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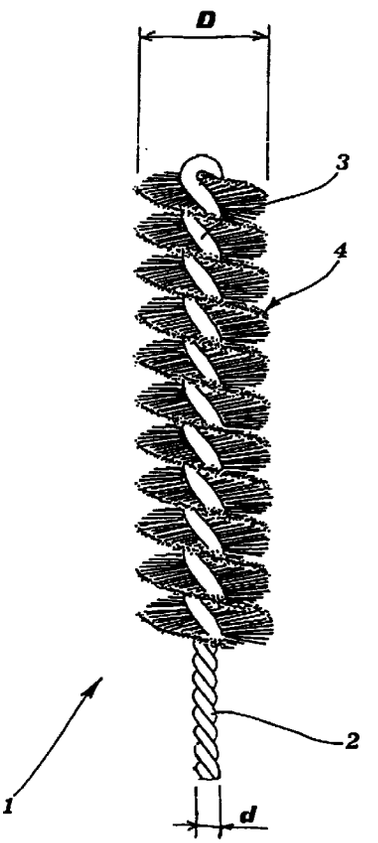
(71) Applicant: **PONZINI S.p.A.**
20020 Lazzate (Milano) (IT)

(72) Inventor: **Ponzini, Eligio**
20146 Milano (IT)

(74) Representative:
Faggioni, Giovanmaria, Dr. et al
Fumero-Studio Consulenza Brevetti
Franz-Joseph-Strasse 38
80801 München (DE)

(54) Brush, particularly for medical and pharmaceutical use

(57) Brush, in particular for medical or pharmaceutical use, of the type comprising a plurality of bristles mounted on a mounting support comprised of a double spirally twisted wire, in which said bristles are gripped between the spirals. According to the invention, said bristles consist of filament yarns with a diameter of less than 0,05 mm (2 mils) and preferably 0,01 mm, said filament yarns being distributed with a density of 250 to 400 yarns per turn of the mounting support.



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Description

[0001] The present invention relates to a brush for medical and pharmaceutical use. In particular, it relates to an improved brush which can be used in all those applications - for example for pap test (Papanicolaou's test) samples in the health sector - where softness is a fundamental requirement.

[0002] In the sector of brushes there exist numerous solutions which are aimed at solving an equally large number of specific problems, for example in the cosmetics sector, in mechanical sector as well as in the medical and/or pharmaceutical sector.

[0003] In particular with regard to swabs or brushes for medical use, as in the case of the present invention, the requirements which they must satisfy are particularly stringent since special needs exist in terms of hygiene, safety and precision during use. Furthermore, when these brushes must be used in the vicinity of delicate tissues or organs of the human body, such as the genital apparatus (pap tests), inside blood vessels or also for dental use in the case of sensitive gums or during post-surgery operation treatment, requirements relating to softness and practical use, which cannot be found equal in any other sector, also arise.

[0004] According to the known art, the brushes manufactured hitherto consist of "bristles" formed by monofilaments of synthetic material which are mounted, in a substantially radial arrangement, on a shank made of plastic or metallic material. It should be pointed out here and below that the term "bristles" is used in a conventional manner to indicate not only bristles of animal origin, but any other natural or synthetic strand-like element, both in the form of monofilaments of the known art and in the form of the filament yarns according to the invention.

[0005] Various solutions have been proposed in order to make these brushes more practical, safer or suitable for collecting and retaining more efficiently the product which they must remove or apply.

[0006] For example, Italian Patent No. 1147406 describes a brush for medical use, in particular for use in the oral cavity, in which the metal shank is coated with an insulating and soft plastic material so as not to create galvanic currents in contact with the dental prostheses and so as not to damage the gums.

[0007] European Patent Application EP-A-0250680, on the other hand, discloses a brush for cosmetic use in which the bristles have a cross-sectional shape particularly suitable for retaining the cosmetic products to be applied.

[0008] Other types of brushes are known from the following documents: US-A-5.611.361, US-A-5.657.778, FR-A-2.685.859 and EP-A1-0.717.944; none of these solutions - which moreover are all intended for the cosmetic sector and in particular for the application of mascara onto the eyelashes - offers however a particular advantage from the point of view of the softness of the brush, as is required in connection with the use of the present invention.

[0009] According to the known art, it is envisaged providing the brush bristles with a greater degree of softness by using suitable materials and/or reducing the thickness of the monofilaments and/or distributing the latter in particular geometrical arrangements.

[0010] Attempts to reduce the thickness of the monofilaments, however, are subject to a limit imposed by technological requirements. In fact, monofilaments are obtained by means of extrusion: with this technique, as is widely known, it is not possible to obtain extruded products which have a cross-section of less than 0,05 mm (2 mils). In the documents mentioned above, for example, the following bristle cross-sections are mentioned: 0,06 to 0,12 mm in col. 3, line 27 of US-A-5.611.361; 0,1 to 0,5 mm in col. 3, line 21 of US-A-5.657.778; 0,12 to 0,25 mm in Claim 1 of FR-A-2.685.859 and 0,05 to 0,35 mm in Claim 13 of EP-A1-0.717.944.

[0011] The impossibility of obtaining diameters of less than 0,05 mm does not allow to obtain the desired softness, in particular when the length of the bristles is fairly short, since the bristles inevitably retain a certain rigidity.

[0012] Moreover, the more the transverse dimensions of the bristles are reduced, the greater are the bristle handling and mounting problems, with obvious increased difficulties during large-scale production.

[0013] The object of the present invention is that of solving the abovementioned problems by providing a brush with a high degree of softness also when it has a small overall diameter.

[0014] This object is achieved with a brush, intended in particular for medical or pharmaceutical use, but certainly applicable also in the cosmetics sector, of the general type described above, comprising a plurality of bristles which are mounted on a mounting support consisting of a double spirally twisted wire and having the characteristic features indicated in Claim 1.

[0015] Not only have these filament yarns never been used in the field of the invention, but their use is also made difficult by the technical prejudice - in accordance with the long-established belief - that they are too fragile and not enough consistence to obtain brushes which are sufficiently stable and useful for the applications for which they are intended according to the known art. Moreover, for the same reason, these filament yarns cannot be handled by the usual machines for manufacturing brushes, as also explained more clearly below. The Applicant, however, have overcome both these prejudices and have been able to provide brushes with filament yarns, which are perfectly stable during use, but which have softness characteristics which have never been achieved hitherto and which make them particularly suitable for use in the medical and pharmaceutical field. Moreover, in a surprising manner, they can also be used very successfully in some fields of the

cosmetics sector, also overcoming here a further technical prejudice.

[0016] Further characteristic features and advantages of the brush according to the present invention will nevertheless emerge more clearly from the detailed description which follows of a preferred embodiment thereof, provided by way of example and illustrated in the accompanying drawing in which the sole figure is a side elevation view on a larger scale of an example of embodiment of the brush according to the invention.

[0017] A brush 1 is comprised of a support formed by a pair of interwoven semi-rigid wires - preferably metal wires lined with plastic material - one part of which performs the simple function of a gripping shank 2, while another part performs the function of a mounting support 3 on which a plurality of bristles 4 are mounted.

[0018] In order to obtain the desired softness of the brush, the present invention teaches to use bristles 4 which have cross-sectional dimensions which are noticeably smaller than those of the bristles used hitherto by the known art; for this purpose the bristles 4 consist of filament yarns, for example formed by natural textile fibres, such as cotton fibres, or preferably fibres obtained from polymeric material extruded and stretched until fibres with dimensions of the order of magnitude of the polymeric chains are obtained. The filament yarns according to the invention therefore have dimensions which are noticeably smaller than 0,05 mm (2 mils) and preferably less than 0,01 mm. In particular in the case of polyamide filament yarns, they preferably have a count of the order of 0,6 to 0,7 tex (the unit of measurement of 1 tex corresponds to a yarn having a weight of 1 g per 1000 m of length), which means a size about a tenth of that of a polyamide monofilament having a diameter of 0,05 mm. It has been found that filament yarns made of polyester or polyamide, for example PA6.6 and PA6, extruded at temperatures of between 200°C and 270°C, preferably between 215°C and 262°C, and greatly stretched, so as to cause orientation of the molecules, in a nitrogen atmosphere, are particularly advantageous.

[0019] The softness achieved with this type of bristles is unrivalled in any other application of this type and is therefore ideal for use in the medical field, in particular for collection in pap tests and for insertion into blood vessels.

[0020] It has been found, after extensive experiments, that the best results are obtained by preferably using a brush filling density of 250-400 filament yarns per radial turn of the mounting support.

[0021] Owing to their fineness, these filament yarns, in principle, are very difficult to handle, at least from the point of view of mounting on the mounting support 3. In fact, whereas, according to the known art, the monofilaments were cut from monofilament bars of reasonable length (about 1 m), without this creating any particular problems, this operation is no longer possible for filament yarns, which would not have enough consistence to be gripped and cut.

[0022] According to the present invention, these problems have been overcome with the use of modified machinery which allows the filament yarns to be suitably treated before being handled, so as to discharge electrostatic charges from them and make them more stable.

[0023] Moreover, by suitable cutting of the filament yarns along the length of the mounting support 3, it is possible to provide the brush with a further degree of softness resulting from the particular shape assumed by the free ends of the filament yarns themselves which form the brush plume shape.

[0024] Finally, the wire of the mounting support 3 may be made of stainless steel or metal coated with suitable plastic materials such as, for example, polyurethane. In this way it is possible to achieve the desired degree of hygiene for the brush as a whole.

[0025] Owing to the consistence and the arrangement of the filament yarns, as described above, the objects defined in the introduction are achieved. In particular the brush according to the invention has a softness of the brush plume which is without comparison, even in critical conditions, i.e. for overall diameters D which are slightly greater than the diameter d of the mounting support 3, while still being able to perform the right mechanical action during frictional contact, so as to remove or distribute effectively the desired substances, without damaging the contact surfaces.

[0026] Said brush is therefore excellently suited especially for all those cases mentioned in the introduction, where the frictional contact occurs in the vicinity of delicate organs and tissues of the human body.

[0027] It is understood, however, that the protective scope of the invention is not limited to the particular configuration shown, but extends to any other technically equivalent constructional variation.

[0028] In particular, although an example of embodiment of the brush provided with a straight mounting support 3 and a bristle plume with a constant diameter D has been described, the shapes of the brush may be many and also very different from that described, without thereby departing from the protective scope of the present invention, as defined by the following claims. Similarly, although the medical and pharmaceutical fields have been indicated as the preferred fields of use for the brush according to the invention, it is also certainly possible to contemplate its use in the cosmetics sector.

Claims

1. Brush, in particular for medical and pharmaceutical use, of the type comprising a plurality of bristles mounted on a mounting support comprised of a double spirally twisted wire in which said bristles are gripped between the spirals, characterized in that said bristles consist of filament yarns with a

diameter of less than 0,05 mm (2 mils), said filament yarns being distributed with a density of 250 to 400 yarns per turn of the mounting support.

2. Brush as claimed in Claim 1, in which said filament yarns preferably have a diameter of less than 0,01 mm.

3. Brush as claimed in Claims 1 or 2, in which said filament yarns consist of extruded and stretched polymeric plastic material.

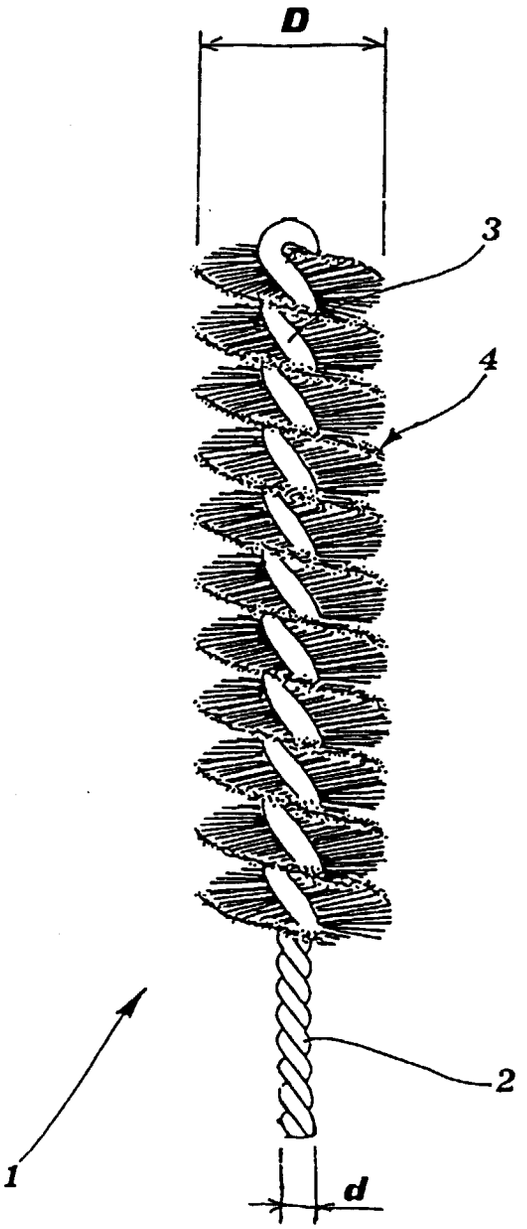
4. Brush as claimed in Claims 2 or 3, in which said polymeric material is polyamide or polyester.

5. Brush as claimed in Claims 3 or 4, in which the transverse dimension of the filament yarns is of the order of magnitude of the polymeric chains from which they are formed.

6. Brush as claimed in Claim 5, in which said filament yarns preferably have a count of between 0,6 and 0,7 tex.

7. Brush as claimed in any one of the preceding claims, in which said spirally twisted wire is made of stainless steel.

8. Brush as claimed in any one of preceding claims, in which said spirally twisted wire is provided with a coating of insulating plastic material.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Application Number
EP 99 10 0418

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TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A46B
A62B
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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
THE HAGUE	14 April 1999	Triantaphillou, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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