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(54) **BRUSH AND METHOD FOR PRODUCING A BRUSH**

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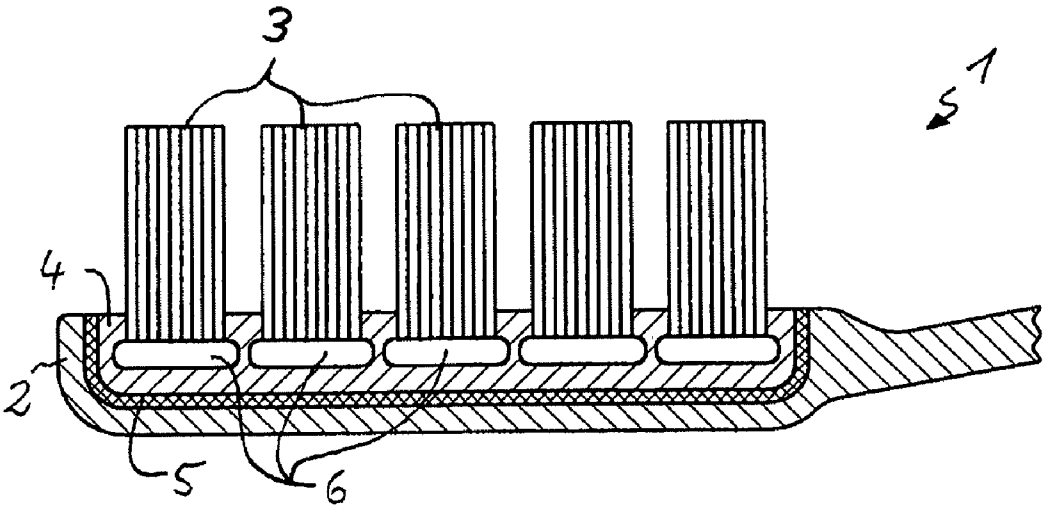
(57) **ABSTRACT**

In the case of a brush (**1**) having a brush body (**2**) and having clusters (**3**) of bristles retained on a bristle carrier (**4**), the clusters (**3**) of bristles have their fastening ends embedded in the bristle carrier (**4**). An intermediate layer (**5**) made of an additional material component is provided between the brush body (**2**) and the bristle carrier (**4**).



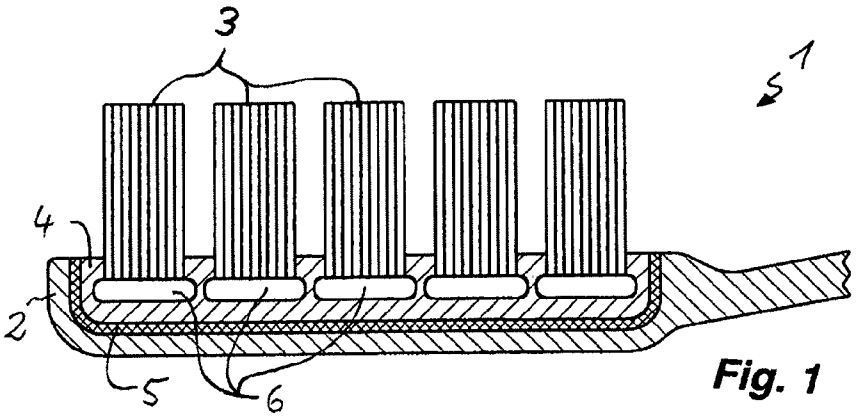


Fig. 1

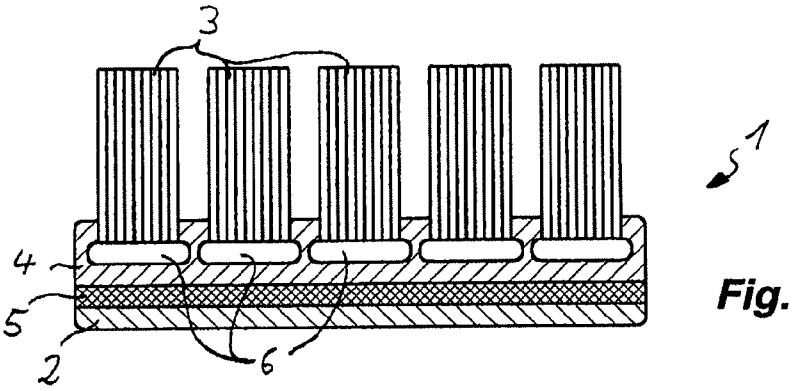


Fig. 2

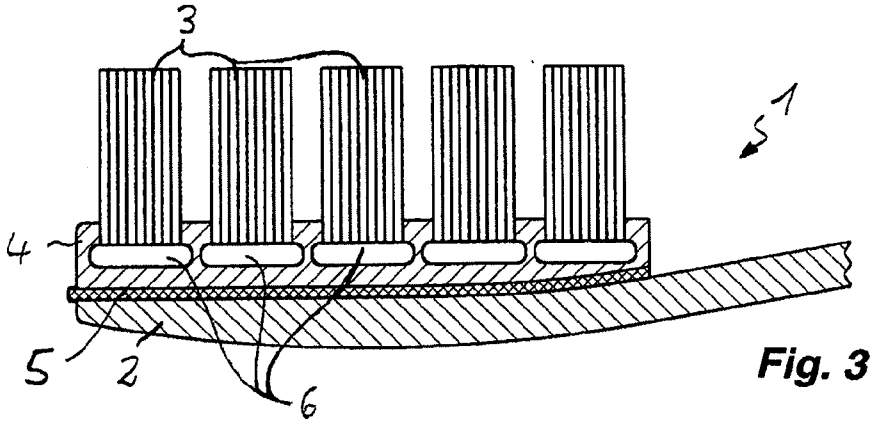


Fig. 3

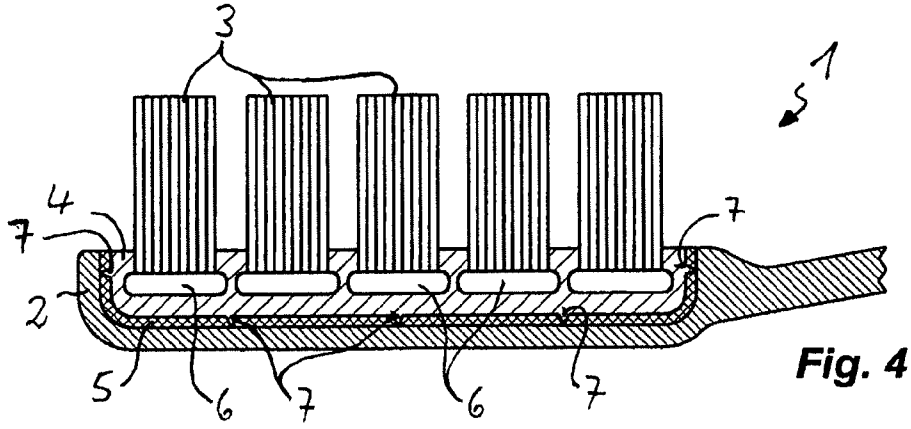


Fig. 4

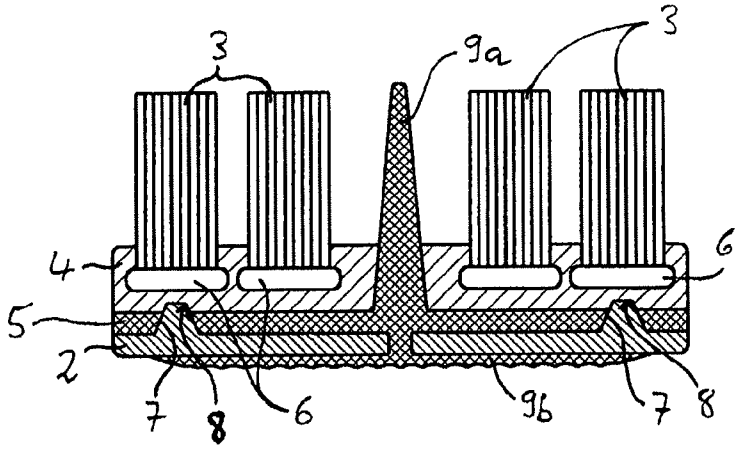


Fig. 5

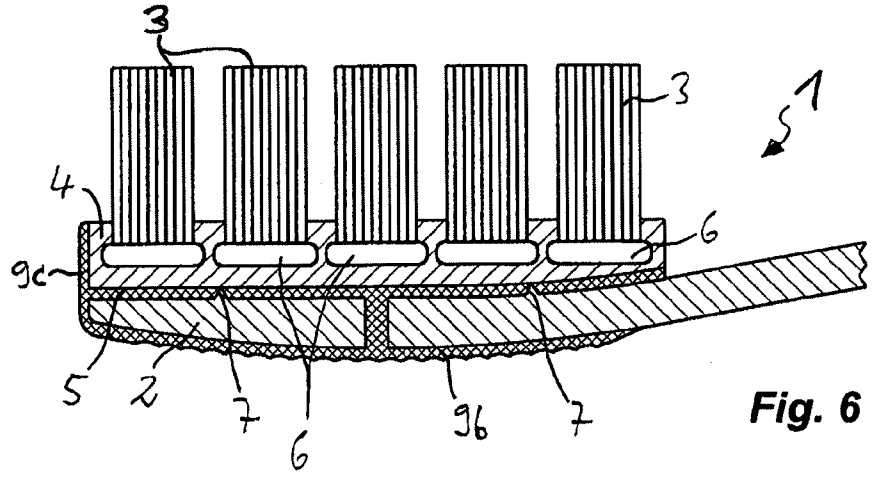


Fig. 6

BRUSH AND METHOD FOR PRODUCING A BRUSH

BACKGROUND

[0001] The invention relates to a brush having a brush body and having bundles of bristles held on a bristle carrier, and to a method for producing the same.

[0002] When producing brushes in which the bristles are not pushed into the brush body but, rather, the bundles of bristles are held in the region of the brush body with synthetic material injection molded around them and are thus held on the brush body, the problem arises that when the brush body is injection molded, the high injection pressure causes liquid synthetic material to be pressed up through the individual filaments of the bundles of bristles or at the edge of the bundle, and this excess synthetic material is then visible at the upper surface of the brush and so the brush is unusable.

[0003] To solve this problem, various devices and methods are already known. EP 1 110 478 A1 discloses a method in which the ends of bundles of bristles that project into a mold cavity first have a synthetic component injection molded around them and the bristle carrier which is thus formed is then transferred to a further mold cavity in which the brush body is injection molded and so injection molding takes place around the bristle carrier, which in this way becomes part of the brush body. In this arrangement, the bristle carrier may be injection molded at a low injection pressure, with the result that it is possible to prevent the injection molding material from overflowing in the region of the bundles of bristles.

[0004] In the case of these brushes and also conventional brushes, in which the bristles are pushed directly into the brush body, it is however problematic that there is a rigid connection between the bundles of bristles and the brush body, and the bundles of bristles cannot be adapted in use to the surface to be brushed, although this would be particularly advantageous in the case of toothbrushes.

SUMMARY

[0005] The object is therefore to provide a brush and a method for producing the same whereof the bundles of bristles can be adapted more flexibly to the surface brushed by the brush and/or in which it is possible to produce different brushes in a simple manner.

[0006] This object is achieved according to the invention in that the bundles of bristles have their fastening end embedded in the bristle carrier, and in that an intermediate layer of an additional material component is provided between the brush body and the bristle carrier.

[0007] In this way, it is possible for different and possibly prefabricated bristle carriers having bundles of bristles, on the one hand, to be connected to brush bodies, on the other, wherein it is also possible for different brushes to be produced by varying the additional material component, if the additional material component is visible on the outside of the finished brush.

[0008] It is advantageous if the fastening ends of the bundles of bristles are surrounded by the material of the bristle carrier and the bristle carrier forms a separating layer which keeps the intermediate layer and the bundles of bristles spaced from one another. The additional material component does not therefore come into contact with the bundles of bristles during the injection molding, as a result of which overflowing in the region of the bristles is reliably prevented. The fastening ends of the bundles of bristles can in this case also be partly fused into a unit and the individual bristle filaments of a bundle of bristles connected to one another.

[0009] Preferably, the intermediate layer is made of elastic material. The result of this is that the bristle carrier having the bundles of bristles is fastened to the brush body elastically, virtually such that it is "floating", and may thus—in the case of a toothbrush when cleaning teeth—yield and adapt itself to the teeth, which makes more thorough and more gentle cleaning possible. This therefore creates a type of spring action for the bundles of bristles.

[0010] This capacity for adapting is further supported if, between adjacent bundles of bristles, the bristle carrier has ribs, depressions or similar thinning in the material, or if the bristle carrier has sleeves for receiving the individual bundles of bristles, which are connected to one another by way of thin-walled webs or similar material bridges.

[0011] The thinner the construction of the bristle carrier itself, the greater its inherent flexibility.

[0012] It is also possible for a plurality of bristle carriers to be provided on a brush body. A plurality of bristle carriers may thus be placed together to form a larger overall bristle zone, wherein different combinations of different bristle carriers are also possible so that different brushes can be produced in a simple manner.

[0013] It may be advantageous if the intermediate layer projects in the direction transverse to the longitudinal direction of the bristles, at least in certain regions, beyond the outer periphery of the brush body and/or the bristle carrier. This results in a cushion that wholly or partly surrounds the brush head and may be used as a protection or an additional functional element, for example for cleaning the tongue.

[0014] It is also possible to provide additional functional elements that are made of the additional material component and are connected to the intermediate layer. These may then be produced, together with the intermediate layer, in an injection molding procedure.

[0015] As additional functional elements there may be provided for example massaging pads, a tongue scraper or a protection for the mucous membranes. For example, projecting laterally next to or between the bundles of bristles there may be fin-like pads arranged parallel thereto, by means of which the gums may be massaged while the teeth are being cleaned.

[0016] Depending on the type of materials used for the brush body, the bristle carrier and the intermediate layer, the intermediate layer may be connected to the brush body and the bristle carrier respectively by a material connection. Here, the intermediate layer may also serve as a binding member to combine two different materials for the brush body and the bristle carrier that cannot be connected to one another directly.

[0017] It is also conceivable for the intermediate layer to be connected to the brush body and the bristle carrier respectively by welding or adhesion.

[0018] It is advantageous if supporting elements that project from the bristle carrier and/or the brush body are provided. These serve as spacers when the brush is produced. One element (bristle carrier or brush body) is supported on the supporting elements of the respectively other element. This ensures that there is a defined position with the two elements at the correct spacing from one another.

[0019] The supporting elements may be constructed to taper. Depending on the degree of hardness of the supporting

elements, when the bristle carrier and brush body are put together, the free ends are broken off or pushed into the respectively other element. This has the effect on the one hand of good retention of the two elements in relation to one another, which may be advantageous in particular if the elements are prefabricated and are only connected to one another for example after being stored for a number of days, during which slight deformations may occur. On the other hand, a tension is created which presses the brush body and the bristle carrier against the mold faces of the injection mold when the additional material component is injection molded, as a result of which precise positioning of the elements is ensured.

[0020] It is also possible for the free ends of the supporting elements of the bristle carrier to engage in a respective receiver in the brush body and/or for the free ends of the supporting elements of the brush body to engage in a respective receiver in the bristle carrier. As a result of this, for example in the case of brush heads for electrical toothbrushes, the high angular acceleration may be transmitted better between the brush body and the bristle carrier.

[0021] Here, the receivers in the bristle carrier and/or the brush body may each have an undercut, and the free ends of the supporting elements may each have a corresponding mating profiling. This has the advantage that the brush body and the bristle carrier may already be joined together outside the injection mold for the additional material component and may then be inserted into the injection mold together, which is particularly advantageous in the case of relatively large brushes, such as hand wash brushes, washing-up brushes or brooms.

[0022] The bundles of bristles may in particular be connected by injection molding the bristle carrier around their partly fused fastening ends, the bristle carrier being formed by the injection molding procedure. However, it is also possible for the bundles of bristles to be pushed into a bristle carrier having bundle-receiving holes, fitted with anchor loops or anchor plates. It is also conceivable to glue or weld the bundles of bristles to a prefabricated bristle carrier.

[0023] As regards the method, the invention is characterized in that an additional material component is inserted between the brush body and the bristle carrier, as a connection means. This produces the advantages already explained above for the finished brush.

[0024] It is preferable here for the brush body and the bristle carrier to be kept spaced from one another and for the additional material component to be inserted into the intermediate space between the brush body and the bristle carrier. When the additional material component is inserted, which is conventionally done by the injection molding method under heat, it completely fills the intermediate space and in so doing forms a material connection between the brush body and the bristle carrier.

[0025] This production method has the major advantage that both the brush body and the bristle carrier can be produced beforehand in separate injection molding machines, and the additional material component is then introduced in a third injection molding machine. Here, each of these three injection molding machines may be of small and simple construction, with the result that the procurement costs for a corresponding production plant are low and low-cost production is possible. Moreover, the greatest variety of prefabricated brush bodies and bristle carriers may be connected to one another with the additional material component in the third injection molding machine, with the result that a comprehensive range of brushes, for example having brush bodies of different colors and handle shapes and bristle carriers having different bristle zone constructions, may be produced without complex procedures.

[0026] As an alternative, it is also possible for the additional material component to be injection molded around the bristle carrier, after which further material is injection molded around the bristle carrier provided with the additional material component, to form the brush body.

[0027] A further variant on the method according to the invention provides for the additional material component to be mounted on the brush body, for the bristle carrier to be mounted on the additional material component and for the brush body and the bristle carrier then each to be connected to the additional material component.

[0028] Here, the brush body and the bristle carrier may be connected to the additional material component in particular by partial fusing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The invention will be explained in more detail below with reference to the drawings.

[0030] In the drawings, shown somewhat schematically:

[0031] FIG. **1** to FIG. **6** each show a cross section through a brush according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0032] According to FIGS. **1** to **6**, a brush, designated as a whole by **1**, in each case has a brush body **2** and bundles of bristles **3**, which have at their connection end a partly fused holding region **6** and are held on a bristle carrier **4**. Both the brush body **2** and the bristle carrier **4** are in each case an injection molding made of rigid material.

[0033] Here, provided between the brush body **2** and the bristle carrier **4** there is in each case an intermediate layer **5** made of an additional elastic material component. The result of this is that the bristle carrier **4** is not rigidly connected to the brush body **2**, but is mounted to be virtually "floating", with the result that when the brush **1**, in this case constructed as a toothbrush, is used the bundles of bristles **3** may yield better and adapt themselves to the contour of the teeth, which makes more thorough and more gentle cleaning possible.

[0034] The fastening ends of the bundles of bristles **3** are each surrounded by the material of the bristle carrier **4**, with the result that the bristle carrier **4** forms a separating layer which keeps the intermediate layer **5** and the bundles of bristles **3** spaced from one another. The additional material component of the intermediate layer **5** does not therefore come into contact with the brush material or the partly fused holding region **6** of the bundles of bristles **3**, as a result of which when the additional material component of the intermediate layer **5** is injection molded, on production of the brush **1**, overflowing in the region of the bristles is prevented.

[0035] In the case of the brush **1** according to FIG. **1**, the intermediate layer **5** and the bristle carrier **4** are arranged in a trough-like depression in the brush body **2**. As a result of this, the elastic material component of the intermediate layer **5** is only visible as a border on the bristle zone side, while the side faces of the brush body **2** are determined by the material thereof.

[0036] In the case of the brush **1** according to FIG. **2**, the elastic material of the intermediate layer **5** extends as far as

the edge of the brush body **2** and the bristle carrier **4**, with the result that the elastic material of the intermediate layer **5** is visible at the side. The bristle carrier **4** may in this case yield laterally to a greater extent than in the case of the brush according to FIG. **1** and may be displaced in relation to the brush body **2**, with the result that the bundle of bristles **3** may be adapted to an even greater extent to the teeth or the surface for cleaning.

[0037] In the case of the brush **1** according to FIG. **3**, the elastic material of the intermediate layer **5** projects laterally beyond the bristle carrier **4** and even, at the free end of the brush body **2**, over the latter. Thus, the intermediate layer **5** additionally forms a cushion by means of which the brush **1** may be protected from damage.

[0038] In the case of the brush **1** according to FIG. **4**, supporting elements **7** that project from the bristle carrier **4** in the direction of the brush body **2** are provided, by means of which the bristle carrier **4** abuts against the brush body **2**. This makes it possible to position the bristle carrier **4** and the brush body **2** precisely in relation to one another when they are inserted into the injection mold for injection molding the intermediate layer **5** and to space the bristle carrier **4** and the brush body **2** correspondingly precisely in relation to one another. The tapering supporting elements **7** are additionally easily pushed into the material of the brush body **2**, as a result of which holding is further improved.

[0039] In the case of the brush **1** according to FIG. **5**, the brush body **2** has a plurality of supporting elements **7** whereof the free end engages in each case in a receiver **8** in the bristle carrier **4** and thus the brush body **2** and the bristle carrier **4** are also mounted at a defined spacing in relation to one another. Moreover, the engagement of the supporting elements **7** in the receivers **8** brings about better transmission of force between the brush body **2** and the bristle carrier **4**, which is particularly important in the case of brush heads of electric toothbrushes that rotate with oscillation.

[0040] In the case of the brush **1** according to FIG. **5**, the additional material component is used for injection molding not only the intermediate layer **5** but also additional functional elements in the form of a massaging pad **9***a* that projects into the bristle zone, and a tongue scraper **9***b* on the rear side of the brush body **2**. The additional functional elements are connected to the intermediate layer **5**, with the result that they can be produced in a common injection molding procedure in an appropriately constructed injection mold.

[0041] The brush **1** according to FIG. **6** also has additional functional elements in the form of a tongue scraper **9***b* and a protection **9***c* for the mucous membranes. This last is intended to prevent injury in the oral cavity during cleaning.

[0042] In the case of the brush **1** according to FIG. **6**, there are provided on the brush body **2** supporting elements **7** on which the bristle carrier **4** lies and in this way, similarly to the brush **1** from FIG. **4**, in which supporting elements **7** are provided on the bristle carrier **4**, a defined spacing is formed between the brush body **2** and the bristle carrier **4** for injection molding the intermediate layer **5**.

[0043] The brushes **1** may in each case be produced by inserting the bristle carrier **4**, which carries the bundles of bristles **3**, into an injection molding machine and there first of all injection molding the additional material component for the intermediate layer **5** and then injection molding further material for forming the brush body **2**.

[0044] However, it is also possible first to injection mold the bristle carrier **4** and the brush body **2** separately and then to keep them spaced from one another in an injection mold and to inject the additional material component for the intermediate layer **5** in between. This production method has the advantage that in each case simple injection molding machines may be used for the individual components of different constructions, which enables production thereof to be low in cost, and they may then be combined with one another as desired. For example, brush bodies of different shapes and color may be combined with bristle carriers that, for their part, have bundles of bristles of different arrangements and/or profiling. This means it is possible with little complexity to put together ranges of different brushes.

1. A brush (**1**) having a brush body (**2**) and having bundles of bristles (**3**) held on a bristle carrier (**4**), characterized in that the bundles of bristles (**3**) have their fastening end embedded in the bristle carrier (**4**), and in that an intermediate layer (**5**) of an additional material component is provided between the brush body (**2**) and the bristle carrier (**4**).

2. The brush as claimed in claim **1**, characterized in that the fastening ends of the bundles of bristles are surrounded by the material of the bristle carrier and the bristle carrier forms a separating layer which keeps the intermediate layer and the bundles of bristles spaced from one another.

3. The brush as claimed in claim **1** or **2**, characterized in that the intermediate layer (**5**) is made of elastic material.

4. The brush as claimed in one of claims **1** to **3**, characterized in that, between adjacent ones of the bundles of bristles (**3**), the bristle carrier (**4**) has ribs, depressions or similar thinning in the material.

5. The brush as claimed in one of claims **1** to **4**, characterized in that the bristle carrier (**4**) has sleeves for receiving the individual bundles of bristles (**3**), which are connected to one another by way of thin-walled webs or similar material bridges.

6. The brush as claimed in one of claims **1** to **5**, characterized in that a plurality of bristle carriers (**4**) are provided on a brush body (**2**).

7. The brush as claimed in one of claims **1** to **6**, characterized in that the intermediate layer (**5**) projects in the direction transverse to the longitudinal direction of the bristles, at least in certain regions, beyond an outer periphery of the brush body (**2**) and/or the bristle carrier (**4**).

8. The brush as claimed in one of claims **1** to **7**, characterized in that additional functional elements (**9***a*, **9***b*, **9***c*) are provided that are made of the additional material component and are connected to the intermediate layer (**5**).

9. The brush as claimed in claim **8**, characterized in that as additional functional elements there are provided massaging pads (**9***a*), a tongue scraper (**9***b*) or a protection (**9***c*) for the mucous membranes.

10. The brush as claimed in one of claims **1** to **9**, characterized in that the intermediate layer (**5**) is connected to the brush body (**2**) and the bristle carrier (**4**) respectively by a material connection.

11. The brush as claimed in one of claims **1** to **10**, characterized in that the intermediate layer (**5**) is connected to the brush body (**2**) and the bristle carrier (**4**) respectively by welding or adhesion.

12. The brush as claimed in one of claims **1** to **11**, characterized in that supporting elements (**7**) that project from the bristle carrier (**4**) and/or the brush body (**2**) are provided.

13. The brush as claimed in claim **12**, characterized in that the supporting elements (**7**) are constructed to taper.

14. The brush as claimed in claim **12** or **13**, characterized in that free ends of the supporting elements (**7**) of the bristle carrier (**4**) engage in a respective receiver (**8**) in the brush body (**2**) and/or the free ends of the supporting elements (**7**) of the brush body (**2**) engage in a respective receiver (**8**) in the bristle carrier (**4**).

15. The brush as claimed in claim **14**, characterized in that the receivers (**8**) in the bristle carrier (**4**) and/or the brush body (**2**) each have an undercut, and in that the free ends of the supporting elements (**7**) each have a corresponding mating profiling.

16. A method for producing a brush (**1**), in which injection molding is performed around bundles of bristles (**3**) at one of the ends thereof to form a bristle carrier (**4**) and the bristle carrier (**4**) is connected to a brush body (**2**), characterized in that an additional material component is inserted between the brush body (**2**) and the bristle carrier (**4**), as a connection means.

17. The method as claimed in claim **16**, characterized in that the brush body (**2**) and the bristle carrier (**4**) are kept spaced from one another and the additional material component is inserted into the intermediate space between the brush body (**2**) and the bristle carrier (**4**).

18. The method as claimed in claim **16** or **17**, characterized in that the additional material component is injection molded around the bristle carrier (**4**), and in that after this further material is injection molded around the bristle carrier (**4**) provided with the additional material component, to form the brush body (**2**).

19. The method as claimed in one of claims **16** to **18**, characterized in that the additional material component is mounted on the brush body (**2**), in that the bristle carrier (**4**) is mounted on the additional material component, and in that the brush body (**2**) and the bristle carrier (**4**) are then each connected to the additional material component.

20. The method as claimed in one of claims **16** to **19**, characterized in that the brush body (**2**) and the bristle carrier (**4**) are connected to the additional material component by partial fusing.

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