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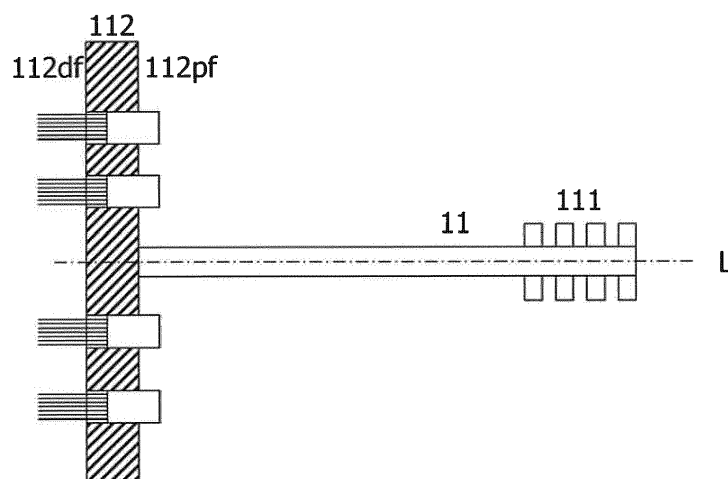
(54) **APPLICATOR FOR PUNCTUALLY APPLYING A COATING AGENT**

(57) The present disclosure relates to an applicator (10, 10a, 10b, 10c) (and a corresponding operation method) for punctually applying a coating agent to a surface having one protrusion or one hole, the applicator (10, 10a, 10b, 10c) comprising an elongated portion (11) having a finger-gripping portion (111) on the proximal end and a fibre-bundle reception portion (112) on the distal end, the fibre-bundle reception portion having: a plate shape having a proximal face (112pf) and a distal face (112df), the proximal and distal faces being substantially parallel to one another and enclosing a predetermined

angle (β) with a longitudinal axis (L) of the elongated portion, and a plurality of through holes (112a, 112b, 112c) extending between the proximal face and the distal face, and a plurality of sub-applicators (12a, 12b, 12c) inserted one-by-one through a respective one of the plurality of through holes, wherein each sub-applicator respectively has: a plurality of grouped fibers (12af, 12bf, 12cf) so as to receive the coating agent, the plurality of grouped fibers protruding from the distal face, and a sleeve (12as, 12bs, 12cs) configured to fix the plurality of grouped fibers, the sleeve protruding from the proximal face.

Fig. 2A

10



Description

[0001] The present invention generally relates to punctually applying a coating agent. In particular, the present disclosure relates to an applicator for punctually applying a coating agent.

[0002] The present invention relates to a coating agent (e.g. a blue varnish) to be applied to certain use cases, as shown in the left column "use case" in Fig. 1. Such use cases comprise standard screws or screw-heads (use case 1), unused bonding points (use case 2) and studs e.g. at raceways (use case 3).

[0003] Currently, the coating agent (such as paint or varnish) is applied via brushes onto the use cases mentioned above. In this regard, there already are very complex machines for applying a coating agent onto rivets, e.g. by means of pressurized air. The disadvantages of such a solution reside in the complexity (e.g. cleaning time and preparation time required), the inability to properly adjust the required amount of coating agent (which leads to excess coating agent dropping down) and a misfit for the operator's requirements for handling, since those machines tend to be quite heavy and require to be connected via air pressure cable (which increases the likelihood of accidents).

[0004] Accordingly, there is a need for an implementation of a scheme that avoids one or more of the problems discussed above, or other related problems.

[0005] The present invention aims at the following targets:

- Easy handling, low degree of complexity
- Ergonomics: fast usage, low weight (not heavier than a brush)
- Low preparation and cleaning times comparable to an ordinary brush which is currently used
- Engineering requirements: No blisters allowed in the coating agent after application

[0006] In addition, the present invention enables the following advantages:

- Current time to apply the coating agent e.g. onto a screw could be divided by half
- Enabling usage also for small-scale applications for which complex machines cannot be used (since e.g. the preparation time is too long)

[0007] There is provided an applicator for punctually applying a coating agent to a surface having one protrusion or one hole, the applicator comprising an elongated portion having a finger-gripping portion on the proximal end and a fibre-bundle reception portion on the distal end, the fibre-bundle reception portion having: a plate shape having a proximal face and a distal face, the proximal and distal faces being substantially parallel to one another and enclosing a predetermined angle with a longitudinal axis of the elongated portion; and a plurality of

through holes extending between the proximal face and the distal face; and a plurality of sub-applicators inserted one-by-one through a respective one of the plurality of through holes, wherein each sub-applicator respectively has: a plurality of grouped fibers so as to receive the coating agent, the plurality of grouped fibers protruding from the distal face, and a sleeve configured to fix the plurality of grouped fibers, the sleeve protruding from the proximal face. In this way, the above-described advantages can be obtained.

[0008] The finger-gripping portion may be dimensioned such that a full 360° rotation about the longitudinal axis is enabled in one single turn. In addition or alternatively, the sleeve of each sub-applicator may comprise plural holes so as to enable forced venting. In this way, easy handling may be augmented. Moreover, the elongated portion and the fibre-bundle reception portion may consist of a plastic material. If so, the elongated portion and the fibre-bundle reception portion may be one integral body formed by an injection moulding process. In this way, easy manufacture may be attained. Further, the coating agent may be one of paint and varnish. In addition, the varnish (e.g. a blue varnish) may be a corrosion protective coating. Further, the colour of the varnish may be a signal colour (such as blue or red) in order to allow easy visual confirmation where the varnish has been already applied.

[0009] The surface may have one protrusion and the plurality of sub-applicators may further comprise a central sub-applicator arranged to protrude to the distal end coinciding with the longitudinal axis, wherein the sleeve of the central sub-applicator may protrude into the elongated portion or the sleeve of the central sub-applicator may be an integral part of the elongated portion. If so, the sub-applicators different from the central sub-applicator may be arranged on an imaginary circle having its centre point directly on the longitudinal axis. Moreover, the predetermined angle may be greater than 90°. Further, the protrusion may be one of the following protruding from the surface: a screw-head, a rivet, a nut, and a bolt. In this way, the special requirements of the above-depicted use case 1 can be met. In addition, the applicator may further comprise a hollow conical-shaped member attached to the fibre-bundle reception portion, the hollow conical-shaped member enclosing the plurality of grouped fibers. In this way, dropping of excess coating agent may be avoided and the painting diameter may be restricted exactly to the protrusion to be painted.

[0010] The surface may have one hole and the applicator may further comprise a centred stopper arranged to protrude to the distal end of the applicator and to coincide with the longitudinal axis, wherein the centred stopper is fixed to the elongated portion and protrudes therefrom or the centred stopper is an integral protrusion of the elongated portion. In that case, the centred stopper may further comprise a tapered portion at its outermost distal end, wherein the tapered portion may gradually reduce its diameter in the direction from the proximal end

to the distal end. Further, the predetermined angle may be substantially equal to 90°. Still further, the hole may be an unused bonding point. Finally, each of the sub-applicators may be skewed in relation to the longitudinal axis of the elongated portion. In this way, the applicator is tailored for the special case of painting the surroundings of a hole, such as an unused bonding point.

[0011] The surface may have one protrusion and the elongated portion may further comprise a centred sleeve arranged to be recessed into the elongated portion along the longitudinal axis, wherein the centred sleeve may have a cylindrical form and extend from the distal face into the material of the elongated portion. If so, the centred sleeve may comprise, at its proximal end, a stopper constituted by the material of the elongated portion. Moreover, the predetermined angle may be substantially equal to 90°. Still further, the protrusion may be one of the following protruding from the surface: a stud and a thread of a screw. Finally, each of the sub-applicators may be skewed in relation to the longitudinal axis of the elongated portion. In this way, the applicator is tailored for the special case of painting the surroundings of a protrusion, such as stud or screw thread.

[0012] Further, there is provided a method for punctually applying a coating agent to a surface having one protrusion or one hole, using the applicator of the first aspect.

[0013] The embodiments of the technique presented herein are described herein below with reference to the accompanying drawings, in which:

- Fig. 1 shows an overview of 3 possible uses cases/embodiments to which the present disclosure is applicable;
- Fig. 2 shows a schematic drawing of a generic example arrangement of the apparatus according to the present disclosure;
- Fig. 2A shows the generic example arrangement of the apparatus according to the present disclosure in the assembled state;
- Fig. 3 shows an overview of the apparatus according to a first embodiment of the present disclosure related to the first use case;
- Fig. 3A shows a schematic drawing of the apparatus according to the first embodiment of the present disclosure;
- Fig. 4 shows an overview of the apparatus according to a second embodiment of the present disclosure related to the second use case;
- Fig. 4A shows a schematic drawing of the apparatus according to the second embodiment of the present disclosure;

Fig. 5 shows an overview of the apparatus according to a third embodiment of the present disclosure related to the third use case;

5 Fig. 5A shows a schematic drawing of the apparatus according to the third embodiment of the present disclosure in a symmetric arrangement;

10 Fig. 5B shows a schematic drawing of the apparatus according to the third embodiment of the present disclosure in a non-symmetric arrangement;

15 Fig. 6 shows a method embodiment which also reflects the interaction between the components of the device embodiment.

[0014] In the following description, for purposes of explanation and not limitation, specific details are set forth in order to provide a thorough understanding of the technique presented herein. It will be apparent to one skilled in the art that the present technique may be practiced in other embodiments that depart from these specific details.

[0015] Moreover, those skilled in the art will appreciate that the services, functions and steps explained herein may be implemented using software functioning in conjunction with a programmed microprocessor, or using an Application Specific Integrated Circuit (ASIC), a Digital Signal Processor (DSP) or general purpose computer. It will also be appreciated that while the following embodiments are described in the context of methods and devices, the technique presented herein may also be embodied in a computer program product as well as in a system comprising a computer processor and a memory coupled to the processor, wherein the memory is encoded with one or more programs that execute the services, functions and steps disclosed herein. This applies especially to the aspect of an automated injection moulding process for manufacturing the applicator of the present disclosure.

[0016] Fig. 2 shows a schematic drawing of a generic example arrangement of the apparatus according to the present disclosure, wherein Fig. 2A shows the generic example arrangement of the apparatus according to the present disclosure in the assembled state.

[0017] As is shown in Figs. 2 and 2A, an applicator 10 for punctually applying a coating agent to a surface is provided. The surface has one protrusion or one hole. The applicator 10 comprises an elongated portion 11 having a finger-gripping portion 111 on the proximal end and a fibre-bundle reception portion 112 on the distal end.

[0018] Here, the elongated portion 11 is shown to be substantially rod-shaped. However, this does not rule out that the elongated portions may have other cross-sections, such as cross-shaped (see e.g. Figs. 3, 4 or 5), e.g. for increasing structural stability/rigidity of the applica-

tor as a whole. Likewise, the finger-gripping portion 111 is depicted as a series of cylindrical rings, but also other arrangements are possible, such as a single body having a nubby surface.

[0019] In turn, the fibre-bundle reception portion 112 has a plate-shape having a proximal face 112pf and a distal face 112df. The proximal and distal faces are substantially parallel to one another and enclose a predetermined angle β with a longitudinal axis L of the elongated portion 1. Note that the parallelism and the angle of the proximal and distal faces also allow for a portion-wise definition, such as two portions shown in Fig. 3A.

[0020] The fibre-bundle reception portion 112 further comprises a plurality of through holes 112a, 112b, 112c extending between the proximal face 112pf and the distal face 112df. Here, it is not excluded that the through-holes further continue e.g. as guide sheaths on the proximal face 112pf (see e.g. Fig. 3).

[0021] The applicator 10 further comprises a plurality of sub-applicators 12a, 12b, 12c which are inserted (in the assembled state shown in Fig. 2B) one-by-one through a respective one of the plurality of through holes 112a, 112b, 112c.

[0022] Each sub-applicator 12a, 12b, 12c respectively has a plurality of grouped fibers 12af, 12bf, 12cf (e.g. brushes) so as to receive the coating agent, the plurality of grouped fibers protruding from the distal face 112df, and a sleeve 12as, 12bs, 12cs configured to fix the plurality of grouped fibers, the sleeve protruding from the proximal face 112pf. The manner of fixing the grouped fibers in the sleeve is not particularly restricted; for instance, the sleeve may be clamped in order to affix the grouped fibers (see e.g. Fig. 3).

[0023] Still further, the finger-gripping portion may be dimensioned such that a full 360° rotation about the longitudinal axis L is enabled in one single turn (e.g. by a pair of fingers in which the applicator is held, e.g. index finger and thumb). In addition, the sleeve of each sub-applicator may comprise plural holes so as to enable forced venting (as to improve the ability to absorb coating agent, such as paint or varnish).

[0024] Still further, the elongated portion 11 and the fibre-bundle reception portion 112 may consist of a plastic material, and in particular, they may be one integral body formed by an injection moulding process. In this way, the applicator is manufactured most easily and is also fit for mass-production. The insertion of the sub-applicators 12a, 12b, 12c may be performed manually or in an automated fashion as well.

[0025] Fig. 3 shows an overview of the apparatus 10a according to a first embodiment of the present disclosure related to the first use case, while Fig. 3A shows a schematic drawing of the apparatus according to the first embodiment of the present disclosure.

[0026] As noted above, the surface may have one protrusion (e.g. a screw-head, a rivet, a nut or a bolt). Further, the plurality of sub-applicators may further comprise a central sub-applicator 12d arranged to protrude to the

distal end coinciding with the longitudinal axis L, wherein the sleeve of the central sub-applicator protrudes into the elongated portion or the sleeve of the central sub-applicator is an integral part of the elongated portion. In this case, the sub-applicators different from the central sub-applicator may be arranged on an imaginary circle having its centre point directly on the longitudinal axis; which may allow for a smooth painting especially of screw-heads and nuts having multiple surfaces.

[0027] Still further, the predetermined angle β may be greater than 90°. In this way, the focus on one point for applying the coating agent is further increased.

[0028] In addition, the applicator 10a may further comprise a hollow conical-shaped member 113 attached to the fibre-bundle reception portion 112, the hollow conical-shaped member 113 enclosing the plurality of grouped fibers 12af, 12bf, 12cf. Also this measure allows for increasing focus on one point for applying the coating agent.

[0029] Fig. 4 shows an overview of the apparatus 10b according to a second embodiment of the present disclosure related to the second use case, while Fig. 4A shows a schematic drawing of the apparatus according to the second embodiment of the present disclosure.

[0030] Here, the surface may have one hole (e.g. an unused bonding point). Further, the applicator may comprise a centred stopper 114 arranged to protrude to the distal end of the applicator and to coincide with the longitudinal axis L, wherein the centred stopper may be fixed to the elongated portion and protrudes therefrom or the centred stopper is an integral protrusion of the elongated portion. Further, the centred stopper 114 may further comprise a tapered portion 114t at its outermost distal end, wherein the tapered portion gradually reduces its diameter in the direction from the proximal end to the distal end. In this way, guided motion is further secured and to immersion of the tool too deep into the hole is avoided.

[0031] In addition, the predetermined angle may be substantially equal to 90°. Moreover, each of the sub-applicators may be skewed in relation to the longitudinal axis L of the elongated portion. In this way, the application angle (not to be mistaken with the predetermined angle β) for applying the coating agent is made smaller than 90° so as to improve applicability of the coating agent.

[0032] Fig. 5 shows an overview of the apparatus 10c according to a third embodiment of the present disclosure related to the third use case, while Fig. 5A shows a schematic drawing of the apparatus according to the third embodiment of the present disclosure in a symmetric arrangement. Fig. 5B further shows a schematic drawing of the apparatus according to the third embodiment of the present disclosure in a non-symmetric arrangement.

[0033] Also here, the surface may have one protrusion (e.g. a stud or a thread of a screw). Further, the elongated portion 11 may comprise a centred sleeve 115 arranged to be recessed into the elongated portion along the longitudinal axis L, wherein the centred sleeve has a cylin-

dricul form and extends from the distal face into the material of the elongated portion. Note that the sleeve 115 is most easily and efficiently formed also during the above-mentioned injection moulding process; however, this does not rule out that the sleeve may also be provided e.g. by cutting, drilling or the like.

[0034] In this regard, the centred sleeve 115 may comprise, at its proximal end, a stopper 115s constituted by the material of the elongated portion. Also here, guided motion is secured and immersion of the applicator too deep or too far from the stripped surface is avoided.

[0035] Moreover, the predetermined angle may be substantially equal to 90°. Finally, as noted above, each of the sub-applicators may be skewed in relation to the longitudinal axis L of the elongated portion, so that the application angle for the coating agent is improved.

[0036] Fig. 6 shows a method embodiment which also reflects the interaction between the components of the device embodiment. The following simple method is enabled:

- Step S1: dip the applicator once into the coloring agent.
- Step S2: if necessary, optionally wipe off excess paint.
- Step S3: application of coating agent onto the protrusion or the hole by rotating tool. It is possible to apply closing agent to multiple junctions per one dipping.

[0037] In addition to the advantages stated above, the present disclosure enables the following advantages:

- The applicator can be used for final protection onto sealed junctions, and most especially, all sizes are conceivable as the applicator is easily adaptable for different sizes.
- As noted above, it is possible to apply closing agent to multiple junctions per one dipping.
- Absorption of the coating agent can be augmented by using forced venting by small holes (e.g. 3 holes).
- In the second embodiment, the centred stopper may also be provided with a taper at its end to secure guided motion and to avoid immersing the tool to deep into the hole.
- In the third embodiment, the centred sleeve may also be provided with a stopper inside it to secure guided motion and to avoid immersing the tool too deep or too far from the stripped surface.

[0038] It is believed that the advantages of the technique presented herein will be fully understood from the foregoing description, and it will be apparent that various changes may be made in the form, constructions and arrangement of the exemplary aspects thereof without departing from the scope of the present disclosure or without sacrificing all of its advantageous effects. Because the technique presented herein can be varied in

many ways, it will be recognized that the present disclosure should be limited only by the scope of the claims that follow.

Claims

1. An applicator (10, 10a, 10b, 10c) for punctually applying a coating agent to a surface having one protrusion or one hole, the applicator comprising:

an elongated portion (11) having a finger-gripping portion (111) on the proximal end and a fibre-bundle reception portion (112) on the distal end,
the fibre-bundle reception portion having:

- a plate shape having a proximal face (112pf) and a distal face (112df), the proximal and distal faces being substantially parallel to one another and enclosing a predetermined angle (β) with a longitudinal axis (L) of the elongated portion; and
- a plurality of through holes (112a, 112b, 112c) extending between the proximal face and the distal face; and

a plurality of sub-applicators (12a, 12b, 12c) inserted one-by-one through a respective one of the plurality of through holes, wherein each sub-applicator respectively has:

- a plurality of grouped fibers (12af, 12bf, 12cf) so as to receive the coating agent, the plurality of grouped fibers protruding from the distal face; and
- a sleeve (12as, 12bs, 12cs) configured to fix the plurality of grouped fibers, the sleeve protruding from the proximal face.

2. The applicator (10, 10a, 10b, 10c) of claim 1, wherein the finger-gripping portion is dimensioned such that a full 360° rotation about the longitudinal axis (L) is enabled in one single turn.
3. The applicator (10, 10a, 10b, 10c) of claim 1 or 2, wherein the sleeve of each sub-applicator comprises plural holes so as to enable forced venting.
4. The applicator (10, 10a, 10b, 10c) of any one of the preceding claims, wherein the elongated portion (11) and the fibre-bundle reception portion (112) consist of a plastic material, the elongated portion (11) and the fibre-bundle reception portion (112) in particular being one integral body formed by an injection moulding process.
5. The applicator according to any one of the preceding

claims, wherein the coating agent is one of paint and varnish.

6. The applicator (10a) of any one of claims 1 to 5, wherein
the surface has one protrusion; and
the plurality of sub-applicators further comprises a central sub-applicator (12d) arranged to protrude to the distal end coinciding with the longitudinal axis (L), wherein the sleeve of the central sub-applicator which protrudes into the elongated portion or the sleeve of the central sub-applicator is an integral part of the elongated portion. 5
7. The applicator (10a) of claim 6, wherein the sub-applicators different from the central sub-applicator are arranged on an imaginary circle having its centre point directly on the longitudinal axis and/or wherein the predetermined angle is greater than 90°. 10
8. The applicator (10a) of claim 6 or 7, further comprising:

a hollow conical-shaped member (113) attached to the fibre-bundle reception portion (112), the hollow conical-shaped member (113) enclosing the plurality of grouped fibers (12af, 12bf, 12cf). 20 25
9. The applicator (10a) of any one of claims 6 to 8, wherein the protrusion is one of the following protruding from the surface: 30

a screw-head,
a rivet,
a nut, and
a bolt. 35
10. The applicator (10a) of any one of claims 1 to 5, wherein
the surface has one hole; and
the applicator further comprises a centred stopper (114) arranged to protrude to the distal end of the applicator and to coincide with the longitudinal axis (L), wherein the centred stopper is fixed to the elongated portion and protrudes therefrom or the centred stopper is an integral protrusion of the elongated portion. 40 45
11. The applicator (10b) of claim 10, wherein
the centred stopper (114) further comprises a tapered portion (114t) at its outermost distal end, the tapered portion gradually reducing its diameter in the direction from the proximal end to the distal end, and/or wherein the predetermined angle is substantially equal to 90°. 50 55
12. The applicator (10b) of claim 10 or 11, wherein the hole is an unused bonding point and/or wherein each

of the sub-applicators is skewed in relation to the longitudinal axis (L) of the elongated portion.

13. The applicator (10c) of any one of claims 1 to 5, wherein
the surface has one protrusion; and
the elongated portion (11) further comprises a centred sleeve (115) arranged to be recessed into the elongated portion along the longitudinal axis (L), wherein the centred sleeve has a cylindrical form and extends from the distal face into the material of the elongated portion.
14. The applicator (10c) of claim 13, wherein
the centred sleeve (115) comprises, at its proximal end, a stopper (115s) constituted by the material of the elongated portion and/or wherein the predetermined angle is substantially equal to 90°.
15. The applicator (10c) of claim 13 or 14, wherein the protrusion is one of the following protruding from the surface:

a stud; and
a thread of a screw, and/or

wherein each of the sub-applicators is skewed in relation to the longitudinal axis (L) of the elongated portion.

Fig. 1

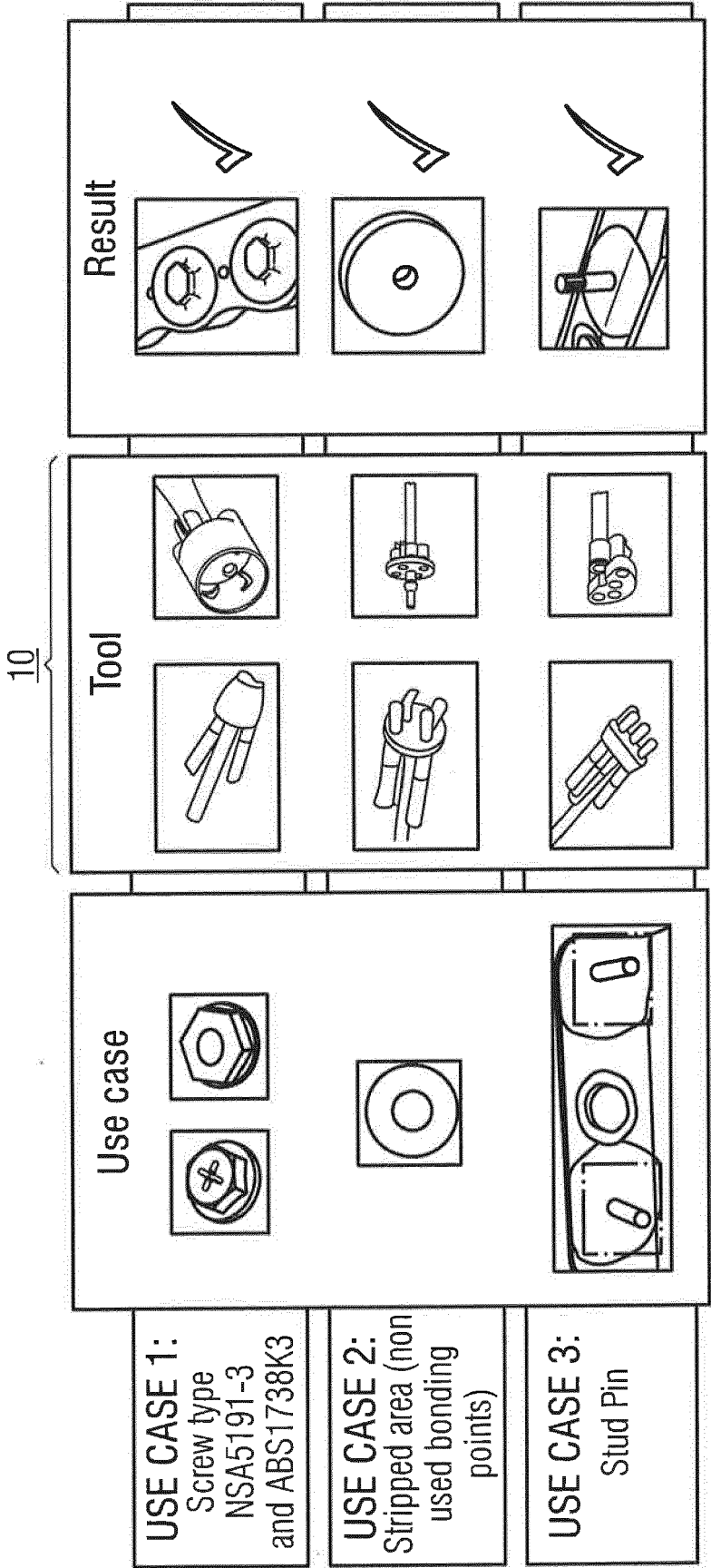


Fig. 2

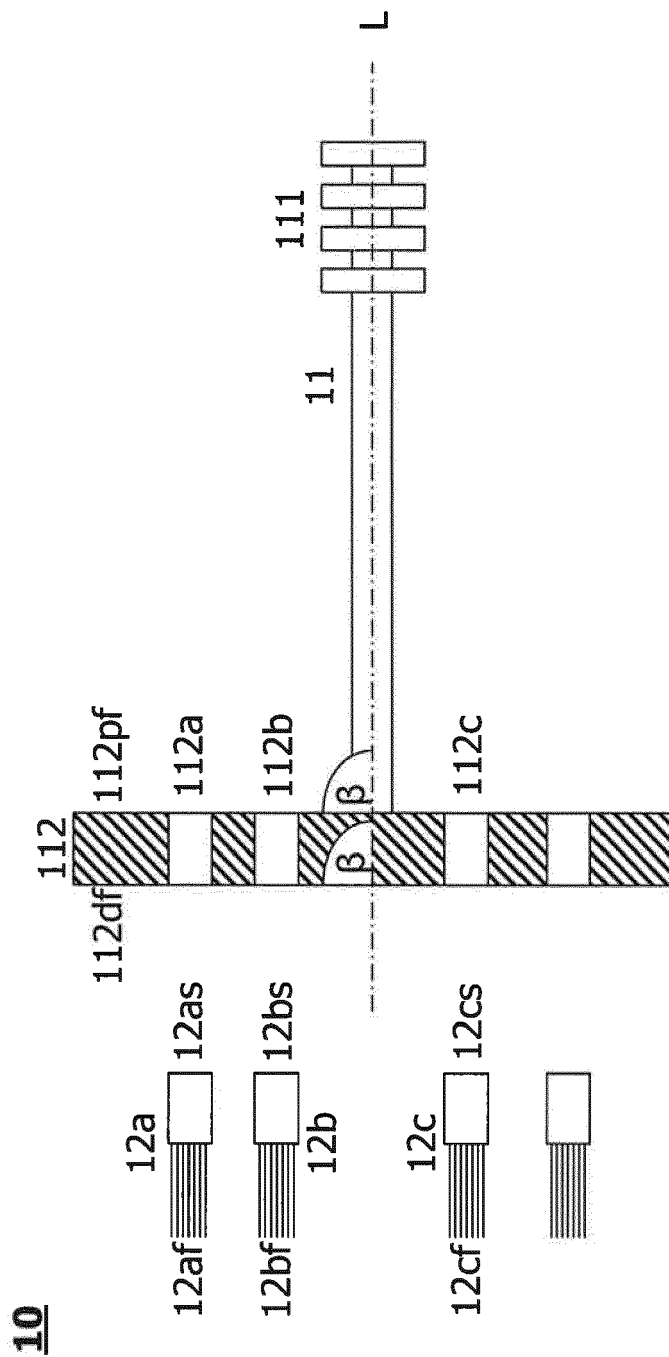
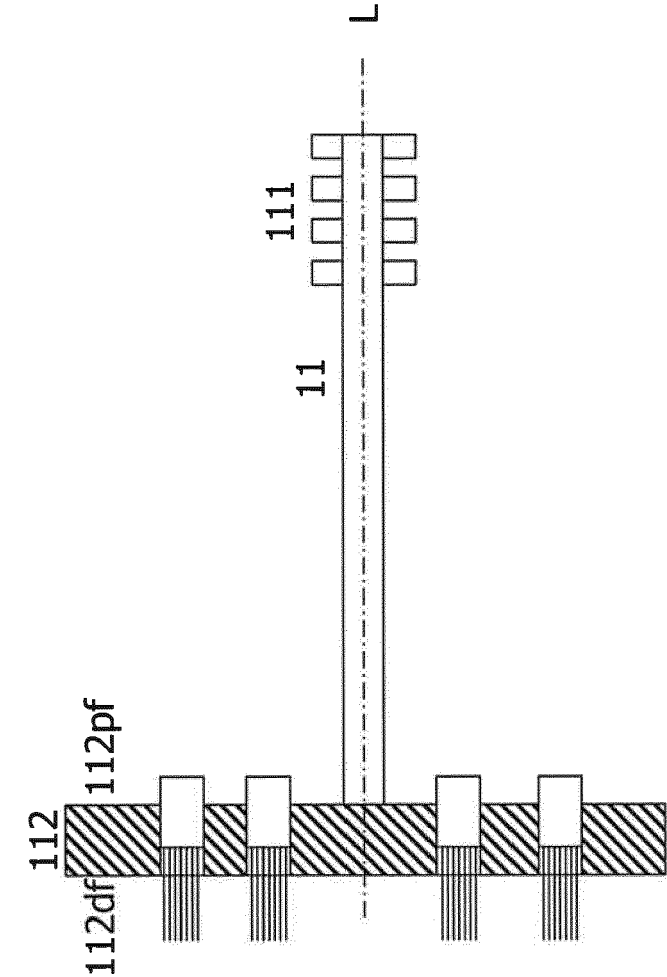


Fig. 2A



10

Fig. 3

10a

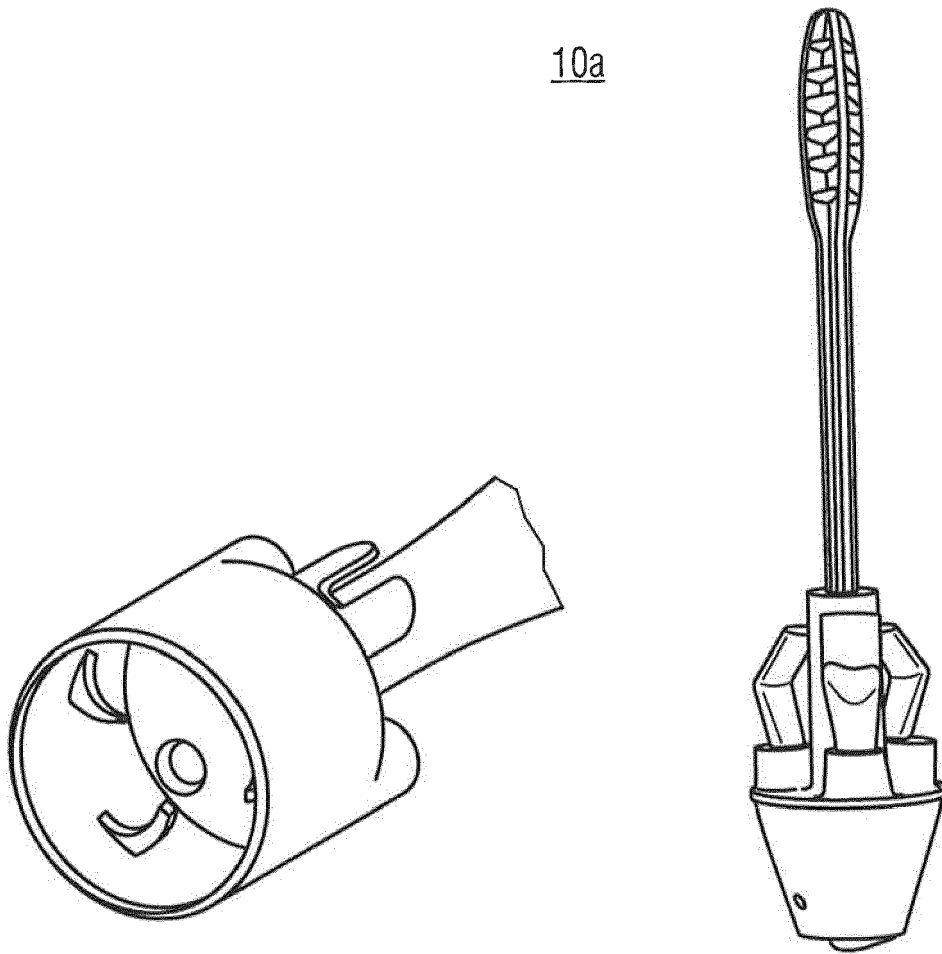


Fig. 3A

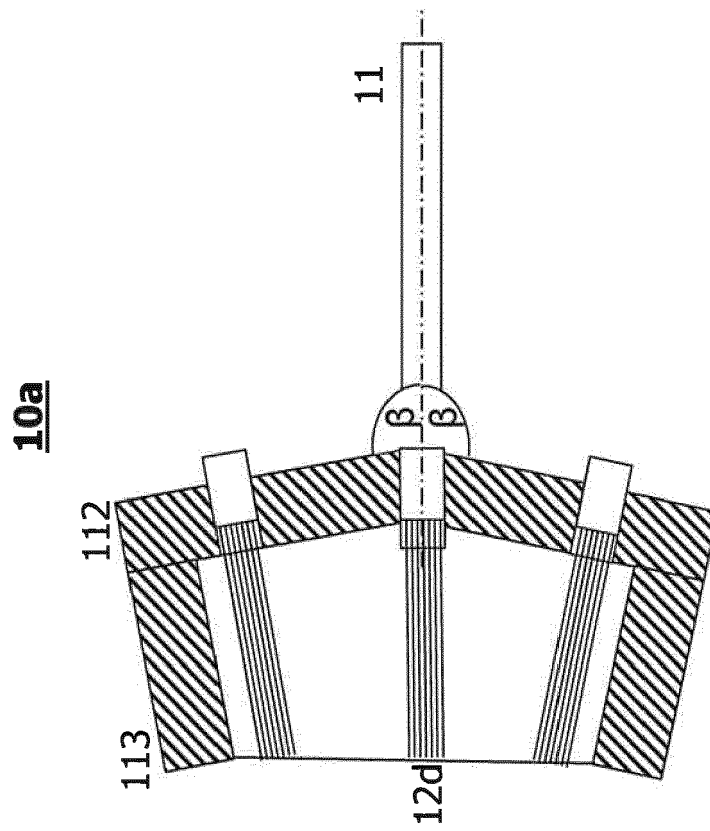


Fig. 4

10b

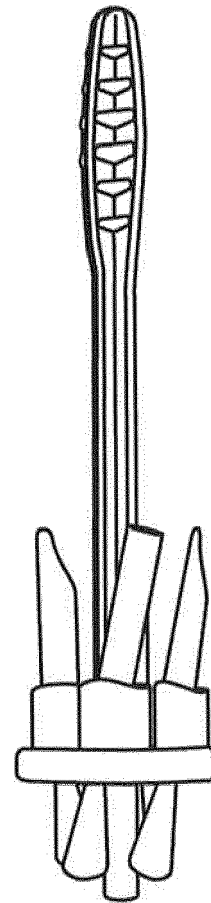
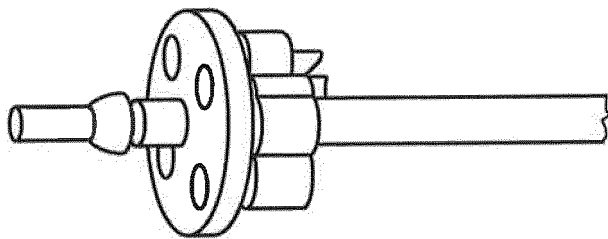


Fig. 4A

10b

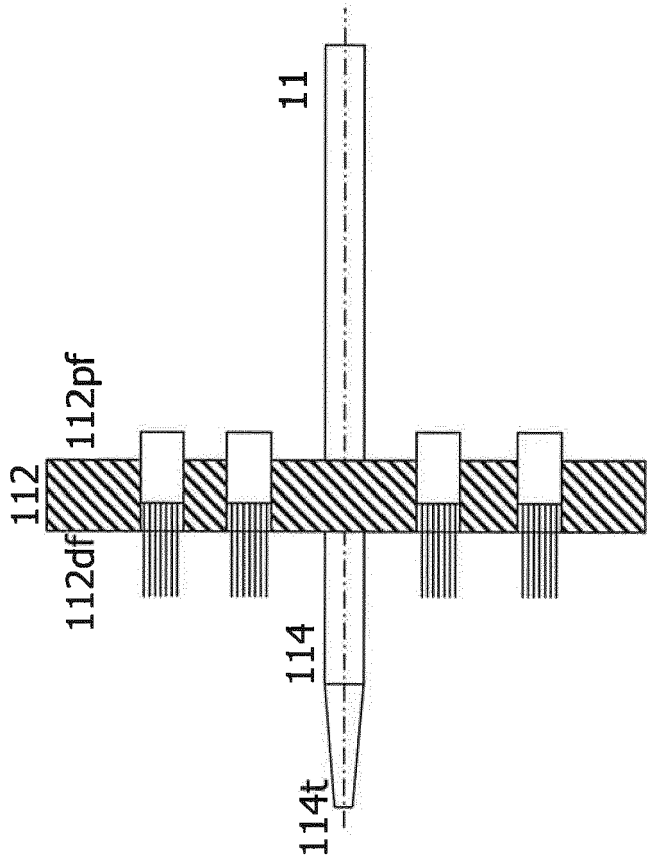
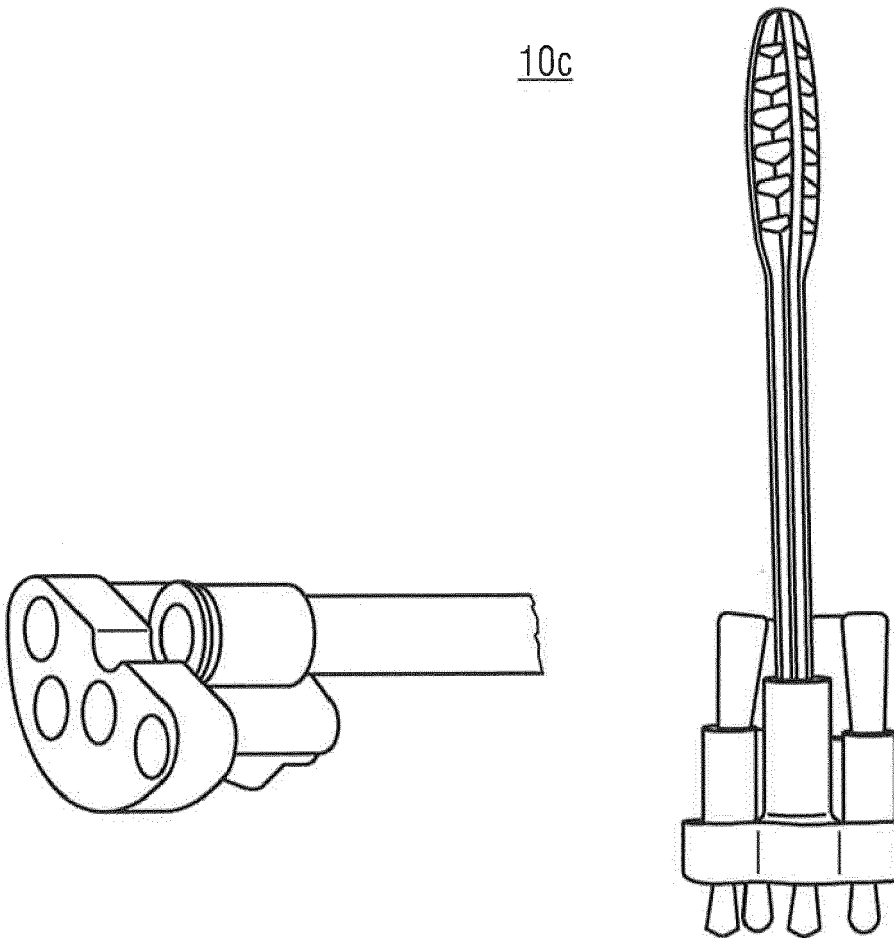


Fig. 5

10c



10c

Fig. 5A

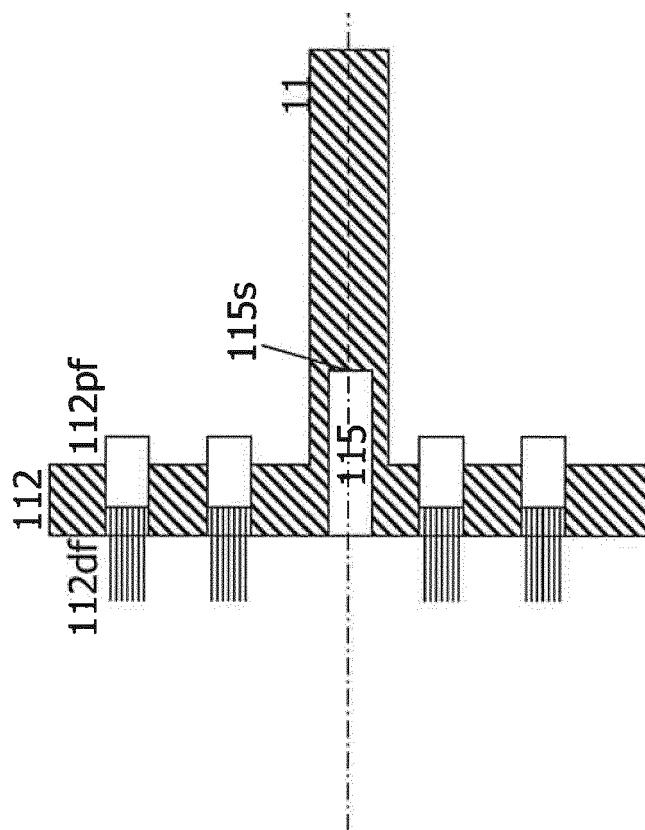


Fig. 5B

10c

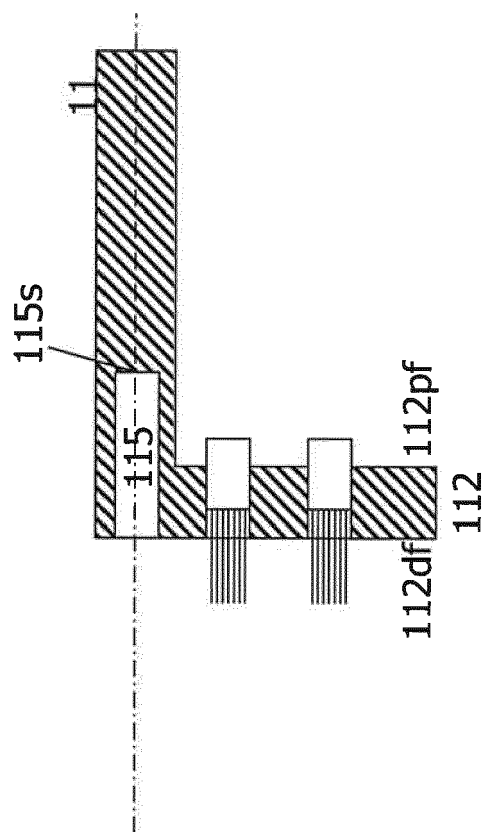
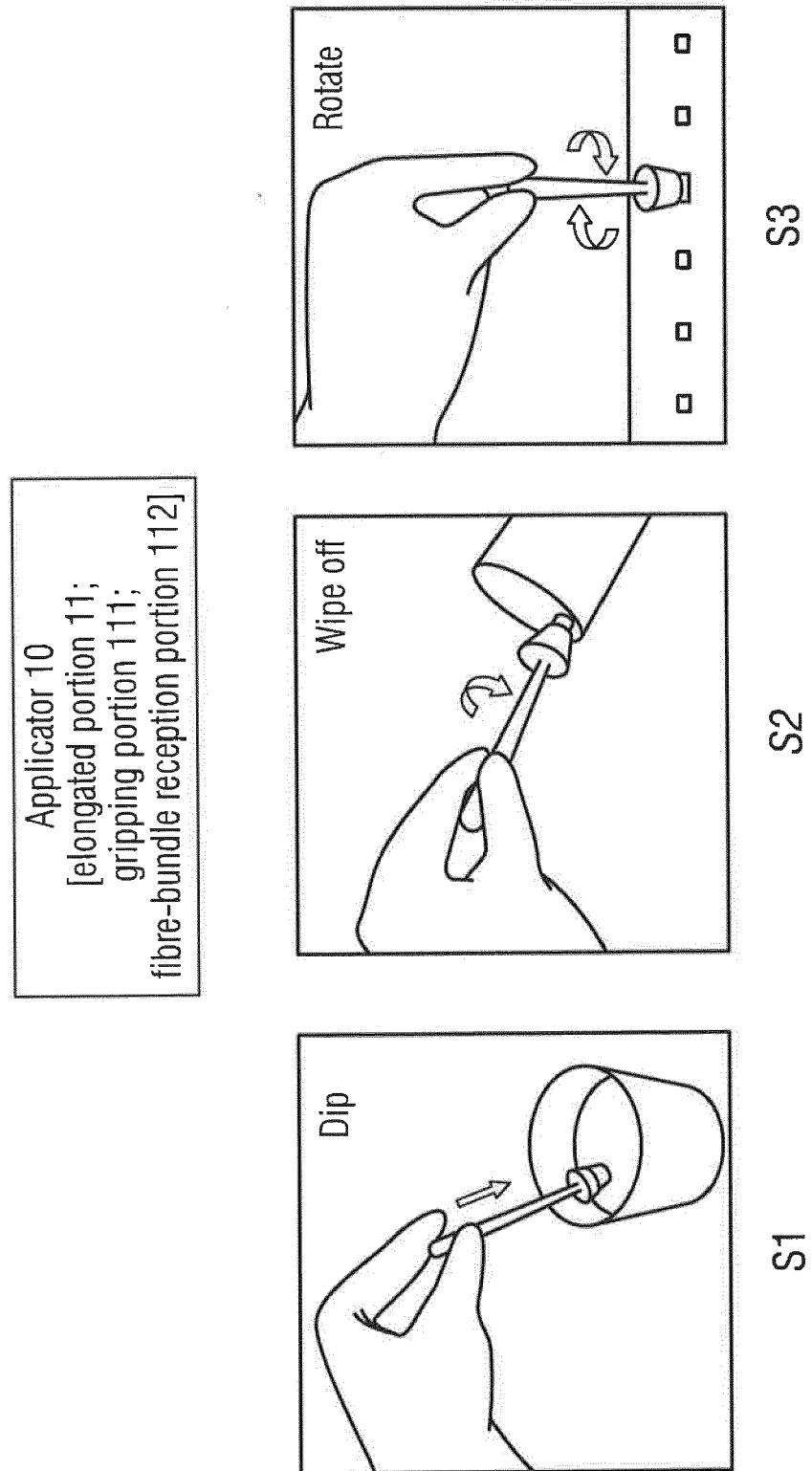


Fig. 6





EUROPEAN SEARCH REPORT

Application Number
EP 16 19 8872

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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A	JP S63 16879 U (NA) 4 February 1988 (1988-02-04) * abstract; figure 1 *	1-15	
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X	US 2012/003028 A1 (BEATY THOMAS HOWARD [US] ET AL) 5 January 2012 (2012-01-05) * abstract; figures 8-10 * * paragraph [0043] * * paragraph [0050] *	1,2,4-7, 9	TECHNICAL FIELDS SEARCHED (IPC) B05C B44D A46B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 April 2017	Examiner Ciotta, Fausto
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 19 8872

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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