Abstract: It is disclosed a brush-like device and related manufacturing method, wherein the device comprises at least a handle head portion (2) obtained by means of plastic mate- rial moulding on a terminal portion of a metal stem (4) on which bristles of the brush are fixed, said terminal portion of the stem (4) being obtained in the moulding position by a through seat (T) of a mould (T) which closes on said stem, and wherein, prior to said moulding of the head portion (2), it is provided to apply a covering sheath (5) of elastically yieldable material on said terminal portion of the stem (4), said sheath being of elongate tubular shape having a length of at least 2.5 mm.
ORAL HYGIENE OR COSMETIC APPLICATOR BRUSH DEVICE AND MANUFACTURING METHOD THEREOF

FIELD OF THE INVENTION

The present invention relates to a brush-like device for the interdental cleaning or cosmetic application or similar tool and a related manufacturing method thereof.

BACKGROUND STATE OF THE ART

In the oral hygiene field the so-called interdental cleaning brushes are widespread, which are generally constituted by a suitably shaped supporting shank, referred to as "handle", having a free end on which a small elongated brush body is mounted, briefly referred to as "brush".

Essentially, two kinds of brush-like devices are commercially available and, namely, a "standard" type, whose handle has practically the sizes of a toothbrush and has an interchangeably brush, and a "pocket" type, whose handle is considerably smaller and conceived as single disposable element.

The active part, i.e., the brush itself, comprises a thin stem portion from which a plurality of bristles radially branches for cleaning action. The stem is typically in the form of a twisted pair of metal wires, possibly coated with plastic material, among which turns, the bristles remain locked. An appendix part of the stem is free from bristles and constitutes the so-called "tang", which is used for the engagement with the handle. The bristles project towards a reference surface which may take many forms, but it typically defines an elongated rotational body.

For obvious hygienic and functional reasons, it is appropriate that the brush is frequently replaced. To this end, at least in standard devices, it is normally provided an engagement head arranged so as to allow an easy but safe assembly and disassembly of the brush (in order to avoid
that the brush accidental detaches and injures the user or is ingested in the mouth). In particular, the provisional fastening of the brush is also achieved by exploiting the large deformability of the tang.

Conversely, in the pocket devices, for sake of constructional economy and low economic impact of the handle, the brush is embedded in the handle head and it is not replaceable. This implies that the fastening system of the brush must be simpler and more economical from the manufacturing point of view.

Traditionally, as can be imagined, the tang of the brush is hence embedded in the handle head part during the manufacturing phase, by simply inserting the tang into the mould, and moulding on it the plastic material constituting the handle.

However, this construction method entails some technical problems.

First, there is a general adaptation problem of the mould to the size of the brush stem. In fact, since the brush derives from a twisting process of two metal wires, it is not possible to ensure close tolerances; furthermore, it would be desirable to use different brushes having the same handle, but this involves providing a plurality of moulds only to accommodate the different diameters of the tangs.

Furthermore, the brush stem is retained in a through seat of the mould which, having theoretically a circular profile, cannot perfectly match the real tang section which, instead, derives from the profile of twisted metal wires. Therefore, considering the natural coupling tolerances, gaps between stem and shape of the mould are formed which allow a partial leakage of the molten plastic material, which is injected at high pressure into the mould, with
an unwanted formation of moulding burrs.

To partially solve this problem, it has been proposed to shape the mould with an expansion chamber at the insertion position of the tang, in order to locally reduce the pressure and eliminate the burr problem. However, this leads to the formation of a small spherical body at the handle end, which does not meet the users' consent.

Alternatively, it is possible to size the seat of the mould so that it strongly clamps the stem of the brush: this solution, however, leads to a localized hardening or yield of the metal wires, which, then, lose resiliency. Therefore, when the brush is subjected to a lateral force, tends to remain folded on one side, which represents a defect.

This problem has already been tackled in the prior art, by providing the insertion of specific gaskets on the tang, in the position where the mould should close. For example, US 8607398 discloses a construction method in which a plastic deformable ring is mounted on the tang, which has also a tapered cross-section to better locks in the closing area of the mould.

However, this technique involves a series of problems, both to handle and mount the sealing ring on the tang, and to ensure that its position is always centred in the desired position.

But above all, there is the additional problem of being able to maintain the extension of naked tang (i.e. the portion between the bristles and the head end of the handle) as short as possible, both for aesthetic reasons and for functional reasons (to reduce the length of the stem which remains without a lateral support). With a traditional mould, this extension cannot be reduced beyond a certain extent, because the mould wall occupies a certain space.
its operation.

These objects are achieved through a manufacturing method of a brush having the features mentioned in claim 1 and a brush-like device as in claim 6. The dependent claims describe preferred features of the invention.

Brief Description of the Drawings

Further features and advantages of the invention are anyhow more evident from the following detailed description of some preferred embodiments, given by mere way of non-limiting example and illustrated in the accompanying drawings, wherein:

Fig. 1 is an elevational side view of the brush-like device according to a first embodiment of the present invention embedded in an interdental brush;

Fig. 2 is an axial sectional view, according to the line II-II of Fig. 1, of the same device of Fig. 1;

Fig. 2A is a view similar to that of Fig. 2 of an alternative embodiment;

Fig. 3 is an axial sectional view of a variant of the embodiment of the invention, with a brush oriented at 90° with respect to the axis of the handle; of which

Fig. 3A represents a partial enlarged elevational view; and

Fig. 4 represents a longitudinal section thereof;

Fig. 4A is a view similar to that of Fig. 4 of another embodiment of the invention;

Fig. 5 is an elevational side view of another embodiment of the invention, embedded in a mascara brush;

Fig. 5A is a partial enlarged view of the detail within the circle B of Fig. 5;

Fig. 6 is a longitudinal sectional view according to the line A-A of Fig. 5;

Fig. 6A is a partial enlarged view of the detail within
the circle A of Fig. 6;

Fig. 7A is a longitudinal sectional view of another embodiment of the invention;

Fig. 8 is a view similar to that of Fig. 6 of another embodiment; and

Fig. 8A is a partial enlarged view of the detail within the circle A of Fig. 8.

Detailed Description of the Preferred Embodiments

As shown in Figs. 1-4, an interdental brush comprises, in a completely known way to a person skilled in the art, a handle 1, which ends with a support head 2 of a bristled body 3; this latter is formed by a plurality of bristles 3' mounted on a stem 4. The stem 4 is in turn formed by a pair of metal wires, twisted on each other, also in a well known way and which, therefore, does not require further explanations.

The specific shape and the material used for the handle 1 do not have a significant importance in this context and, thus, will not be further described.

The only aspect to be consider is that at least the handle head 2, where the brush 3 is fixed, is constructed with mouldable plastic material.

The handle head 2 is usually formed as a cusp, in which the stem 4 or, better, the end portion free from bristles referred to, in the following, as tang, is inserted and locked. For this purpose, in the portion of the mould (represented only for its terminal part T), which determines the shape of the handle 1 head 2, a cylindrical terminal seat T' is formed, which, always according to the prior art, directly clamps around the stem 4 tang; in other words, the tang is held locked in this cylindrical seat T' of the terminal portion of the mould, during the injection moulding step of the handle head 2.
According to the present invention, on the tang or at least on part of the stem 4 which is intended to be embedded in the handle head 2, an elongated covering sheath 5 of elastically yielding material is applied, preferably an elastomer or a high density foam material. The material with which the covering sheath is manufactured must withstand the moulding temperature and pressure of the plastic material of the handle head 2.

For the purposes of the inventive solution provided here, it is important that the sheath 5 is able, from the internal part, to well adhere to the roughness of the twist of metal wires, so as to fill at least partially the recesses within the helical shape and fill any possible gap which would let pass a fluid under pressure, and from the external part, to sufficiently deform to remain in seal coupling with the surface of the seat 1" of the mould. In this way, the sheath 5 is configured as a kind of bearing interposed between the twisted metal wire stem and the mould seat, filling every gap also in case of a great relative dimensional tolerance between stem 4 and mould seat T'.

The sheath according to the invention is a constant section element having, generally, a tubular shape and a great elongation, e.g., having a length of at least 2.5 mm. This tubular shape of the sheath is an important geometric aspect to offer all the desired benefits.

According to a first embodiment, the covering sheath 5 is made of a part 5 of small tube of elastomeric material, which is produced separately and then inserted with an interference on the stem 4 tang.

The external diameter of the small tube is nominally equal to or slightly greater than the internal one of the mould seat T', so that it can seal couple on this latter
when the mould is closed for the injection of plastic material; the external diameter is, e.g., between 1.2 mm and 2.5 mm. The internal diameter of the small tube is substantially equal to or slightly lesser than the external diameter of the stem 4, so as to exploit the elasticity of the elastomeric material for an easy insertion, but, at the same time, ensure a close adhesion on the stem 4; the internal diameter is, e.g., between 0.3 mm and 0.8 mm.

The length of the small tube is 2.5-5 mm.

The part 5 of the small tube is mounted on the stem 4 so that an external end 5' thereof projects from the handle head 2 end from a few tenths of a millimetre to a few millimetres, so as to preferably end adjacent to the first bristles 3.

Internally to the handle head 2 body, the part 5 of the small tube preferably end at a folding area of the stem, e.g., a knee portion or a portion folded at 90° (as shown in Fig. 2). This allows to retain more effectively the sheath 5 on the stem 4, but also to lock more firmly the stem 4 itself in the handle head 2 material.

Another terminal folding mode of the stem, in the form of knee, is illustrated in Figs. 2A and 4A.

The small tube 5, as mentioned, is made of a thermoplastic, preferably elastomeric material, which has an elasticity and yieldably degree appropriate to its function; first of all, an elasticity such that, when the mould T is closed, with its cylindrical seat T' clamped on the small tube 5, the elastomeric material of which it is made, fills at least in part, the said gaps between the cylindrical surface of the seat T' and the surface of the twisted wire stem 4; but, furthermore, the elasticity of the small tube 5 is fundamental to adequately support the metal stem 4 of the tang and avoid that it is permanently folded dur-
To obtain a better behaviour in the assembly step, it is preferably to choose a small tube 5 of greater internal diameter than that of the stem 4, with a small play. In this case, the sheath 5 is a thermo-shrinkable plastic material so that, before placing the brush in the mould, the thermoplastic small tube is preliminary heated, to obtain a thermo-shrinking which makes the material perfectly adhere to the irregular surface of the twisted wires of the stem 4.

Suitable thermoplastic materials are, in general, all the elastomers such as, e.g., those belonging to the groups designated by the symbols: SB, SBS, SEBS, SI, TPE-A, TPE-E, TPE-O, TPE-U, EVA, TPC-ET and not only, having variable hardness grade in relation to the tang diameter.

According to another embodiment, the sheath 5 is obtained in situ by deeping in the plastic material in the liquid or fluid state, which perfectly wets the tang portion of the stem 4. Following the hardening of the coating material, by cooling or cross-linking, the coating sheath 5 is perfectly formed and stabilized in the desired thickness and elastic module.

A further embodiment, provides that the sheath 5 is obtained by winding a tape of plastic material according to a plurality of turns around the tang portion of the stem 4. The turns of the tape wound on the stem can be consolidated to each other and stabilized, e.g., through welding with heat addition.

In Figs. 3, 3A and 4 a different embodiment is shown, in which the terminal tang of the stem 4, after being covered with the sheath 5, is generally folded at right angles of about 90°: in this way the main axis of the bristled brush is arranged perpendicular with respect to the main
axis of the handle terminal head 20.

As well shown in Figs. 1 and 3A, the handle head 2 and 20 has, at the central area of the sheath 5, a plurality of radial recesses 2a and 20a, e.g. four in number, which form the impressions of corresponding mould retaining pins (not shown).

In other words, for the support of the brush into the mould, on the one hand, it is exploited the outlet seat of the mould which tightly engages with the sheath 5 and, on the other hand, pins are arranged inside the mould which abut against points located circumferentially around the sheath 5, according to several opposite radial directions, so as to support the tang well centred in the desired position in the mould cavity.

Figs. 5, 5A, 6 and 6A illustrate a different application of the invention to a mascara brush. In this case, the stem of a mascara brush 30 is embedded in a shank 40 of a plastic material handle intended to close the mascara container. The structure principles and construction methods are completely identical to those described above and, therefore, they will not be repeated.

Figs. 2A, 7A and 8-8a illustrate a further embodiment, in which the support sheath 5 has also external projections, e.g., annular ribs 5a: they ensure a better retention of the sheath in the moulded material of the handle. This particular solution allows to firmly lock the stem in the handle and easily overcome the severe endurance tests, imposed to avoid that the bristled part may detach from the handle.

As can be understood from the above description, the use of the sheath 5 on the tang of the brush allows to perfectly achieve all the objects exposed in the premises.

In fact, the soft sheath 5 allows to adequately clamp
the mould on the stem of the brush, even in case of wide tolerances of the stem size, which are absorbed by the compressibility of the sheath, without affecting the integrity and the elastic properties of the metal stem. The presence of the covering sheath ensures a perfect seal both with the surface of the mould and with the irregular surface of the metal stem so that, when the plastic material is injected in the mould, material which will constitutes the handle, this fluid material, even under high pressure, does not has the possibility to leak from the seat "I" and avoids the formation of burrs.

However, at the same time, the elongated sheath is simple to manipulate and apply on the stem and does not have problems in term of centring with respect to the mould.

Furthermore, since the sheath projects outside and is extended beyond the mould, it can extend up to the bristles on the brush, thereby ensuring a good aesthetic effect - because it hides the stem - but also a good technical effect in terms of mucous or skin protection from the contact with the metal part and in terms of elastic support of the stem itself.

Finally, the friction coefficient of the sheath material, possibly assisted by the presence of asperities on the external surface of the sheath, as the annular ribs, cooperate to a perfect holding of the stem in the handle.

It is understood, however, that the invention is not to be considered as limited by the particular arrangements illustrated above, which represent only exemplary embodiments of the same, but different variants are possible, within the reach of a person skilled in the art, without departing from the scope of the invention, as defined by the following claims.
CLAIMS

1. Manufacturing method of a brush-like device, wherein the brush-like device comprises at least a handle head portion (2) obtained by means of plastic material moulding on a terminal portion of a metal stem (4) on which bristles of the brush are fixed, said terminal portion of the stem (4) being retained in the moulding position by a through seat (T') of a mould (T) which closes on said stem, characterized in that, prior to said moulding of the head portion (2), it is provided to apply a covering sheath (5) of elastically yieldable material on said terminal portion of the stem (4), said sheath being of elongate tubular shape having a length of at least 2.5 mm.

2. Manufacturing method as in 1, wherein said elastically yielding material is an elastomer or a high density foam material.

3. Method as in 1 or 2, wherein said covering sheath (5) is made of a part (5) of a small tube, axially inserted on said stem (4), having an internal diameter less than the nominal diameter of said stem (4) and an external diameter equal to or greater than the internal diameter of said seat (T') of the mould (T).

4. Method as in 1 or 2, wherein said covering sheath (5) is made of a part (5) of a small tube, of thermo-shrinkable material axially inserted on said stem (4) and heated so as to clamp said small tube to the stem.

5. Method as in any one of the preceding claims, wherein said covering sheath (5) is applied on said stem (4) so as to project of at least 0.5 mm from the outlet of said seat (T') of the mould (T).

6. Method as in 5, wherein said covering sheath (5) extends up to be adjacent to a bristled area of the brush.

7. Method as in any one of the preceding claims,
wherein said covering sheath (5) is applied so as to extend on said stem (4) internally to said handle head (2) up to a knee or terminal folding of the stem (4).

8. Method as in any one of the preceding claims, wherein said stem (4) is retained within a cavity of the mould (7) by means of radial pins which abut against circumferentially spaced points of said covering sheath (5).

9. Brush-like device, comprising a handle (1) and a moulded handle head (2) of plastic material on a terminal part of a retaining stem (4) of a bristled part (3) of the brush, characterized in that it is obtained by means of a manufacturing method as in any one of the preceding claims, wherein said stem (4) has at least in part a covering sheath (5) of elastic material, said sheath having an elongated tubular shape having a length of at least 2.5 mm.

10. Device as in 9, wherein said stem (4) is obtained from a pair of twisted metal wires.

11. Device as in 9 or 10, wherein said covering sheath (5) also extends over a substantial part between said head (2) and said bristled part (3) of the brush.

12. Device as in 9, 10 or 11, wherein said sheath (5) has projections (5a) on its external surface.
**INTERNATIONAL SEARCH REPORT**

**International application No**

PCT/IB2016/056019

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A46B3/18 A46D3/00
ADD. A46B9/Q2

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A46B A46D B29C B29L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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[ ] Further documents are listed in the continuation of Box C.  [ ] See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

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