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The invention relates to a paintbrush comprising a handle, a bristle carrier plate which is fastened directly to the handle, and a multitude of bristle bundles which are fitted through receiving openings in the bristle carrier plate.

The most difficult problem in manufacturing paintbrushes is the fastening of the bristles. On the one hand, it is necessary that a sufficiently large number of bristles can be fixed to obtain the desired density of the bristles packs formed from the bristles. On the other hand, it must be ensured that the bristles are reliably fixed so that they do not fall out when used.

One kind of fastening consists in inserting the bristles into a sleeve as a compact pack and to glue the ends of the bristles arranged in the sleeve together, for example by means of a synthetic resin. The handle of the paintbrush is then connected to the sleeve. Though a very compact bristle pack can be obtained with this kind of fastening, the individual bristles are not held in a particularly reliable manner. Another kind of fastening consists in attaching the bristles in holes, for example in a wooden body, using small clamps. Though it is in principle possible that the bristles are comparatively well fixed with this kind of fastening, the holes used to receive the bristles must have a comparatively large distance from each other as otherwise, the body containing the holes does not have a sufficient stability to hold the clamps. The required distance of the holes from each other leads to the fact that the bristle pack is not particularly compact. This problem is even more serious if natural bristles are used as bristles, for example hog hairs. For example, whereas in synthetic bristles the clamp can be arranged in the center of the bristles curved in a U-shaped and both ends of the bristle can be used, only one end can be used in the case of bristles of hog hair, more specifically the end opposite to the root of the hair. As a result, the bristles must be configured so as to be longer than the actual bristle pack, as the end portion placed inside the paintbrush is bent to be adapted to be fixed by means of the clamp. This is disadvantageous with regard to costs, as natural bristles are particularly expensive. Furthermore, a very low compactness of the bristle pack is obtained.

Document WO 88/02998 A1 discloses a paintbrush containing two rows of bristles. They are arranged in blocks, more specifically within openings.

Document US 1,482,415 A shows a paintbrush which includes a guiding plate serving to guide bristles.

The object of the invention is to provide a paintbrush which is characterized by low manufacturing costs, a compact bristle pack and a reliable fastening of the individual bristles.

To achieve this object, in a paintbrush of the type initially mentioned, it is provided according to the invention that the bristle carrier plate is a grid and that the bristles of a bristle bundle are connected to the bristle carrier plate at their ends fitted through the receiving openings. A grid distinguishes itself in that the proportion of the receiving openings is very large in comparison with the total surface area and in particular larger than 50 percent. In this way, a particularly high density of the bristle pack is obtained. Further advantages are additionally obtained. On the one hand, the entire bristle pack is subdivided into a plurality of smaller bristle bundles, which simplifies the fastening of the bristles. On the other hand, as the bristle bundles are fitted through the receiving openings, the use of clamps is unnecessary, for which reason the receiving openings can be configured so as to be comparatively large. This leads to a compact bristle pack.

According to an embodiment, the handle is provided with a retainer in which the bristle carrier plate is inserted. This leads to a particularly stable connection between the bristle carrier plate and the handle and moreover to an appealing appearance. Furthermore, the retainer can be configured so deep that the edges of the retainer support the bristle pack.

According to an alternative embodiment, it is provided that on its side facing the handle, the bristle carrier plate is provided with a circumferential collar. This permits an insertion of the handle into the collar, the latter being thus adapted to be connected to the bristle carrier plate in a mechanically stable manner and with little effort. The handle can be glued to the bristle carrier plate or can be mechanically attached thereto, for example using nails, a snap connection, a screw connection, a welding connection, etc. A further advantage of the circumferential collar consists is that a clear limitation of the area is provided in which the bristle bundles are connected to the bristle carrier plate and the handle is also connected to the bristle carrier plate.

Alternatively, the handle can also be injection-molded to the bristle carrier plate, that means within the collar or also so as to engage around the bristle carrier plate from the outside.

According to an embodiment, it is provided that the bristle carrier plate is surrounded by a sleeve which also realizes the connection with the shaft. The sleeve takes the function of the collar. The advantage of this embodiment consists in that the bristle

carrier plate can be reached more easily for the insertion of the bristle bundles. The sleeve can be made of sheet metal so that the paintbrush is optically very similar to a conventional paintbrush.

It is preferably provided that on its side facing the bristles, the bristle carrier plate is provided with a circumferential collar. The latter supports the bristle pack so that the bristles are well held together. The collar can have parallel walls or walls that extend towards each other, away from the bristle carrier plate.

Depending on the desired purpose of use, the bristle carrier plate can be even or also arched. This is advantageous particularly with regard to stiffness.

The compactness of the bristle pack can also be influenced by the way of arranging the bristle bundles in the bristle carrier plate. For example, at least one of the bristle bundles can be arranged in a direction which is not perpendicular to the bristle carrier plate. The exterior rows of the bristle bundles can for example be inclined towards the center of the bristle pack. It is thus possible to obtain a higher density of the bristles in those regions in which this is advantageous, or to obtain an improved capillarity of the bristles.

The compactness of the bristle pack can also be varied in that the surface proportions of the receiving openings differ from each other in different sections of the bristle carrier plate. Due to the use of smaller receiving openings in the outer region, for example, which are surrounded by appropriately wider webs, a compactness can be obtained in the outer region of a bristle pack that is lower than in the center, where larger receiving openings can be used for example, that are surrounded by thinner webs. In this way, it is also possible to form small empty spaces in appropriate places at the basis of the bristle pack, that means near the bristle carrier plate, these empty spaces serving as "storeroom" for paint. By an appropriate arrangement and dimensioning of these storerooms, the quantity of paint and the uniformity of the paint reaching the bristle tips during painting is influenced.

The bristles of a bristle bundle are preferably connected to one another at their ends fitted through the receiving openings. This ensures that no bristles are detached from a bristle bundle.

The ends of the bristles of a bristle bundle that are fitted through the receiving openings can be welded to one another, for example. This is particularly advantageous if bristles made of a plastic material are used. The ends of the bristles can be pressed

against a heated fusion die, for example, so that they melt and are welded to one another. Simultaneously, if desired, the corresponding side of the bristle carrier plate can also be melted by an appropriate configuration of the fusion die and an appropriate selection of the pressure, so that the ends of the bristle bundles are also welded to the bristle carrier plate. If necessary, after the melting of the bristles, a further pressing action into the melted bristles can be performed using a second die in order to process the surface or to obtain a better density.

Alternatively, it can be provided that the bristles of a bristle bundle are glued to one another at their ends fitted through the receiving openings, for example using a synthetic resin. This is particularly advantageous if bristles made of a material which is not suitable for welding are used. Due to the adhesive, the bristle bundles can also immediately be connected to the bristle carrier plate.

In order to optimally adapt the paintbrush to the respective purpose of use, it can be provided that the bristle carrier plate is equipped with different bristles. One example of such an equipment consists in equipping the receiving openings arranged on the outer surface of the bristle carrier plate with particularly wear-resistant bristles, and in equipping the receiving openings arranged in the center of the bristle carrier plate with particularly paint-receptive bristles.

It is also possible to arrange different bristles within one receiving opening, for example a combination of synthetic bristles and natural bristles.

The invention will be described below with reference to different embodiments which are illustrated in the accompanying drawings in which:

- Figure 1 shows in a schematic, broken section a paintbrush according to a first embodiment of the invention;

- Figure 2 shows in a perspective view a bristle carrier plate used in the paintbrush of Figure 1;

- Figure 3 shows a paintbrush according to a second embodiment in a sectional view;

- Figure 4 shows an exploded view of the paintbrush of Figure 3;

- Figure 5 shows a paintbrush according to a third embodiment in a perspective view;

- Figure 6 shows in a perspective view the bristle carrier plate used in the paintbrush of Figure 5, with bristle bundles inserted;

- Figure 7 shows in a perspective view the bristle carrier plate used in the paintbrush of Figure 5;

- Figure 8 shows in a perspective view a bristle carrier plate with bristle bundles inserted for a paintbrush according to a fourth embodiment;

- Figure 9 shows the bristle carrier plate of Figure 8 with bristle bundles inserted in a further perspective view;

- Figure 10 shows three variants of a bristle carrier plate which can be used in the paintbrush according to the fourth embodiment;

- Figure 11 shows a paintbrush according to a fifth embodiment in a schematic sectional view;

- Figure 12 shows the handle of the paintbrush of Figure 11 in a schematic sectional view;

- Figure 13 shows a first variant of the paintbrush according to the fifth embodiment;

- Figure 14 shows a second variant of the paintbrush according to the fifth embodiment;

- Figure 15 shows a third variant of the paintbrush according to the fifth embodiment; and

- Figure 16 shows a schematic section through the handle of the paintbrush according to the fifth embodiment.

Figures 1 and 2 show a paintbrush according to a first embodiment. The essential parts of this paintbrush are a handle 10, a bristle carrier plate 20 and a bristle pack 30.

The bristle carrier plate 20 (see Figure 2) has a grid-like body 22 in which a plurality of receiving openings 24 is formed, which are separated from each other by webs 26. The receiving openings 24 serve to receive bristle bundles 32 of which the bristle pack 30 is composed. The shape of the receiving openings 24 is substantially determined by the desired properties of the paintbrush and by solidity requirements. The larger the surface proportion of the receiving openings 24 in the total surface area of the body 22, the higher the density of the bristle pack 30. However, the solidity of the bristle carrier plate also decreases as the webs 26 must be configured appropriately thinner. The

shape of the receiving openings 24 substantially depends on how the bristles and the bristle bundles 32 formed by the receiving openings 24 are to be arranged within the bristle pack 30.

Both sides of the webs 26 around the receiving openings 24 can be provided with chamfers to facilitate the insertion of the bristle bundles 32 in the receiving openings 24, on the one hand, and, on the other hand, to improve the connection of the ends of the bristles fitted through the bristle carrier plate 20 to the bristle carrier plate. Furthermore, empty spaces which act as a storeroom for paint are produced by the webs at the basis of the bristle pack. By an appropriate arrangement and dimensioning of these empty spaces, it is determined how many paint can be made available there, how man bristles are in contact with the paint and how fast and uniformly the paint is guided from there to the tips of the bristles during painting.

The outer surface of the grid-like body 22 is provided with a collar 28 (see also Figure 1) which serves to receive the handle 10. A second collar 29 is provided on the other side of the grid-like body 22, which surrounds the bristle pack 30 and serves to support the bristles. Here, the collar 29 is configured such that its walls converge away from the bristle carrier plate. In this way, the bristles are held together and supported particularly well.

The bristle bundles 32 are fitted through the receiving openings 24 via the ends that are to be anchored in the paintbrush. The ends fitted through the grid-like body 22 are then connected to one another. In the first embodiment, the ends of the bristles have been welded to one another for this purpose, so that the mushroom-shaped welding heads 34 shown in Figure 1 are formed. Alternatively, the ends of the bristles can be melted in a common, continuous film-like plastic compound. The film-like plastic compound can be uniformly thick or have different thicknesses over its surface. A thickened portion of the film-like compound, for example, can be formed where the bristle bundles are located. At the same time, the ends of the bristle bundles 32 can be welded to the bristle carrier plate 20, more specifically to the webs 26 surrounding the receiving openings 24. To this end, the bristle carrier plate 20 is preferably made of a plastic material which can be welded to the material of the bristles.

The handle 10 is inserted into the collar 28 and is there connected thereto by means of a layer of adhesive 12. A synthetic resin, for example, can be used as adhesive. The collar 28 has the advantage to precisely receive the handle 10, on the one hand, so that a mechanically stable fastening is provided. On the other hand, the collar 28 ensures

that no adhesive 12 and no other material of the ends of the bristle bundles 32 that are welded one to another can escape to the outside. An optically very clear connection between the handle 10 and the bristle carrier plate 20 is therefore ensured.

Instead of being connected by the adhesive 12, the handle can also be connected differently to the bristle carrier plate 20, for example by a latching or a clip connection, by nails, screws or a thread. It is also possible to manufacture the handle 10 from a plastic material, for example, and to inject it directly into the bristle carrier plate 20 so that it is fastened there.

Figures 3 and 4 show a paintbrush according to a second embodiment. The same reference numerals are used for the components known from the first embodiment, and in this respect, reference is made to the above explanations.

Generally speaking, the difference between the first and the second embodiment consists in that in the second embodiment, it is not the handle which is inserted into the bristle carrier plate, rather, the bristle carrier plate 20 is inserted into the handle 10. To this end, the handle is provided with a retainer 14 which is configured like a large blind hole. The bristle carrier plate 20 equipped with the bristles is inserted into the retainer 14 (see the case P in Figure 4). The retainer 14 is configured so deep that the free edge of the skirt forming the retainer 14 surrounds and supports the bristle pack 30 in a manner similar to the collar 29 of the first embodiment.

In the second embodiment, the bristle carrier plate 20 is configured without any collar. Only a small collar 21 is provided on the side on which the ends of the bristles are connected to the bristle carrier plate 20, this collar preventing an adhesive 12 used to fasten the bristle bundles 32 from flowing downwards along the side of the bristle carrier plate 20. The collar 21 further provides for a higher mechanical stability of the bristle carrier plate 20.

To fasten the bristle carrier plate 20 equipped with the bristles within the retainer 14, it is possible to use an adhesive 12, as shown in Figure 3, or to use any other kind of fastening.

A further difference to the first embodiment consists in that the collar surrounding the bristles is configured with parallel walls. This permits to manufacture the collar with little effort in an injection-molding process.

Figures 5 to 7 show a third embodiment. The same reference numerals are used for the components known from the previous embodiments, and in this respect, reference is made to the above explanations.

The essential difference between the first and the third embodiment consists in that in the third embodiment, the surface proportion of the receiving openings 24 for the bristle bundles 32 is smaller than in the first embodiment. This leads to a lower compactness of the bristle pack 30. Furthermore, it can be seen that the surface proportion of the receiving openings 24 in an exterior annular region of the grid-like body 22 is larger than in the center.

Figures 8 and 9 show a bristle pack 30 with a bristle carrier plate 20 for a paintbrush according to a fourth embodiment. The same reference numerals are used for the components known from the previous embodiments, and in this respect, reference is made to the above explanations.

Figure 10 shows different variants of the bristle carrier plate 20 which differ from each other in that the receiving openings 24 have different configurations and in different webs between the receiving openings. In addition to the different densities of the bristle pack of the respective paintbrush resulting therefrom, storerooms for paint are formed by the webs at the basis of the bristle pack. In the variant of Figure 10a, an approximately annularly rectangular storeroom is formed, whereas in the variant of Figure 10b, a center storeroom is formed which is provided with eight "oriels". In the variant of Figure 10c, a generally rectangularly circonferential storeroom is formed, similar to Figure 10a, the cross-section of which however increases towards the center.

The essential difference between the first and the fourth embodiment consists in that in the fourth embodiment, the bristle carrier plate 20 is rectangular. Rectangular receiving openings are also used for the bristle bundles 32, as can be seen in Figure 9 by means of the shape and the arrangement of the welded ends of the bristle bundles.

Figure 11 shows a paintbrush according to a fifth embodiment. The same reference numerals are used for the components known from the previous embodiments, and in this respect, reference is made to the above explanations.

The essential difference to the first embodiment, for example, consists in that in the fifth embodiment, the handle 10 is configured so as to be hollow and is composed of two shells 40, 42. The collar 29 is formed in one piece with the handle 10, the collar 29 supporting and holding the bristle pack 30 together. To this end, the collar tapers to the

front. The bristle carrier plate 20 is received in the handle by means of a circumferential groove 44 (see Figure 12) which is formed in both shells 40, 42.

The bristle carrier plate 20 can easily be held in a mechanical way in the groove 44. Alternatively, the bristle carrier plate 20 can be bonded or welded therein.

The hollow handle according to the fifth embodiment leads to a paintbrush having a very low weight. Furthermore, the two shells 40, 42 can very easily be manufactured in an injection mold as each shell can easily be removed from the mold; the mold parting plane extends in the center through the handle. In this configuration, the collar 29 can moreover be configured in a tapering manner without any difficulties.

Figure 13 shows a first variant of the fifth embodiment. The difference to the paintbrush shown in Figure 11 is that the handle is reinforced inside by three ribs 46 so that it cannot be pressed together, even if a low wall thickness is used.

Figure 14 shows a second variant of the fifth embodiment. The difference to the paintbrush shown in Figure 11 is that a closure plate 48 is arranged in the transition region between the collar 29 and the handle 10. This plate serves, on the one hand, as a support for the bristle carrier plate 20 and prevents the bristle carrier plate 20 to be pressed into the handle 10 due to an excessively high pressure onto the bristle bundle 30. The closure plate 48, on the other hand, serves as a separation between the region of the bristle bundle 30 and the handle 10 and prevents paint from flowing into the inside of the hollow handle 10.

Figure 15 shows a third variant of the fifth embodiment. The difference to the paintbrush shown in Figure 11 is that the two shells 40, 42 are configured as a multicomponent part. In the example shown, two sections 50 made of a plastic material that is softer than the material of the two shells 40, 42, for example of a thermoplastic elastomer, are applied on the two shells 40, 42 by injection-molding in the region of the handle. Such a softer plastic material improves the handling feeling and can be arranged in an appropriate manner depending on the requirements, for example as a support for the thumb and/or the index finger of the user.

According to a further variant that is not illustrated, it can be provided that the collar 29 is injection-molded from a flexible material to the two shells 40, 42 which form the handle 10. In this way, a flexible support within certain limits is obtained for the bristle pack 30. It is also possible to inject only part of the collar from the flexible material, whereas other parts are made of the same harder material as the handle 10.

For the sake of completeness, reference is made to the fact that the features of Figures 13 to 15 can be combined with each other in any way.

Figure 16 shows the two shells 40, 42 in a sectional view. In the example embodiment shown, it can be seen that on a longitudinal edge, each shell 40, 42 is provided with a small circumferential welding edge 52, an even edge of the other shell being opposite thereto. This permits a connection of the two shells to one another by ultrasonic welding. It is particularly advantageous that the two shells 40, 42 are configured identically so that the same injection mold can be used to manufacture the two shells 40, 42. Alternatively, only one of the two shells 40, 42 could be provided with the welding edge 52.

It is also possible to connect the two shells 40, 42 to one another in any other way than by welding. The two shells 40, 42 can be glued or mechanically clipped to one another, or can be connected to one another other by injection-molding (for example by injecting a second material component therearound).

In all embodiments, different materials can be used for the bristles. It is in particular possible to use bristles of plastic material and of natural fibers such as hog hair, cattle hair, badger etc. In the case of plastic bristles, solid bristles or hollow bristles can be used. The cross-sectional shape of the bristles can be adapted to the respective requirements, they can be round, star-shaped, triangular, rectangular, for example, or can be a combination of different cross-sectional shapes. Different bristle materials can also be combined within one receiving opening, for example bristles of plastic with natural bristles. The tips of the bristles can be pre-processed and can be rounded or bevelled, for example.

Unlike the embodiments shown, the thickness of the grid-shaped body can be varied so that a higher thickness is provided in mechanically more stressed regions, for example.

A particular advantage resulting from the use of the bristle carrier plate 20 having receiving openings 24 is that the shape of the bristle pack 30 can be manufactured with little effort in the desired manner by simply inserting the bristles to a greater or lesser extent into the receiving openings 24. It is also possible to use bristles having different lengths from the start so that the cuttings are minimized, which leads to lower manufacturing costs.

The bristle carrier plate can be provided with elements such as fingers, lamellas, etc. which can be made of a flexible material such as a thermoplastic elastomer, for example. These elements can support the bristles within the bristle pack. With such elements, it is also possible to produce specific painting effects, structural effects, for example. The bristle carrier plate can also be provided with elements such as sponges, etc. between the bristle packs, which form a paint stock and influence the paint absorption or the paint distribution.

PATENTKRAV

1. Pensel med et håndtag (10), en børstebæreplade (20), som er fastgjort umiddelbart til håndtaget (10), og adskillige børstebundter (32), som er stukket igennem optagelsesåbninger (24) i børstebærepladen (20), idet børstebærepladen (20) er et gitter, hvor børsterne i et børstebundt (32) ved deres igennem optagelsesåbningerne (24) gennemstukne ender er forbunder med børstebærepladen.

2. Pensel ifølge krav 1, **kendetegnet ved, at** i det mindste ét af børstebundterne har en langsgående akse, som ikke står vinkelret på børstebærepladen (20).

3. Pensel ifølge krav 1 eller krav 2, **kendetegnet ved, at** håndtaget (10) er forsynet med en holder (14), i hvilken børstebærepladen (20) er indsat.

4. Pensel ifølge krav 1 eller krav 2, **kendetegnet ved, at** børstebærepladen (20) på sin mod håndtaget (10) vendende side er forsynet med en rundtgående krave (28), i hvilken håndtaget kan indsættes.

5. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** håndtaget (10) er sprøjtestøbt på børstebærepladen (20).

6. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** en rundtgående krave (29) er tilvejebragt, som omslutter børstepakkerne (32) og er forbundet med håndtaget (10).

7. Pensel ifølge krav 6, **kendetegnet ved, at** kraven (29) er udformet i ét stykke med håndtaget (10) eller børstebærepladen (20).

8. Pensel ifølge krav 6, **kendetegnet ved, at** kraven (29) er dannet af en separat bøsning, som er fastgjort til håndtaget (10) og i hvilken børstebærepladen (20) er indsat.

9. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** børstebærepladen (20) er hvælvet.

10. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** overfladeproportionerne for optagelsesåbningerne (24) er indbyrdes forskellige i forskellige afsnit af børstebærepladen (20).

11. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** der ved basis af børstebundterne (32) imellem disse er dannet optagelsesrum for maling.

12. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** børsterne i et børstebundt (32) ved deres igennem optagelsesåbningerne (24) gennemstukne ender er indbyrdes forbundet, især indbyrdes sammensvejst eller indbyrdes sammenklæbede.

13. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** børstebærepladen (20) er bestykket med forskellige børster.

14. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** de ved ydersiden af børstebærepladen (20) anbragte optagelsesåbninger (24) er bestykkede med særligt slidfaste børster, og de i midten af børstebærepladen (20) anbragt optagelsesåbninger (24) er bestykkede med særligt malingsoptagelsesduelige børster.

15. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** skråtstillingen af børstebundterne vælges således, at en bedre malingsoptagelse eller bedre påstrygningsvirkning opnås.

16. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** i det mindste en del af enderne af børstebundterne er skråtstillede imod hinanden.

17. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** i det mindste en del af enderne af børstebundterne er skråtstillede imod penselmidten.

18. Pensel ifølge ethvert af de foregående krav, **kendetegnet ved, at** indenfor én optagelsesåbning (24) er der anbragt forskellige børster.

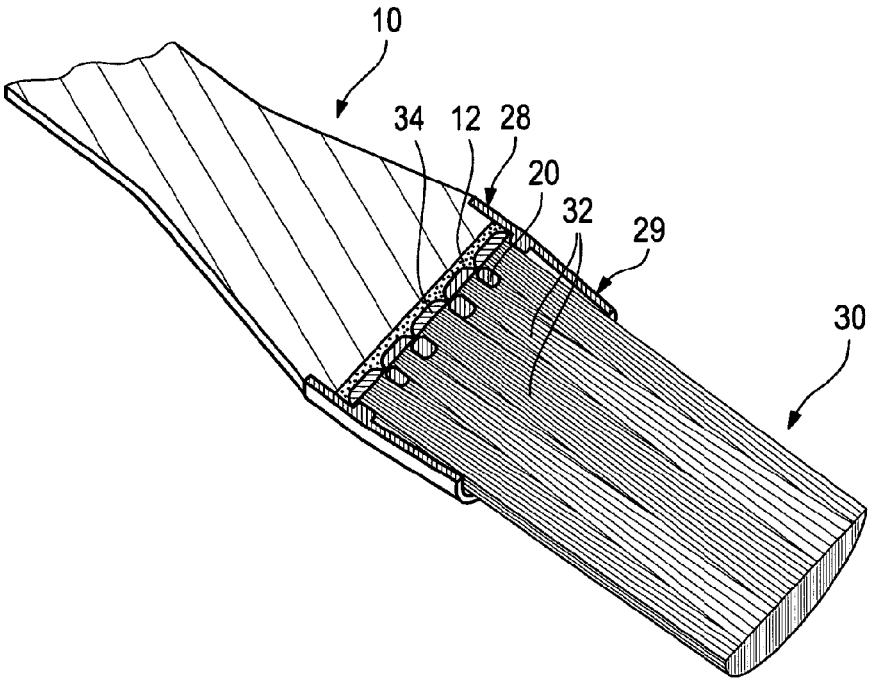

Fig. 1

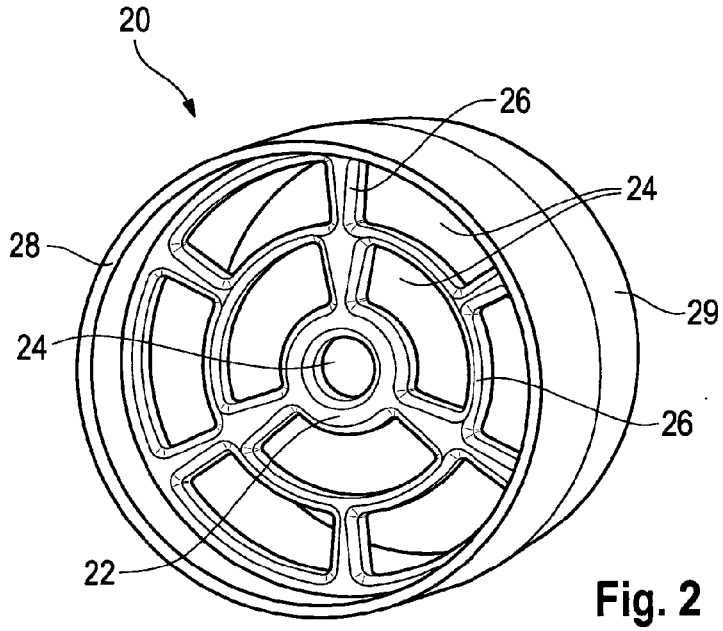

Fig. 2

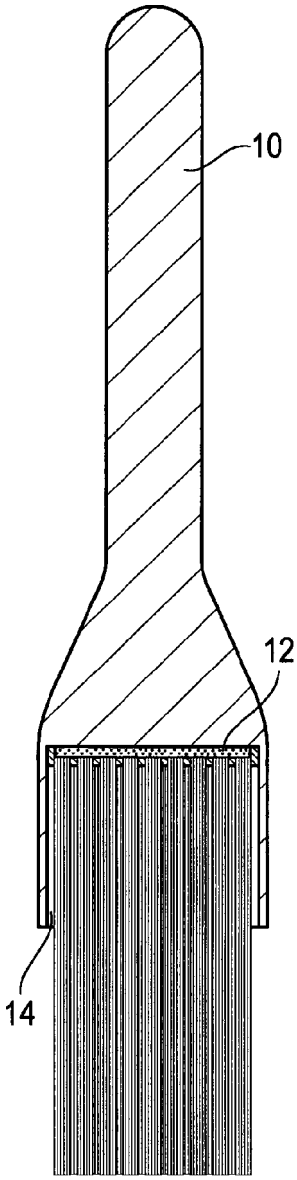

Fig. 3

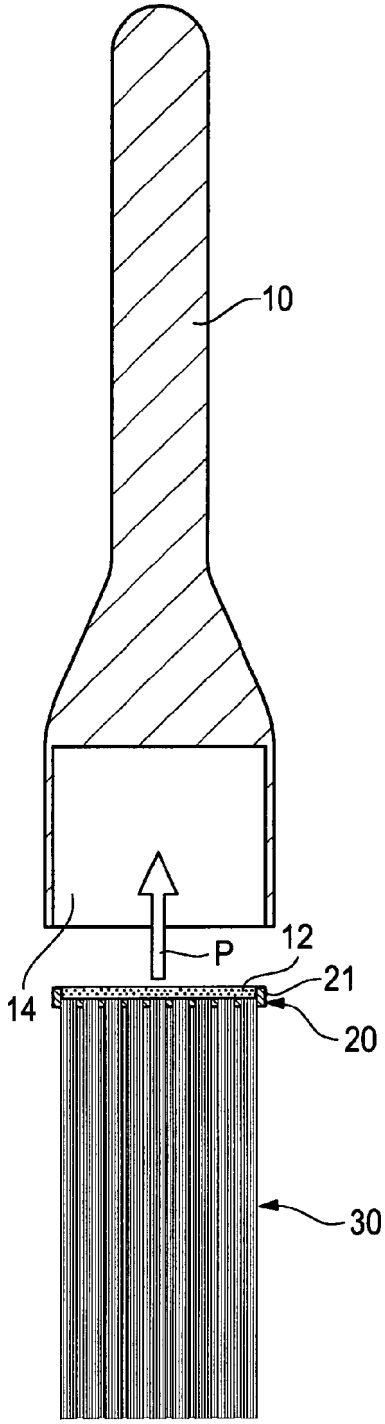

Fig. 4

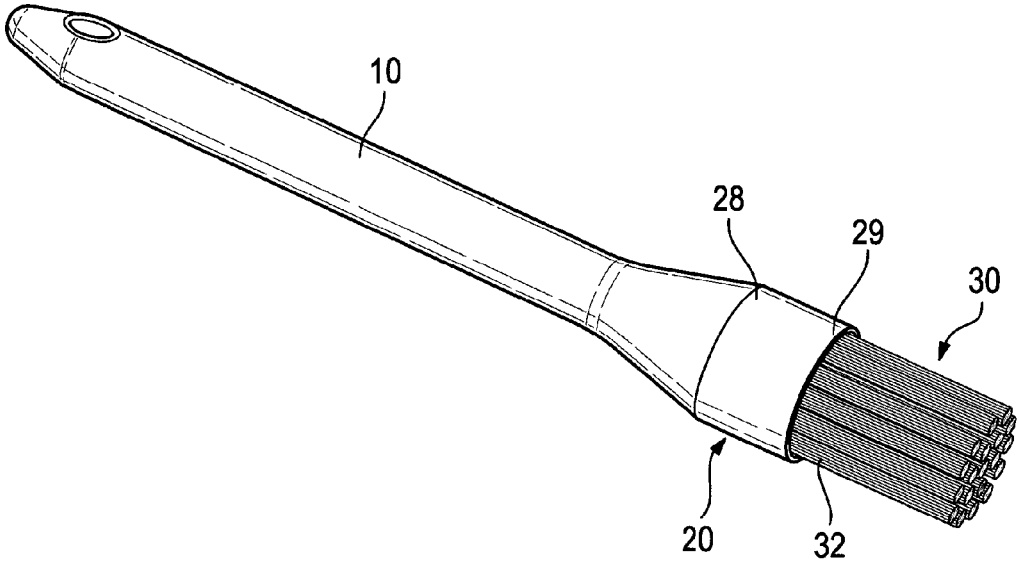

Fig. 5

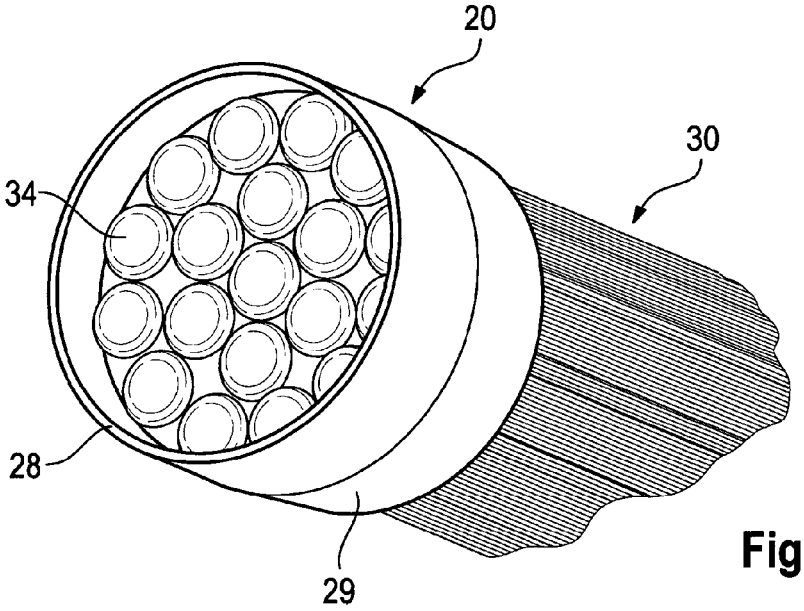

Fig. 6

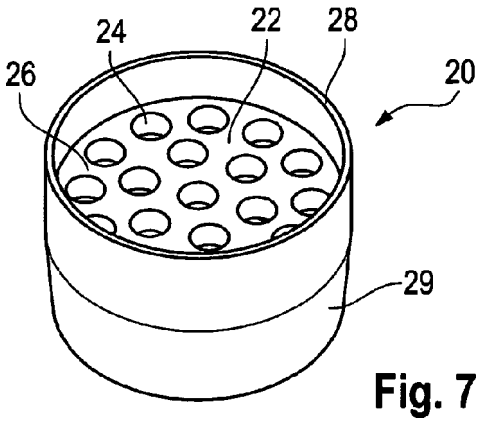

Fig. 7

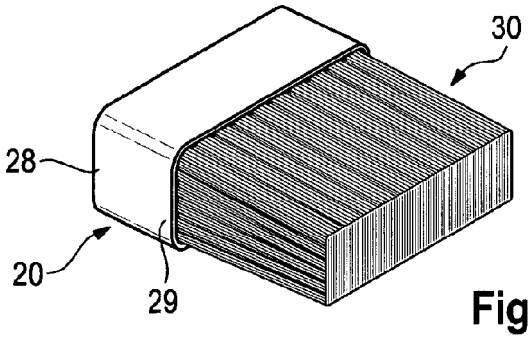

Fig. 8

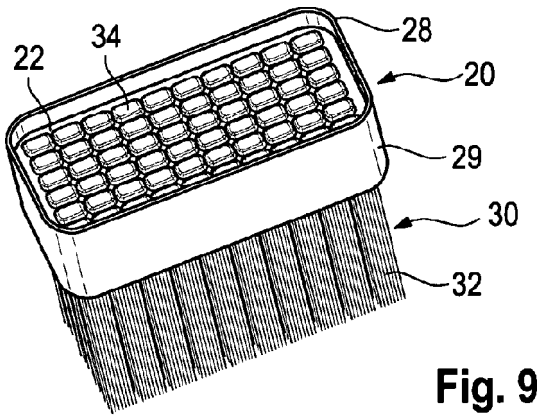

Fig. 9

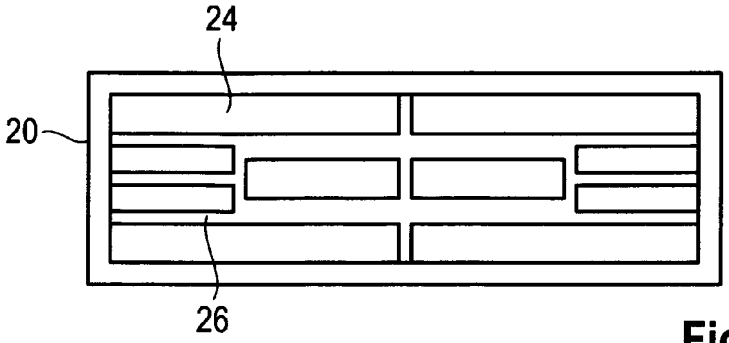

Fig. 10a

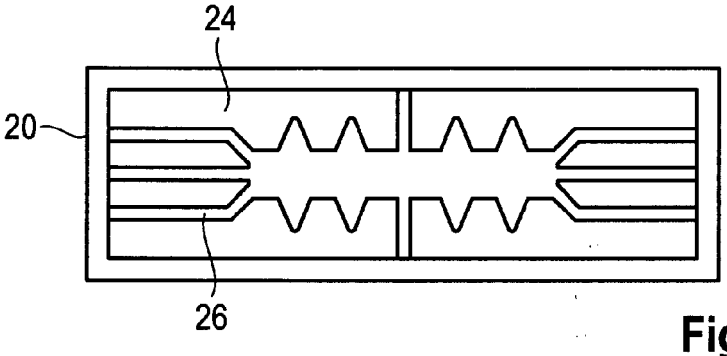

Fig. 10b

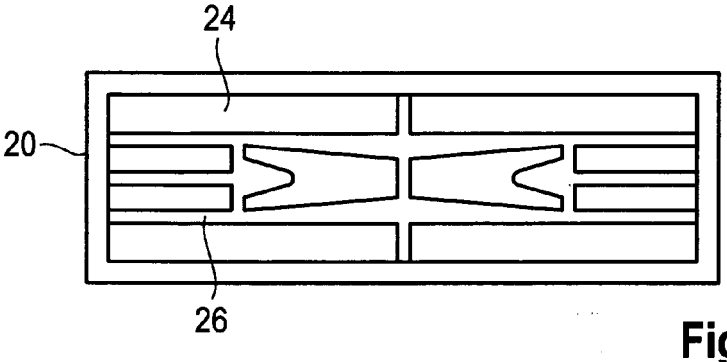

Fig. 10c

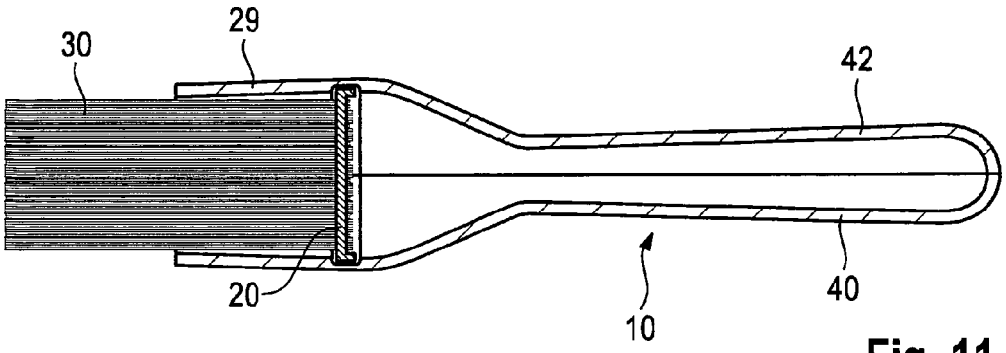

Fig. 11

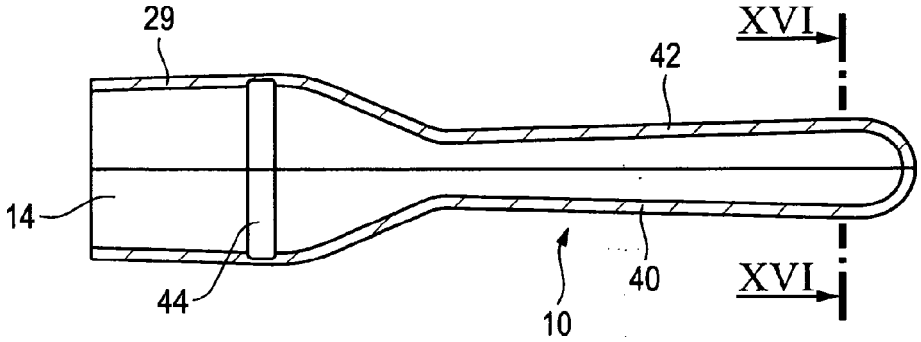

Fig. 12

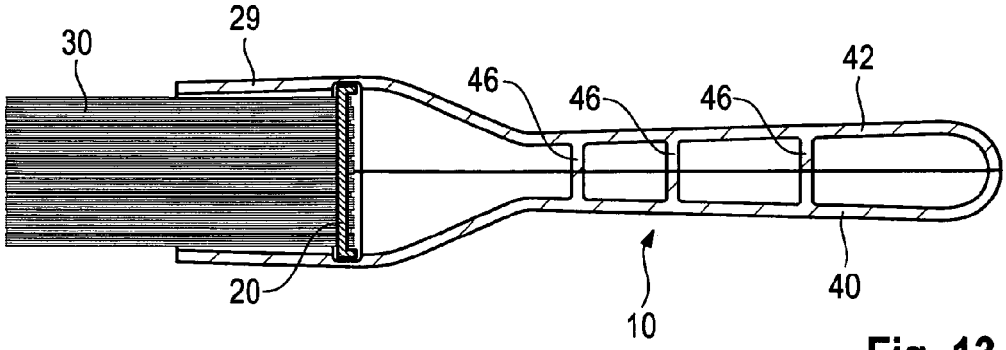

Fig. 13

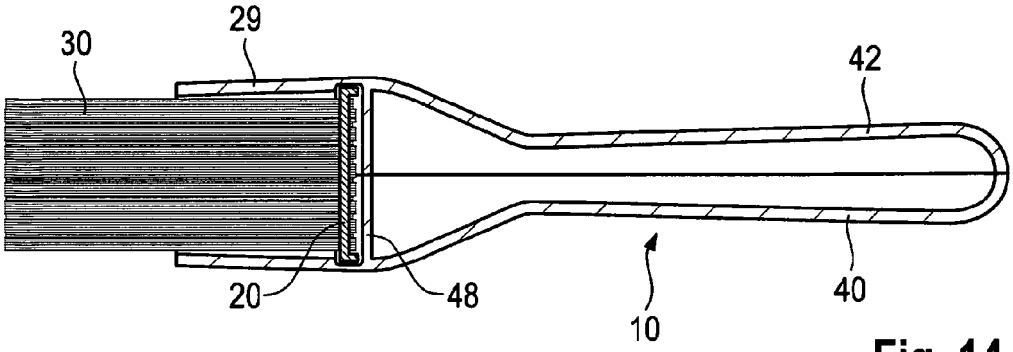

Fig. 14

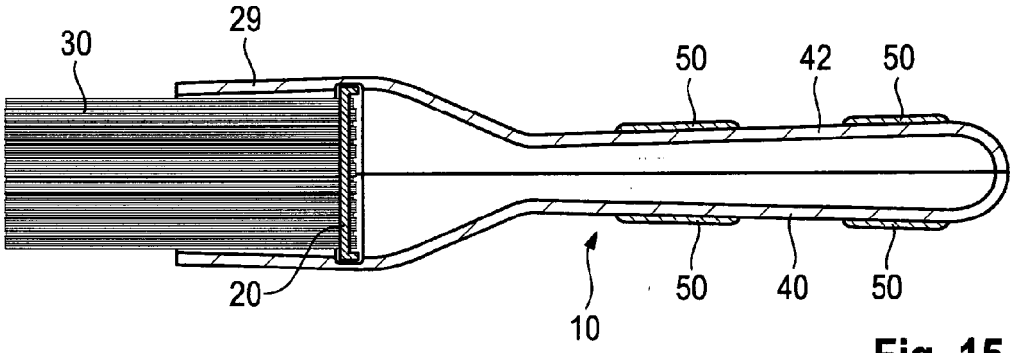

Fig. 15

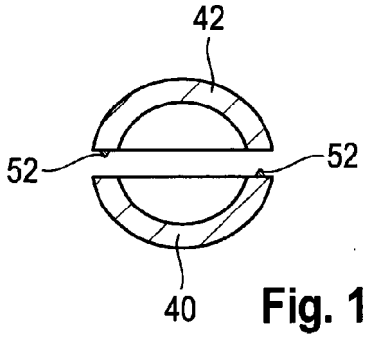

Fig. 16