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(54) Non-contact process for decorating dye-permeable fibres of a cosmetic applicator

(57) The present invention provides a non-contact process for decorating dye-permeable fibres of a cosmetic applicator. The process comprises heating a dye-carrying surface of a carrier medium to a temperature sufficient to cause a dye plume to be released from said dye-carrying surface. The process further comprises placing said dye-permeable fibres of the cosmetic applicator at a distance from said dye-carrying surface in the path of the released dye plume, thereby allowing said dye to penetrate and decorate said dye-permeable fibres. The dimensions and the density of the dye plume can be optimised by controlled air flow. In an embodiment, the process comprises decorating all of the dye-permeable fibres simultaneously. Alternatively, the process comprises decorating only a portion of the fibres, the portion being either radial sections around a core to which the fibres are fitted, or longitudinal sections along the length of the core. In an embodiment, the distance between the free ends of the dye-permeable fibres and the dye-carrying surface is at least approximately 0.1mm.

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a non-contact process for decorating dye-permeable fibres of a cosmetic applicator.

BACKGROUND OF THE INVENTION

[0002] Cosmetic applicators typically take the form of a brush applicator or a flocked applicator, both of which include fibres that protrude individually from a central core. Mascara brushes, which form a significant part of the first category, are typically made using black synthetic fibre, such as Nylon, that extends from a core consisting of twisted stainless steel wire. The typical diameter of the fibre is approximately 4 mils (i.e. 0.1 mm). Flocked applicators are typically made with much thinner white Nylon fibres ranging from 0.5 to 25 dtex (mass in grams per 10 kilometres), which are applied using electrostatics to a plastic core, the fibres being held in place by a layer of glue.

[0003] There is, however, an increasing demand for cosmetic applicators to have fibres that are decorated in one or more colours, and in some cases to have a decoration pattern that varies around and/or along the applicator. The reasons for this include:

1. To create an attractive presentation to a potential consumer, before use.
2. To represent a code for the consumer to easily recognize a particular cosmetic product within a range of products. In such a case, for example, a mascara package may be presented to the consumer as a separate container and brush, rather than the brush being already inserted into the mascara, as is currently the practice. Alternatively, for example with translucent lip gloss, the decorated applicator may be presented already inside the product.
3. To promote a particular brush feature by providing a different color on that specific part of the brush.

[0004] One way of achieving cosmetic applicators with colour decorated fibres is to pre-print or pre-colour the fibres, as desired, before fitting the fibres onto the core. Practically, however, this approach has shortcomings in that, during the applicator manufacturing process, it can be very difficult to assemble the fibres onto the core so as to end up with the initially desired fibre decoration.

[0005] An alternative way of decorating cosmetic applicators is to decorate an already assembled, three-dimensional (3D) applicator. A complication is that cosmetic applicators usually have irregular shapes, including figure of eight, peanut-shaped, conical, square etc. In addition, processes that involve transferring a resinous material containing pigments or dyes, by dipping, spraying or by contact, leave a resinous material on the surface of the fibre which will be in contact with the cosmetic product in use, and will therefore not be acceptable to the final user, either due to chemical compatibility, or lack of adhesion and subsequent flaking off of the resinous material. The ideal process to colour decorate fibres of a cosmetic applicator is one that entails selectively absorbing colour into the fibre, without leaving material on the surface which could detach as previously described. Sublimation falls into this realm, in which the fibres are heated so as to open up the pores of the fibres, thereby allowing penetration of a dye. The typical temperature range for sublimation is between 180°C to 230°C; however, at temperatures over 200°C-220°C, Nylon fibres will tend to deform.

[0006] Sublimation, as practiced, entails the use of a carrier medium, typically paper ranging from 20 to 200 grams/sq metre, which has been pre-printed using special inks containing sublimation dyes of different colours. In prior art sublimation processes, the medium is brought into contact with the article under pressure (or vacuum) in order to ensure full contact with the surface to be decorated. This is done at a temperature chosen in order to ensure sublimation of the dyes, whilst allowing sufficient time for sublimation and absorption to take place in order to impart sufficient colour. In such a process, heat is typically provided by, for example, an oil-heated drum, hot plates with embedded resistances, laser or more conventional forms of drop radiant heat.

[0007] Significantly, the current practice of sublimation involves applying pressure or vacuum in order to ensure contact with the surface to be sublimated. However, this has a number of drawbacks when it comes to cosmetic applicators, in that the use of pressure entails risking permanent damage and deformation of the fibres. For example, at temperatures required for sublimation, a compression of applicator fibres of only between 0.1 to 0.2 mm, in the direction of their length, will result in visible permanent deformation of the fibre that will, in turn, alter the aesthetics and application properties of the applicator.

[0008] It is therefore an aim of the present invention to provide a non-contact process for decorating dye-permeable fibres of a cosmetic applicator, and, in particular, existing 3D cosmetic applicators, including brush applicators and flocked applicators.

SUMMARY OF THE INVENTION

[0009] In broad terms, the present invention makes use of the surprising observation that sublimation dye travels several millimetres into the air above a heated, pre-printed paper or carrier medium. In other words, contact is not necessary, in that under appropriate heat, a plume of dye emanates from a heated print containing sublimating dye and is absorbed by the heated fibre. It has further been observed that this dye plume can be controlled or optimised in order, for example, to increase the length or the density of the dye plume. This could be

referred to as 'projected sublimation'.

[0010] Accordingly, a first aspect of the present invention provides a non-contact process for decorating dye-permeable fibres of a cosmetic applicator, the process comprising:

heating a dye-carrying surface of a carrier medium to a temperature sufficient to cause a dye plume to be released from said dye-carrying surface; and

placing said dye-permeable fibres of the cosmetic applicator at a distance from said dye-carrying surface in the path of the released dye plume, thereby allowing said dye to penetrate and decorate said dye-permeable fibres.

[0011] In an embodiment, the process comprises decorating all of the dye-permeable fibres simultaneously. Alternatively, the process comprises decorating only a portion of the fibres, the portion being either radial sections around a core to which the fibres are fitted, or longitudinal sections along the length of the core.

[0012] In an embodiment, the distance between the dye-permeable fibres and the dye-carrying surface is at least approximately 0.1 mm.

[0013] In an embodiment, said cosmetic applicator is a brush applicator.

[0014] In an embodiment, said cosmetic applicator is a flocked applicator.

[0015] In an embodiment, the step of heating said carrier medium comprises providing at least one heated surface placed in contact with said carrier medium, proximate which the dye-permeable fibres of the cosmetic applicator can be positioned.

[0016] In an embodiment, the dye-permeable fibres are positioned either above or below the heated surface. In alternative embodiments, the fibres may be positioned next to the heated surface, in any other configurations, such as sideways.

[0017] In an embodiment, the dye-permeable fibres are positioned between a pair of heated surfaces.

[0018] In an embodiment, the step of heating said carrier medium comprises providing a plurality of heated surfaces that at least partially surrounds the dye-permeable fibres of the cosmetic applicator.

[0019] In an embodiment, the step of heating said carrier medium comprises providing a cylindrical heated surface that encloses the dye-permeable fibres of the cosmetic applicator.

[0020] In an embodiment, the step of heating said carrier medium comprises providing a laser source to sweep said carrier medium.

[0021] In an embodiment, the process comprises providing an aspiration source, wherein said aspiration source increases said dye plume flow towards said dye-permeable fibres of said cosmetic applicator.

[0022] In an embodiment, the process comprises heating the carrier medium at about 180 to 200°C, as measured at the dye-carrying surface, with the dye-permeable fibres being held in position, and at a distance, relative to the dye-carrying surface for between 60 and 240 seconds, depending on the degree of decoration transfer required.

[0023] In an embodiment, the process comprises rotating the said dye-permeable fibres of the cosmetic applicator relative to the dye-carrying surface of the carrier medium. In particular, the step of rotating the dye-permeable fibre can be done either continuously or in a stepped manner.

[0024] According to a second aspect of the present invention, there is provided a cosmetic applicator decorated using the process defined above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025]

Figure 1 shows a flow chart representing a non-contact process for decorating dye-permeable fibres of a cosmetic applicator, according to the present invention; and

Figures 2 to 6 show various ways in which the process shown in Figure 1 may be implemented.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0026] As indicated above, the present invention makes use of the surprising observation that sublimation dye travels several millimetres into the air above a heated, pre-printed paper. In other words, contact is not necessary, in that under appropriate heat, a plume of dye emanates from a heated print containing sublimating dye.

[0027] Referring to the figures, the present invention provides a non-contact process 10 for decorating dye-permeable fibres 20 of a cosmetic applicator 22. The applicator 22 comprising a core 24 from which the fibres 20 extend, the core 24 terminating in a handle 26, as is well known in the art. The process 10 comprises heating a dye-carrying surface 28 of a carrier medium 30 to a temperature sufficient to cause a dye plume 32 to be released, and thereby flow away, from said dye-carrying surface 28. This heating step is summarised in block 12 of Figure 1.

[0028] The carrier medium 30, which is typically thin paper or tissue, e.g. 20 to 120 grams per square meter, is typically printed by flexography, offset, screen printing, or digital printing, depending on suitability, and in one or several colours. The inks used are formulated specially for the sublimation process, and the pattern and number of colours chosen according to the design required to be transferred to the applicator 22.

[0029] The process 10 includes the further step of placing said dye-permeable fibres 20 of the cosmetic appli-

cator 22 at a distance from said dye-carrying surface 28 in the flow path of the released dye plume 32, thereby allowing said dye to penetrate and decorate said dye-permeable fibres 20. This placing step is summarised in block 14 of Figure 1.

[0030] In an embodiment, the process 10 comprises decorating all of the dye-permeable fibres 20 simultaneously. Alternatively, the process 10 comprises decorating only a portion of the fibres 20, the portion being either radial sections around a core to which the fibres are fitted, or longitudinal sections along the length of the core 24. The option of decorating all or only a portion of the fibres will be described in more detail further on in the specification.

[0031] As mentioned, the process 10 ensures that there is a slight gap 34, preferably less than 1 mm between the free ends of the fibres 20 and the carrier medium 30, so as to ensure that no part of the applicator 22 is deformed through contact with the heated medium 30. In an embodiment, the distance between the free ends of the dye-permeable fibres 20 and the dye-carrying surface 28 is at least approximately 0.1 mm.

[0032] In an embodiment, said cosmetic applicator is a brush applicator, as illustrated in the accompanying drawings. Alternatively, the cosmetic applicator is a flocked applicator.

[0033] In an embodiment, the step 12 of heating said carrier medium 30 comprises providing at least one heated surface 36 placed in contact with said carrier medium 30, proximate which the dye-permeable fibres 20 of the cosmetic applicator 22 can be positioned.

[0034] The dye-permeable fibres 20 may be positioned either above (as shown, for example, in Figures 2 and 3) or below the heated surface 36. The heated surface 36 may take the form of, for example, a thermally controlled hot plate. The applicator 22 may be positioned either operatively vertically as shown in Figure 2, in which only the fibres 20 at the end tip of the core 24 would be coloured, or operatively horizontally as shown in Figure 3, in which only the fibres 20 on one side of the core 24 would be coloured.

[0035] In one possible version, as shown in Figure 4, the dye-permeable fibres 20 are positioned between a pair of heated surfaces 36. These arrangements, and those also shown in Figures 5 and 6, recognise the tendency for the dye plume 32 to follow the path of rising heat generated by the heated surfaces. Thus, numerous configurations and arrangements may be used to ensure an efficient and uniform sublimation process.

[0036] In a further possible embodiment, as shown in Figure 5, the step 12 of heating said carrier medium 30 comprises providing a plurality of heated surfaces 36 that at least partially surrounds the dye-permeable fibres 20 of the cosmetic applicator 22.

[0037] In yet another possible embodiment, turning now to Figure 6, the step 12 of heating said carrier medium 30 comprises providing a cylindrical heated surface 38 that encloses the dye-permeable fibres 20 of the cosmetic applicator 22. In this case, sublimation is faster, and deformation is avoided by reducing the time during which the protruding fibres 20 are subjected to heat.

[0038] The step 12 of heating said carrier medium 30 may comprise providing a laser source to sweep said carrier medium 30. In this version, for example, a YAG (yttrium aluminium garnet) laser and a translucent transfer medium 30 may be used.

[0039] In an embodiment, the process 10 comprises means for optimising the dimensions and the density of the dye plume by a controlled air flow. Such controlled may be achieved by providing an aspiration source, indicated schematically by reference numeral 40, wherein said aspiration source 40 increases said dye plume 32 flow towards the dye-permeable fibres 20 of the cosmetic applicator 22. The aspiration source 40 may take the form of a low-pressure ventilation system.

[0040] Typically, the process 10 comprises heating the carrier medium 30 to about 180 to 220°C, as measured at the dye-carrying surface 28, with the dye-permeable fibres 20 being held in position, and at a distance, relative to the dye-carrying surface 28 for between 60 and 240 seconds, depending on the degree of decoration transfer required. If, for example, only a light decoration in limited areas is required, the exposure time may be less. However, if widespread decoration is required, for example along the length of the fibres 20 towards the core 24 of the applicator 22, a longer exposure time of between 120 to 240 seconds may be required.

[0041] The process 10 may comprise rotating the applicator 22 (and thus the fibres 20), as indicated by arrows 42 in the figures, relative to the dye-carrying surface 28 of the carrier medium 30. In particular, the step of rotating the dye-permeable fibres can be done either continuously or in a stepped manner, again, depending upon the nature and extent of sublimation required. In particular, rotation 42 of the applicator 22 can be timed with any movement and positioning of the transfer medium 30 in order to create a repeatable pattern on different applicators, thereby ensuring that the sublimated decoration is consistently transferred to the same place of each applicator.

[0042] Trials were conducted using two heating systems, namely a thermally controlled hot plate, able to be set at temperatures from 150°C to 300°C, and placed in contact with a paper transfer medium, and a 37W CO2 laser, placed behind a paper transfer medium. The hot plate was varied at surface temperatures ranging from 180°C to 250°C, to give a reasonable degree of sublimation in about 1 to 4 minutes, and the laser sweep at 20% to 30% power at 1250 to 5000 mm/second at a focal distance of 192mm to give a sublimation in about 2 seconds per applicator. The advantage of using a laser source is reduced cycle time.

[0043] The present invention thus provides a non-deforming process for decorating 3D cosmetics applicators. A particular advantage of the disclosed process is that it can be used with applicators having irregularly shaped

fibres.

Claims

1. A non-contact process for decorating dye-permeable fibres of a cosmetic applicator, the process comprising:

   heating a dye-carrying surface of a carrier medium to a temperature sufficient to cause a dye plume to be released from said dye-carrying surface; and
   placing said dye-permeable fibres of the cosmetic applicator at a distance from said dye-carrying surface in the path of the released dye plume, thereby allowing said dye to penetrate and decorate said dye-permeable fibres.

2. The process of claim 1, which comprises decorating all of the dye-permeable fibres simultaneously.

3. The process of claim 1, which comprises decorating only a portion of the fibres, the portion being either radial sections around a core to which the fibres are fitted, or longitudinal sections along the length of the core.

4. The process of any one of the preceding claims, wherein the distance between the free ends of said dye-permeable fibres and the dye-carrying surface is at least approximately 0.1 mm.

5. The process of any one of the preceding claims, wherein said cosmetic applicator is a brush applicator.

6. The process of any one of the preceding claims 1 to 4, wherein said cosmetic applicator is a flocked applicator.

7. The process of any one of the preceding claims, wherein the step of heating said carrier medium comprises providing at least one heated surface placed in contact with said carrier medium, proximate which the dye-permeable fibres of the cosmetic applicator can be positioned.

8. The process of claim 7, wherein the dye-permeable fibres are positioned either above or below the heated surface.

9. The process of claim 7, wherein the dye-permeable fibres are positioned between a pair of heated surfaces.

10. The process of any one of the preceding claims 7 to 9, wherein the step of heating said carrier medium comprises providing a plurality of heated surfaces that at least partially surrounds the dye-permeable fibres of the cosmetic applicator.

11. The process of any one of the preceding claims 7 to 9, wherein the step of heating said carrier medium comprises providing a cylindrical heated surface that encloses the dye-permeable fibres of the cosmetic applicator.

12. The process of any one of the preceding claims, wherein the step of heating said carrier medium comprises providing a laser source to sweep said carrier medium.

13. The process of any one of the preceding claims, wherein the process comprises providing an aspiration source, wherein said aspiration source increases said dye plume flow towards said dye-permeable fibres of said cosmetic applicator.

14. The process of any one of the preceding claims, which comprises heating the carrier medium to about 180 to 220°C, as measured at the dye-carrying surface, with the dye-permeable fibres being held in position, and at a distance, relative to the dye-carrying surface for between 60 and 240 seconds, depending on the degree of decoration transfer required.

15. The process of any one of the preceding claims, which comprises rotating the said dye-permeable fibres of the cosmetic applicator relative to the dye-carrying surface of the carrier medium.

16. The process of claim 15, wherein the step of rotating the dye-permeable fibre can be done either continuously or in a stepped manner.

17. A cosmetic applicator decorated using the process defined in any of claims 1 to 16.

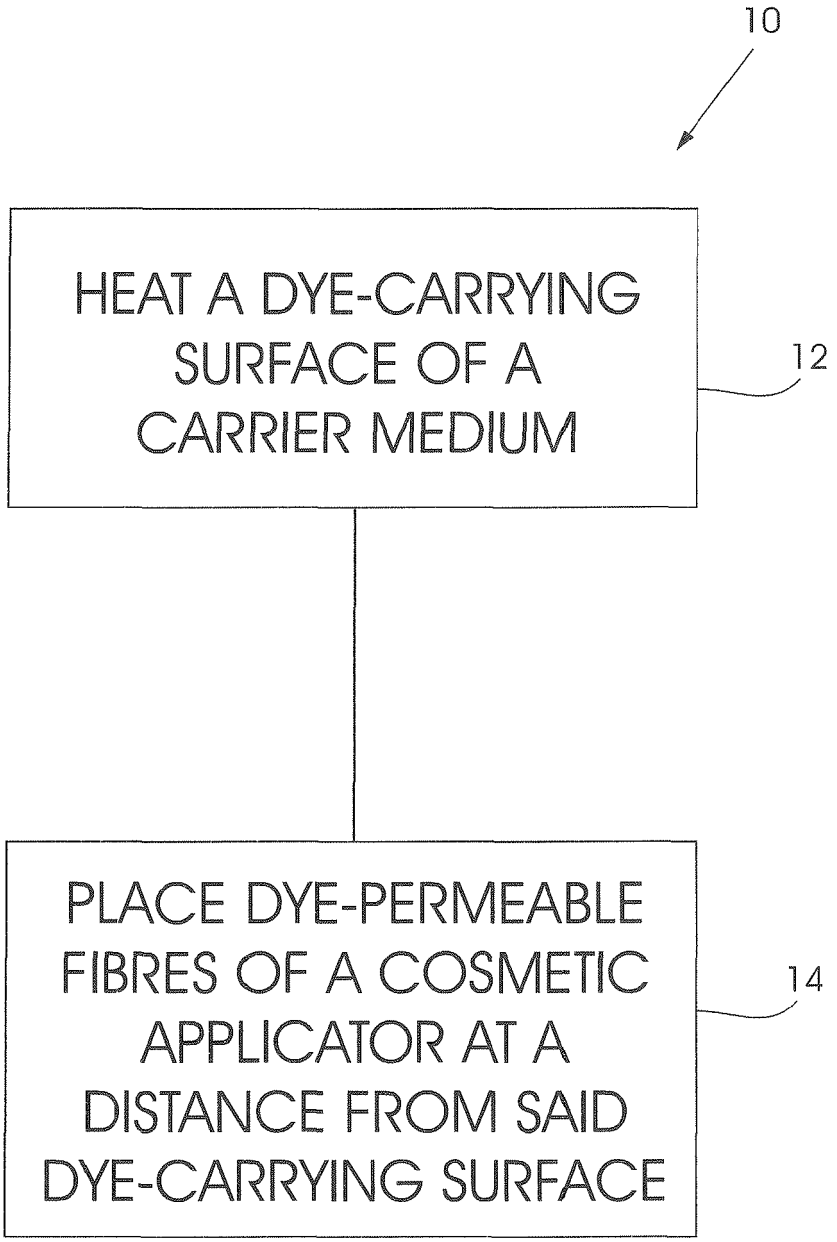
10
HEAT A DYE-CARRYING SURFACE OF A CARRIER MEDIUM
12
PLACE DYE-PERMEABLE FIBRES OF A COSMETIC APPLICATOR AT A DISTANCE FROM SAID DYE-CARRYING SURFACE
14

FIGURE 1

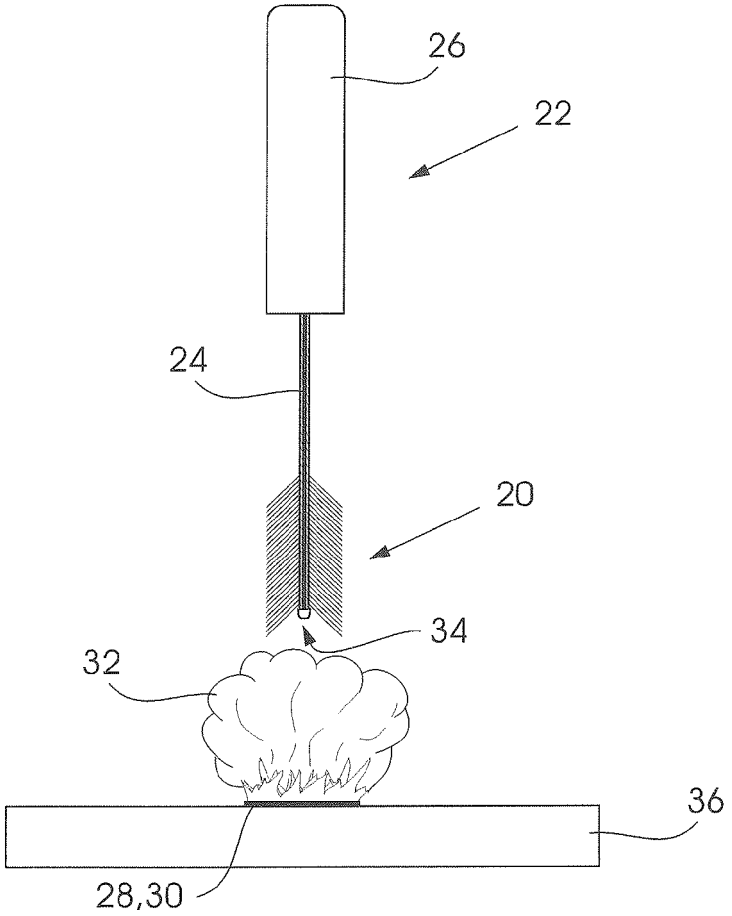

FIGURE 2

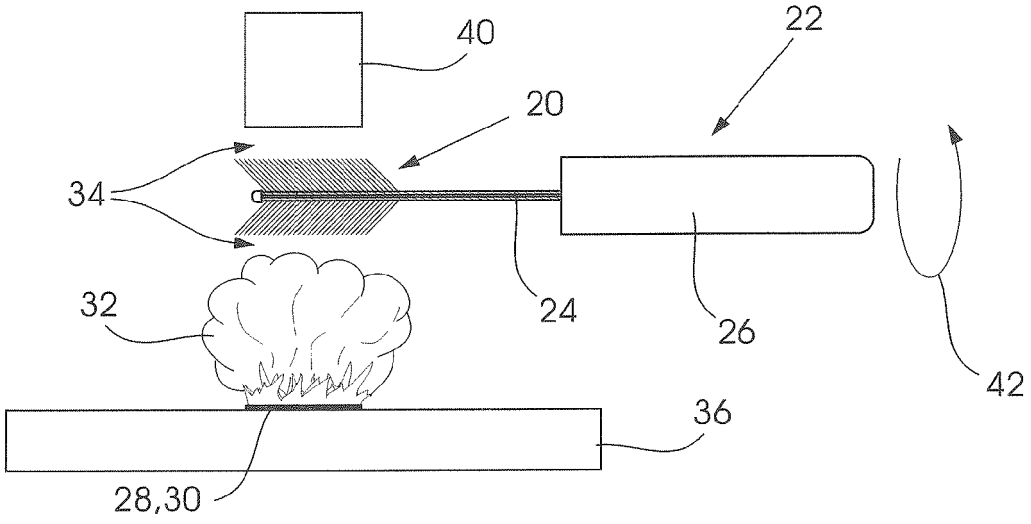

FIGURE 3

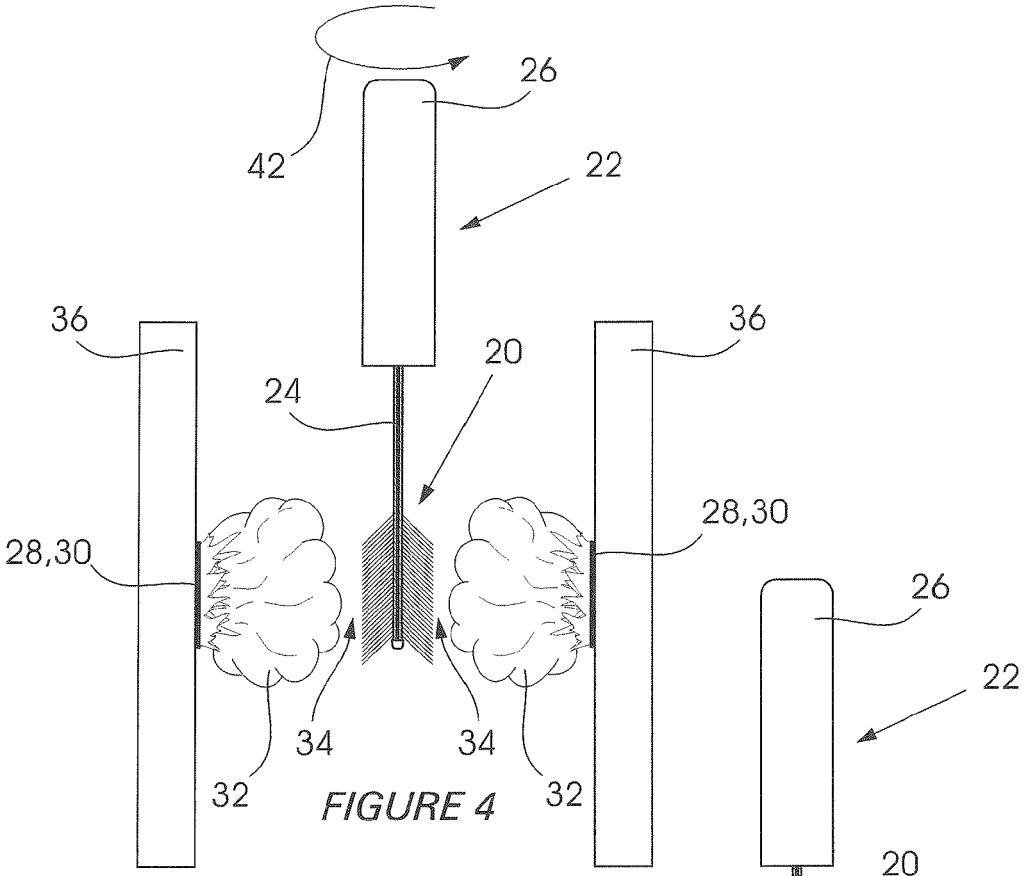

FIGURE 4

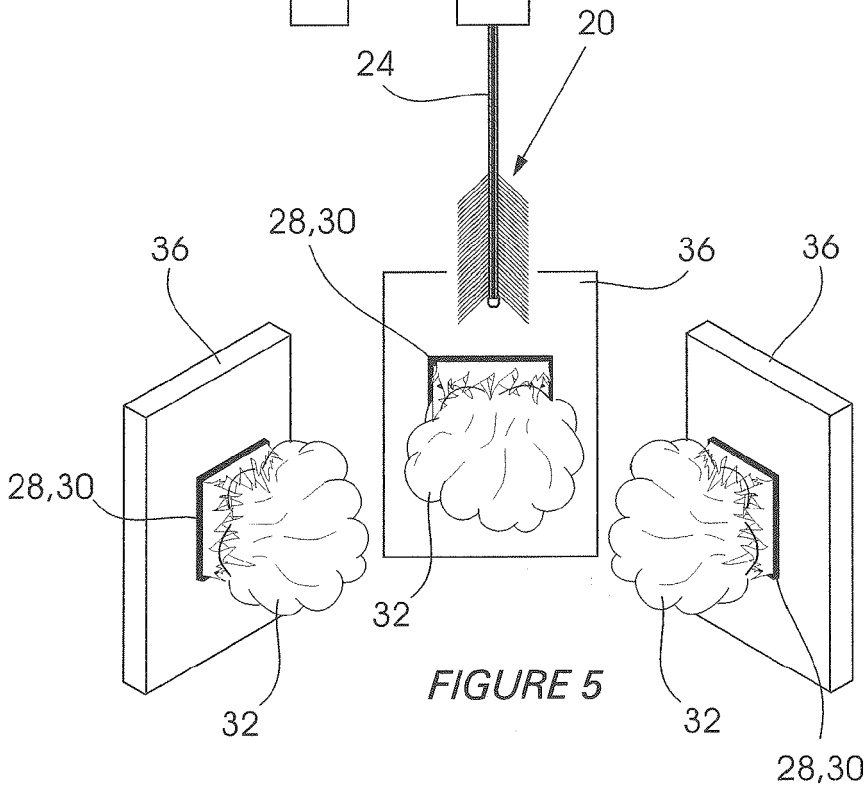

FIGURE 5

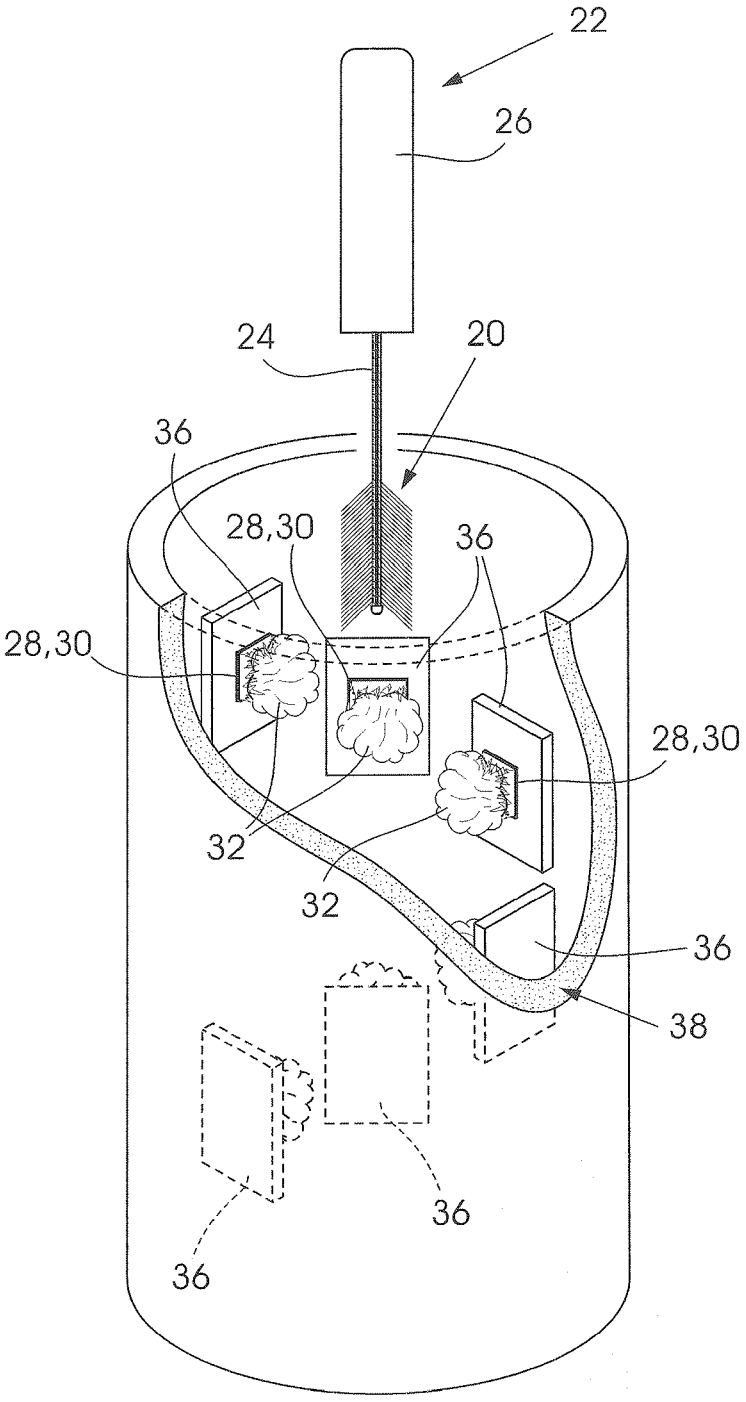

FIGURE 6

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EUROPEAN SEARCH REPORT

Application Number
EP 10 30 5132

DOCUMENTS CONSIDERED TO BE RELEVANT

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TECHNICAL FIELDS SEARCHED (IPC)

B41M
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 June 2010	Patosuo, Susanna

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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