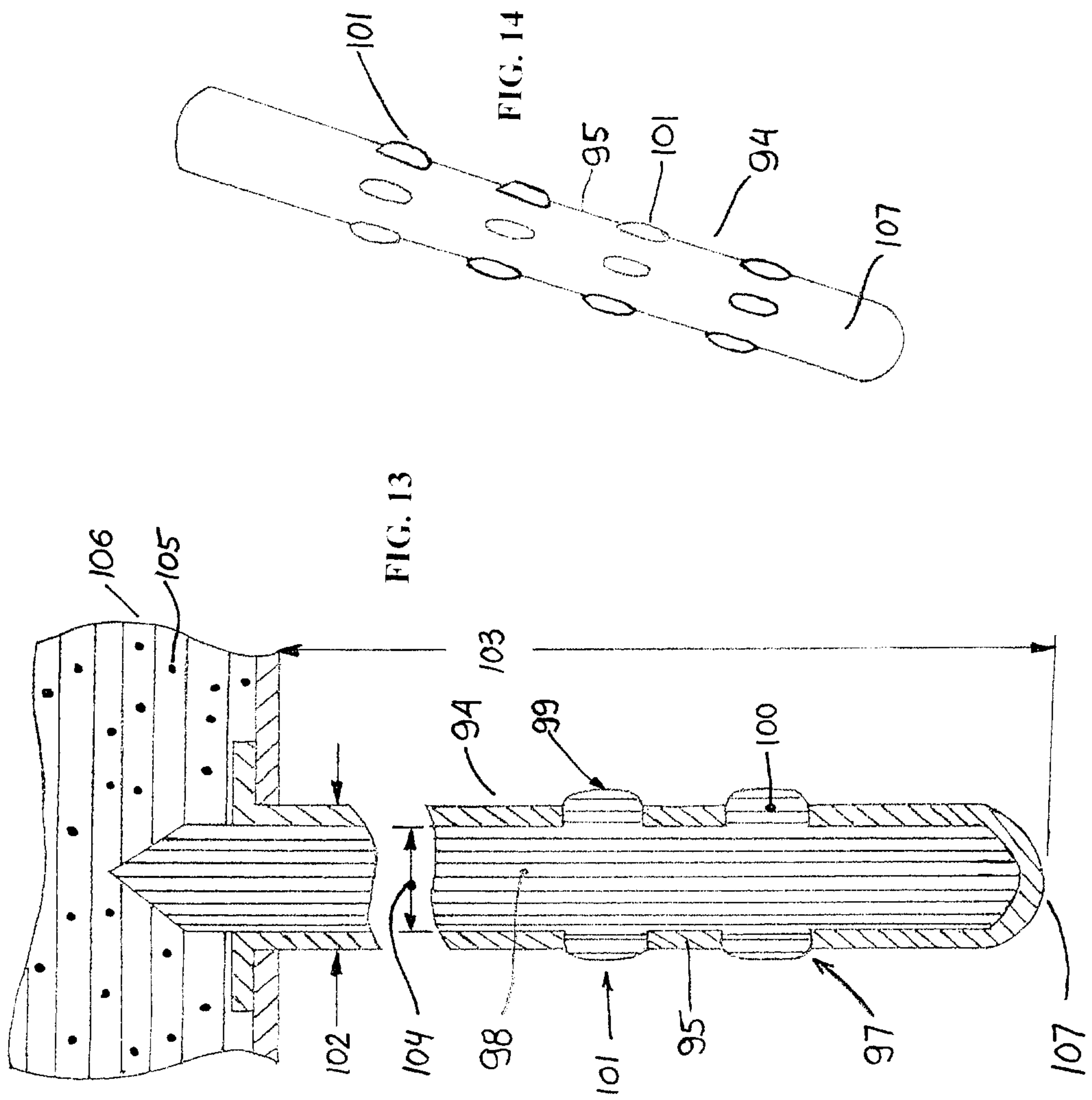
FIG. 6

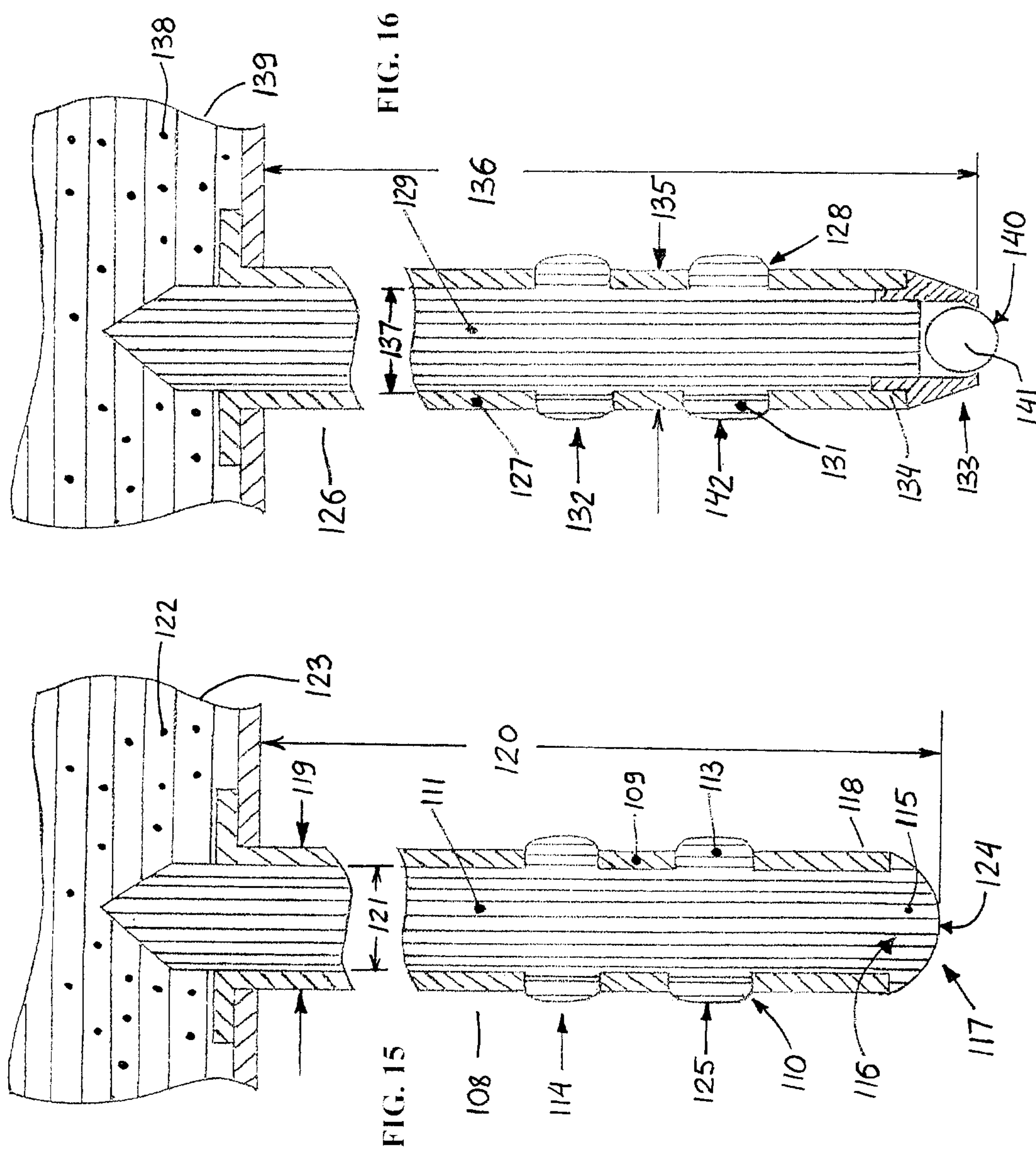
FIG. 6A











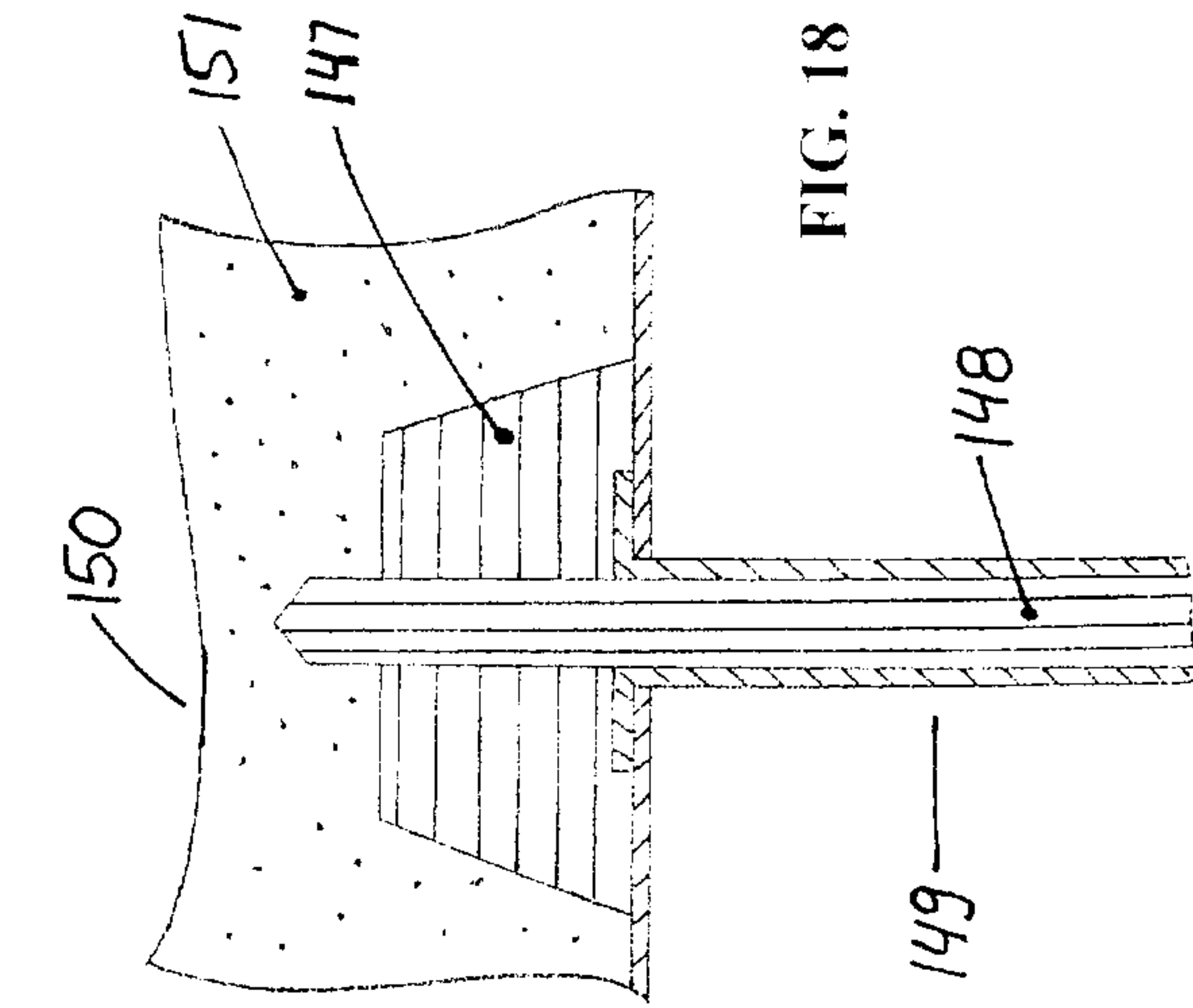


FIG. 18

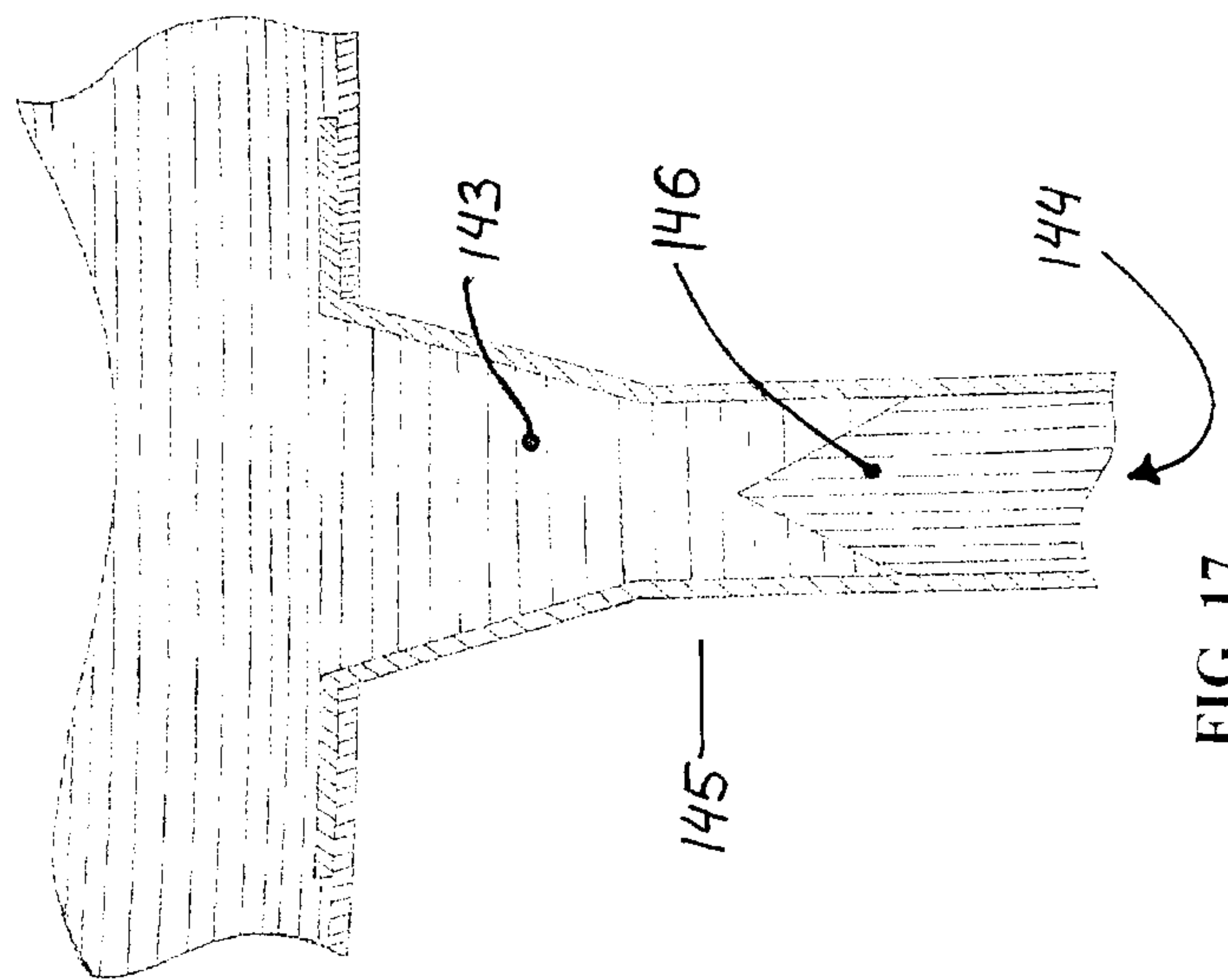


FIG. 17

