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D E C I S I O N
of 1 June 1995

Case Number: T 1009/93 - 3.2.4

Application Number: 84201599.2

Publication Number: 0142885

IPC: A46D 3/00

Language of the proceedings: EN

Title of invention:
Process for making a brush with self retention of bristles and brush made by the process

Patentee:
ANCHOR ADVANCED PRODUCTS, INC.

Opponent:
Coronet-Werke GmbH

Headword:
-

Relevant legal provisions:
EPC Art. 114(2)

Keyword:
"Late filed documents (not admitted)"
"Novelty (yes)"
"Inventive step (yes)"

Decisions cited:
T 0248/85

Catchword:
-

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Case Number: T 1009/93 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 1 June 1995

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office dispatched on 27 October 1993 rejecting the opposition filed against European patent No. 0 142 885 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: C. A. J. Andries
Members: M. G. Hatherly
J. C. M. De Preter

Summary of Facts and Submissions

I. The decision of the Opposition Division to reject the opposition against European patent No. 0 142 885 was dispatched on 27 October 1993.

On 25 November 1993 the Appellant (Opponent) both filed an appeal against this decision and paid the appeal fee. The Statement of Grounds of Appeal was received on 4 March 1994.

II. Claim 1 as granted reads:

"A brush making process comprising the steps of:

a) inserting at least one bristle tuft (10) into a respective hole (12) in a first mold member (14), such that a length of said tuft protrudes from a first side (18) of said member adapted to form an inner surface of a mold cavity (28) for a brush body;

b) fusing at least part of the protruding length of the tuft (10) into a mass (22) having a larger cross-section than that of the hole (12) at said first side;

c) mating the first mold member (14) with a second mold member(32) to define said mold cavity (28); and

d) injecting molding material into the cavity (28) to form the brush body, characterized in that the entire protruding length of the tuft is fused into said mass and said molding material pressing against said mass (22) effecting plugging of said hole (12) and flowing between at least the widest portion of the mass and said inner surface of the first mold member to form an integral tuft retaining portion of the brush body."

Claim 2 as granted reads:

"A brush made according to the process of claim 1 and comprising an injection molded body (34) and at least one tuft (10) of bristles having an end thereof retained in said body, the said end comprising a fused mass (22) having a cross-sectional area larger than that of the tuft (10) characterized in that said fused mass (22) is disposed immediately adjacent a face of the body (34) from which the tuft (10) projects, thereby facilitating plugging of a tuft receiving hole in a mold in which the body is formed, said body (34) being molded around said fused mass (22) such that it defines a cavity conforming to the shape of the fused mass and having in said face an opening with a cross-sectional area smaller than that of the fused mass, thereby effecting retention of the tuft end in the body."

III. The following documents were referred to in the Statement of Grounds of Appeal:

D1 DE-C-845 933
D2 FR-A-1 453 829
D3 US-A-3 026 146
D4 DE-B-1 050 304
D5 US-A-3 081 497
D6 US-A-2 298 156

The following documents were referred to for the first time in the Appellant's letter dated 24 May 1995 and received in the EPO by facsimile on the same day:

D7 DE-C-191 657
D8 US-A-278 660

IV. Oral proceedings took place on 1 June 1995 in the presence of the parties.

In the appeal proceedings the Appellant argued essentially that the subject-matter of the granted independent Claims 1 and 2 lacked novelty (or inventive step if the realisation that an effect occurred in a known process was not to be considered under the definition of novelty), and that the dependent claims merely contained constructional measures.

In the appeal proceedings the Respondent (Proprietor) argued essentially that the subject-matter of all the granted claims was novel and inventive and that to argue the contrary was to use an ex post facto analysis.

V. The Appellant requests the setting aside of the decision and the revocation of the patent.

The Respondent requests:

- as a main request, the dismissal of the appeal, and

- as an auxiliary request, the setting aside of the decision and the maintenance of the patent amended with Claims 1 and 2 filed with the letter dated 24 October 1994 and with Claims 3 to 5 as granted.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of documents D7 and D8*

Documents D7 and D8 were submitted only a week before the oral proceedings. If it had been in the public interest to admit the documents then, even at this late stage, the Board would have decided to do so. However

the documents are no more relevant than those already relied upon by the Appellant (indeed the Appellant did not seek to refer to documents D7 and D8 in the oral proceedings) and their introduction into the appeal proceedings would not change the Board's decision on the appeal as a whole.

The Board therefore declines to admit documents D7 and D8 into the appeal proceedings (Article 114(2) EPC).

3. As regards the Respondent's main request the Board sees no objection under Article 123 EPC.

4. *Novelty - main request*

No single document on file discloses all the features set out in either of independent Claims 1 and 2 as granted. Regarding the interpretation of Claim 2 attention is drawn to section 8 below.

4.1 The fused head 7 in document D1 is away from the mould hole and away from the face of the brush body from which the tuft emerges (see section 5.2 below and compare the present patent: column 7, lines 59 and 60; and column 8, lines 5 to 7).

The Board cannot accept the Appellant's explanation that, due to the statements in document D1 (see page 1, line 18; page 2, lines 48 to 51; page 3, lines 5 and 6) that the ends of the tufts are heat welded together and having regard to the common knowledge of a person skilled in the art that the material when heated tries to adopt the minimum surface area possible, namely a ball form, the skilled person immediately recognises that in document D1 a spherical ball has been formed. Indeed the Board cannot detect such a teaching in document D1, either explicit or implicit. It is true

that the ends are heat welded but there is no indication whatsoever in document D1 of how much the tufts should be heated to achieve welding, to what degree welding should occur or what the result of the welding should be (other than that the ends have to be connected). The Appellant's interpretation of the content of the document D1 has to be considered as the result of an ex post facto analysis.

4.2 Since in document D4 the handle 3 overlaps the edge of the sealing plate 2 in a form fitting manner, the plate 2 is away from the face of the brush body from which the tuft emerges and so could not plug a mould hole (see section 7.3 below). This kind of connection is not only clearly shown in Figure 2 but also unequivocally specified a number of times in the description as well as in Claim 1 (see column 2, lines 27 to 30 and 44 to 46; column 1, lines 36 to 38). It is true that other statements in the rather short description could give rise to interpretations which would not correspond to the above form fitting connection, namely that the tufts can be used up to their ends (see column 1, line 50 to column 2, line 16). The Board however is of the opinion that the general teaching of document D4 is directed to said form fitting connection, this also being what is claimed, so that all further indications in the disclosure have to be interpreted in this context.

4.3 Document D2 (see section 7.2.3 below) and document D3 (see section 7.1.5 below) disclose neither a fusing of the whole protruding length of the tuft (compare the present patent: column 7, lines 57 and 58) nor an enlarged head providing interlocking under the head

(compare the present patent: column 7, lines 50 and 51; and column 8, lines 2 to 4). Concerning the heat welding mentioned in both documents, the Board refers to its position indicated with respect to document D1.

4.4 Document D5 does not disclose a brush and document D6 does not disclose fused bristle ends.

4.5 The subject-matter of each of Claims 1 and 2 as granted is thus to be considered as novel within the meaning of Article 54 EPC.

5. *Closest prior art*

5.1 Like the parties, the Board considers the state of the art closest to the invention to be document D1 which discloses a process of making a brush in which, see lines 33 to 69 of page 2, a tuft of bristles in a hole in a mould half 2 can be clamped by a pusher plate 4. Using e.g. a hot plate the ends of the protruding bristles are welded together to form a head 7 (see Figure 1), then the pusher plate 4 and the mould half 2 are moved towards a fixed mould half 8 to leave a space 9 (see Figure 2) between the two mould halves 2, 8 into which material 11 is injected while the tuft is still clamped by the pusher plate 4. The protruding tuft including the head is embedded in the material 11 which also forms the brush head and handle.

5.2 Figure 2 of document D1 shows that not the entire protruding length of the tuft is fused into the head 7 and that the enlarged head 7 is located away from the hole in the mould half 2 because the tuft is held by the pusher plate 4 (see above section 4.1).

6. *Problem and solution*

6.1 Problems occurring during moulding when tufts of bristles are located in perforations in a mould member concern not only leakage of moulded material along the tufts but also the secure anchoring of the tufts after moulding.

Starting from the process disclosed by document D1 the Board sees the problem to be solved by the process of the present invention to be to provide a simpler mould which does not require clamping means for the bristles, in order to obtain a simple process which allows the avoidance of leakage along the tufts.

6.2 The step in Claim 1 as granted that the moulding material flows between at least the widest portion of the mass and said inner surface of the first mould member to form an integral tuft retaining portion of the brush body, is per se also part of the process disclosed by document D1 since therein the material flows between the widest portion of the head 7 and the inner face of the mould half 2. However this only occurs because the head 7 is located away from the mould half 2. If the head 7 were immediately adjacent the mould half 2 then, because the head is plate shaped, merely a negligible amount of moulding material would flow between the widest portion of the head and the mould half. This amount could not be termed an integral tuft retaining portion of the brush body.

6.3 In the process set out in Claim 1 as granted, the entire protruding length of the tuft is fused into the mass (head) and the moulding material presses against this mass to plug the hole in the first mould member (mould half) to prevent leakage of moulding material therethrough. Despite the mass being located against the

first mould member's inner surface, the mass is so shaped that material flows between it and the inner surface to form an effective integral tuft retaining portion.

6.4 The Board thus considers that the features of Claim 1 as granted solve the problems presented by the brush manufacturing process disclosed by document D1.

7. *Inventive step - Claim 1 as granted (main request)*

7.1 *Documents D1 and D3*

7.1.1 The Appellant argues that it would be obvious for the skilled person to follow the teaching of document D3 and carry out the process of document D1 while omitting the pusher plate 4, whereupon he would automatically arrive at the process set out in Claim 1 as granted.

7.1.2 Document D3 refers to Figure 8 of document D6 which has an insert 46 which is a stiffener for the ends of the bristles to resist bending and dislodgement of the bristles under the extreme pressure of the injection operation (see document D6, page 2, right hand column, lines 7 to 10).

The Appellant maintains that, since the process according to document D3 avoids the use of an insert, then the insert's function must be fulfilled by some other measure, the only measure disclosed in document D3 being to secure the ends of the bristles together e.g. by heat (see document D3, page 1, column 2, lines 61 to 64). Thus the absence of an insert in the apparatus of document D3 teaches the skilled person that the pusher

plate 4 of document D1 can be omitted. It would then follow that the moulding material entering the mould would force the head 7 towards the inner face of the mould half 2 where it would seal the tuft hole.

7.1.3 The Board however does not consider that it would be obvious to the skilled person to dispense with the use of the pusher plate 4 in the process disclosed by document D1.

It might indeed be possible that if the pusher plate 4 were omitted then the moulding material would force the head 7 against the mould half 2 but this is not certain due to the flow of the moulding material (from below, see Figures 1 and 2) being perpendicular to the purported movement of the head. Moreover the use of the pusher plate 4 is in fact central to the process of document D1 (it being included in the independent process Claim 1) and so the skilled person would need an incentive to omit it. If the skilled person did contemplate omitting it, he would then undoubtedly realise that as a result either the head 7 would simply be shifted sidewards away or, if the head were located against the mould wall, then only the head 7, and not the head 7 together with a length of tuft, would be embedded in the moulding material. As he would expect thereby the hold of the bristles in the brush body to be weakened, he would have no reason to omit the pusher plate 4.

7.1.4 The Appellant argues that the skilled person would realise that the head 7 is shown incorrectly in document D1 and would in fact be adequately retained in the brush body even adjacent to the inner face of the mould half 2.

The Appellant reasons that fibre for the bristles of modern day brushes is made by extruding high quality plastics and stretching the extruded fibre to orient the molecules along its longitudinal axis and so improve its properties e.g. strength. When heat is applied to the end of such a fibre, the molecular orientation is automatically altered and a ball shaped head is formed which is of greater diameter than the remaining fibre. Moreover, when the ends of the bristles of a tuft are heated, a ball shaped head is formed at the end of the tuft, this head being of greater diameter than the remaining tuft.

The Appellant argues that the above would apply in the process disclosed in document D1, namely that the application of heat to the end of the tuft would necessarily result in a head having a fully regular ball shape, see above section 4.1. This head, which if no pusher plate were provided would be pushed against the mould half 2, would seal the hole and would be shaped like the heads disclosed by the disputed patent so that moulding material would flow between the widest portion of the head and the inner face of the mould half 2 to form an integral tuft retaining portion of the brush body.

7.1.5 As already stated in the above section 4.1, the Board considers this line of argumentation to be the result of an ex post facto analysis, with no basis whatsoever in document D1 itself.

Furthermore, in its communication dated 6 March 1995 the Board had already referred to documents D2 and D3, expressing doubts that heating a tuft automatically produced a shape capable of sealing a mould hole. The

Appellant, while maintaining its assertion, has produced no evidence to support it. The burden of proof is on the Appellant, being the Opponent, to substantiate its assertion, this it has failed to do.

The Board considers that, to achieve both a complete fusing of the exposed part of the tuft and a regular ball shaped head (i.e. capable of sealing a mould hole), the heating must be at the correct temperature, at the correct place and for the correct time. While it would be within the technical capabilities of the skilled person to arrive at the complete fusing and the regular ball shaped head, he must set out to achieve these things, he must first of all realise that they are of use to him.

For securing together the ends of the bristles, document D3 specifies three alternatives, namely in order glue, solvent or heat. The first two alternatives could not yield the required shape. The Board cannot see that the skilled person would realise that the last of the three alternatives would produce not only a differently shaped head but in addition thereto a regular ball shaped head and therefore choose this last alternative.

In the process according to document D1 the head is produced in order to be embedded in the moulding material to hold the tuft firmly in the brush body, the skilled person would see no reason to aim at a regular ball shaped head.

7.1.6 Even if the head were in fact not shaped as shown in documents D1 and D3 but as postulated by the Appellant, the skilled person would need to realise this and its significance but the Board considers that this would go beyond what can be expected of the average skilled person in the art.

7.1.7 If nevertheless the skilled person were to add the teaching of document D3 to that of document D1, then he would presumably arrange the mould halves as shown in Figure 1 of document D3 with the result that any fused ball formed on the tuft end 28' would tend due to gravity to be formed at a vertical distance from the mould surface 30.

7.1.8 As agreed by the Appellant, document D1 discloses neither the complete fusing of protruding tuft nor that the head should seal the hole in the mould half 2. To proceed from the solution proposed by the present invention and attempt to show how this solution could have been arrived at is the result of an ex post facto analysis.

The Board thus finds that it would not be obvious to the skilled person to combine the teachings of documents D1 and D3, and that even if the teachings were combined the result would not yield the process of Claim 1 as granted.

7.2 *Document D2*

7.2.1 This document discloses using a flame 5 to form a head on the extremity 4 of a tuft of thermoplastic bristles 1 protruding from a lower mould half 3 and then injecting a plastic material into the space between the lower mould half 3 and an upper mould half 6 to form a brush 8 (see page 1, lines 1 to 20 and the Figures).

7.2.2 The Appellant argues that the flame 5 will melt the whole protruding length of the thermoplastic bristles 1 into a fused pearl which will have a larger diameter than the tuft. The melting could only be stopped where cooling is provided and no cooling is provided. The injection pressure acts on the back of the enlarged head

to press it against the mould hole to seal it. Accordingly in the Appellant's view, the process of Claim 1 as granted necessarily occurs when carrying out the process described in document D2.

7.2.3 However, for reasons similar to those set out in sections 4.1 and 7.1.5 above, the Board concludes that document D2 does not disclose a fusing of the whole protruding length, it would be perfectly possible to seal only the ends. Even if the whole protruding length were melted there is no disclosure either of an enlarged head or of an appropriate sealing. On the contrary, Figures 2 to 4 show the opposite. A fused mass on the mould surface would only be produced if more melting occurs than that necessary to merely fuse the bristles together. Even then the mass might have a rough or segmental lower face which would not seal the mould hole. The skilled person would not necessarily see it as advantageous to form a completely fused ball, in the process of document D2 the tuft is held firmly because it extends for the maximum length into the moulding material.

7.3 *Document D4*

7.3.1 Document D4 describes (see column 1, lines 8 to 10) the prior art of moulding the handle around the bristles 1 and states in column 1, lines 10 to 15 that the disadvantage is that the flowing material not only envelopes the bristle ends but also leaves the mould along the bristles. The invention of document D4 overcomes the disadvantage by welding the bristle ends together to a plate 2.

7.3.2 According to the Appellant, the handle edge 4 overlapping the plate edge in Figure 2 is shown larger than in real life, leakage can only be avoided if the

plate 2 is pressed by the injection pressure against the mould hole periphery. Moreover the overlap must be minimal in order to use the whole length of the bristles as required by column 1, line 50 to column 2, line 16.

7.3.3 As explained in the above section 4.2 the Board however considers that if the plate 2 were located against the mould hole periphery then Figure 2; column 2, lines 30 to 35 ("greifen seitlich über" (grip sideways over) and "sichere Halterung" (secure holding); column 2, lines 45 to 46 ("Rand (4) ... Rand der ...Platte (2) übergreift" (edge 4 grips over the edge of the plate 2); and column 2, lines 29 and 30 "formschlüssig" (positive, interlocking, form fit) would be contradicted. By the use of the word "übergreifen" document D4 expresses not just an overlapping but a gripping, an interlocking connection.

The Board considers that the statement in column 1, line 50 to column 2, line 16 that the bristles can be used up to their root ends is to be seen as a comparison with brushes of the types set out in column 1, lines 10 to 15 and column 1, lines 16 to 31. The bristles of the brush proposed by document D4 have a much longer usable length than those of the other brushes. The Board does not take the statement so literally as to conclude that the root ends are located level with or even below the edge 4 of the handle.

7.3.4 Thus the Board finds that the plate 2 is not located against the mould hole periphery and cannot seal the latter, so that a person skilled in the art could not find in document D4 a teaching pointing towards the claimed solution.

7.4 *Document D5*

This document discloses a pin whose head, featuring additionally a deformable end, seals the hole in an injection mould taking the pin. This is a particular application in a field well removed from brush manufacture. The Board does not see that the skilled person in brush manufacture would show any interest in this document. Furthermore document D5 was not cited in the oral proceedings.

7.5 Thus the Board concludes that the teachings of the prior art documents in the appeal proceedings, taken singly or in combination, would not lead the skilled person to the process set out in Claim 1 as granted. The idea of plugging the hole in the mould in the way set out in the claim is neither disclosed by nor hinted at in any of the prior art documents which would be consulted by the skilled person, namely documents concerned with brushes.

8. *Claim 2 as granted - interpretation (main request)*

8.1 The independent Claim 2 commences with the words "A brush made according to the process of claim 1 ... " and, in the view of the Appellant, impermissibly contains various process features.

8.2 It is clear that if the brush defined in Claim 2 were not novel per se then it would not made be novel by specifying that it is made according to the process of Claim 1 (see decision T 248/85 OJ EPO 1986, 261). It is the definition of the brush per se which forms the basis for deciding if Claim 2 defines novel and inventive subject-matter.

Nevertheless some features referring to the method by which the brush is made leave their mark on the finished brush.

Thus it would be apparent to the skilled person whether a particular brush had an injection moulded body as specified in column 7, line 65.

The word "fused" in the feature "a fused mass (22)" in column 8, line 3 is not merely a reference to the process by which the brush is obtained but also to the brush in its finished state. The skilled person looking at a finished brush could see (probably even without cutting the brush) whether the mass is fused or perhaps knotted or glued. Thus this feature can be taken into account in determining the patentability of Claim 2.

Similarly the feature of "said body (34) being moulded about said fused mass" in column 8, lines 9 and 10 describes the finished brush. Moreover this wording continues with the wording "such that ... " to define the shape of the body relative to the mass. The skilled person could see whether a brush, if necessary after cutting it, satisfies the definition in the Claim.

8.3 The feature "thereby facilitating plugging of a tuft receiving hole in a mould in which the body is formed" in column 8, lines 7 to 9 of course refers to a process rather than to the brush per se which has no mould or hole in a mould. The word "facilitating" in Claim 2 does not seem to the Board to be inconsistent with the word "effecting" in column 7, line 59 of Claim 1. In the process of Claim 1 the plugging actually occurs whereas in the product of Claim 2 the feature merely explains that the fused mass would be suitable for plugging a hole in a mould during the process referred to in the first two lines of Claim 2.

9. *Claim 2 as granted - inventive step (main request)*

The reasons why the Appellant's arguments that the process of Claim 1 as granted lacks inventive step do not succeed are basically applicable to the product Claim 2. The Board sees no reason why the skilled person should extract, without using an ex post facto analysis, the teaching from the prior art documents to provide that end of a tuft which is retained in a brush body with a fused mass which

- has a cross section larger than that of the tuft,
- is located immediately adjacent the face of the brush body from which the tuft protrudes, and
- has the brush body moulded therearound providing a hole in the face whose cross sectional area is smaller than that of the fused mass to retain the latter in the brush body.

The combination of the features of Claim 2 is neither disclosed by nor obvious from the prior art documents whereas it does define a brush with good tuft retention while being of a design which is simpler to manufacture than those of the prior art.

10. The subject-matter of Claims 1 and 2 as granted are thus patentable as required by Article 52 EPC. The patent may therefore be maintained unamended based on these allowable independent Claims and on Claims 3 to 5 which are dependent on Claim 2.

11. Consideration of the Respondent's auxiliary request is therefore unnecessary.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin

C. Andries