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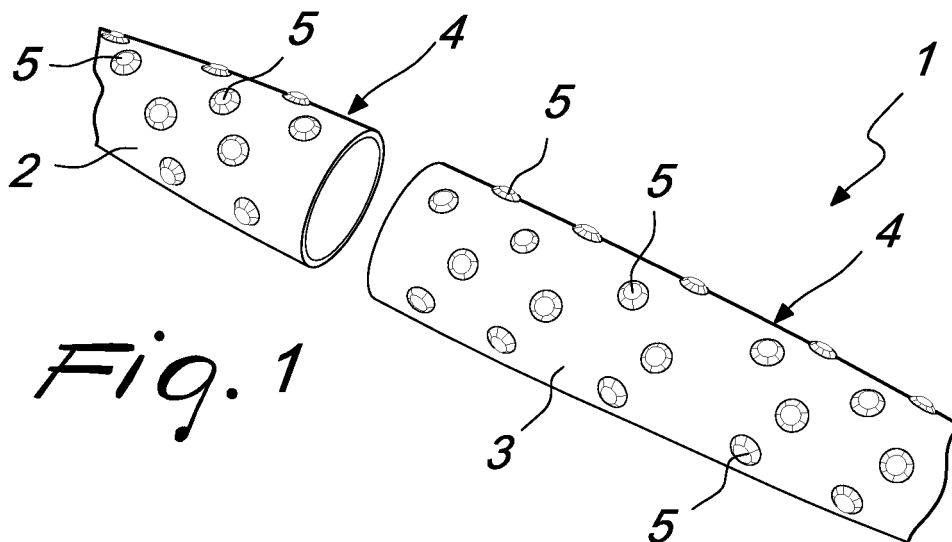
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(54) **Method for embedding natural or synthetic stones and brilliant-cut glass on a medium made of plastics and product obtained with the method**

(57) A method for embedding natural or synthetic stones and brilliant-cut glass on a medium (1) made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, and a product obtained with the method, the method providing for milling

the lateral surface (4) of the medium (1) so as to obtain a seat (8) which is shaped approximately complementarily with respect to a pavilion (9), which is then heated and in which the stone (5) is then placed and forced until a plastic deformation of the seat (8) is obtained which, once hardened, forms a perimetric tab (14) that blocks the stone (5) at a crown (13).



*Fig. 1*

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## Description

**[0001]** The present invention relates to a method for embedding natural or synthetic stones and brilliant-cut glass on a medium made of plastics, preferably made of synthetic resin or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, and to a product obtained with such method.

**[0002]** Currently it is known to use natural and synthetic stones and brilliant-cut glass, which are applied by embedding to products that are within the sector of writing instruments and therefore pens and/or fountain pens, especially in the high range of the product offered to the expert and demanding buyer.

**[0003]** The use is therefore known of thermoplastic and thermosetting resins to manufacture writing instruments, particularly acrylic resins and thermoplastic methacrylate. The presence of stones and glass in a writing object made of thermoplastic acrylic resin, however, requires the presence of a metallic medium, which is inserted beforehand and prepared as a whole with the part or finished product.

**[0004]** This occurs because the embedding process, i.e., the system used universally to fix the stone to its medium, is traditionally performed directly on the metal, normally alloys of precious metals, after preparing a suitable seat, and providing, in the points for closing the stone, of metallic elements made of the same base metal, known as prongs, which are then used to fix the stone permanently to the metallic medium.

**[0005]** This last process is normally performed by hand by expert personnel only after the result of long professional preparation.

**[0006]** An important aspect of the final effect on the produced object, when precious stones are used, is the enhancement of the beauty of the stone, its light, its color, in the context in which it is placed.

**[0007]** Any association of stones and glass directly in a writing object made of thermoplastic acrylic resins and thermosetting materials by using adequate adhesives is not feasible, since the typical optical properties of the stones would be distinctly poor.

**[0008]** Indeed, while on the one hand an adequate adhesive ensures the strength of the coupling, on the other hand it compromises final quality in addition to compromising the light effect that is characteristic of the stone.

**[0009]** Another drawback of the background art consists in the high percentage of waste that is inherent in the traditional embedding process, with possible breakage of stones and the need to perform reworking and remaking, which are typical of handicraft manual skills.

**[0010]** The aim of the present invention is to solve the above-mentioned technical problems, eliminating the drawbacks of the cited background art, by providing a method that allows to achieve rapidly the embedding of natural or synthetic stones and brilliant-cut glass on a medium made of synthetic resin, acrylic resin, thermo-

plastic methacrylate, so that the embedding is stable over time and at the same time allows to increase the aesthetic and qualitative value of the product.

**[0011]** Within this aim, an object of the invention is to provide a method which does not use adhesives and/or intermediate metallic media.

**[0012]** A further object of the invention is to provide a method that allows to achieve the embedding of natural or synthetic stones and brilliant-cut glass on a medium made of synthetic resin, acrylic resin, thermoplastic methacrylate, so that it can be repeated over time and is less subject to the drawbacks that can be observed in the manual work according to the cited background art.

**[0013]** Another object is to provide a method that has a considerable reduction of the percentage of waste, with consequent elimination of reworking, remaking and stone breakage.

**[0014]** Another object is to provide a method that allows to achieve a higher quality of the resin/stone assembly.

**[0015]** Another object is to provide a method that is simple and has low manufacturing costs.

**[0016]** This aim and these objects, as well as others that will become better apparent hereinafter, are achieved by a method for embedding natural or synthetic stones or brilliant-cut glass on a medium made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or material known by the trademark Nylon or polycarbonate, **characterized in that** it comprises, even in a different sequence, the steps of:

- a) milling the lateral surface of said medium by means of a milling cutter with a bit whose dimensions are approximately equal to those of said stone or glass, so as to obtain at least one seat which is shaped approximately complementarily with respect to the pavilion;
- b) heating said medium at said at least one seat;
- c) picking up said natural or synthetic stone or brilliant-cut glass and placing said pavilion in said at least one seat;
- d) axially forcing said pavilion into said at least one seat so as to obtain a temporary plastic deformation thereof;
- e) hardening the surface of said at least one seat and forming a perimetric tab that affects at least partially the crown of said natural or synthetic stone or brilliant-cut glass.

**[0017]** A medium is obtained which is made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, which is **characterized in that** it has, on the outer lateral surface, a plurality of natural or synthetic stones or brilliant-cut glass pieces in which the crown is partially embedded in said lateral surface.

**[0018]** Further characteristics and advantages of the

invention will become better apparent from the following detailed description of a particular but not exclusive embodiment thereof, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side perspective view of the medium with stones embedded therein;

Figure 2 is a transverse sectional view of the medium, with the seat already obtained by means of a milling cutter;

Figure 3 is a transverse sectional view of the medium with the seat already provided and the step for positioning the stone therein;

Figure 4 is a view of the stone;

Figure 5 is a view of a detail of the seat obtained on the medium;

Figure 6 is a transverse sectional view of the stone forced within the seat;

Figure 7 is a view of the stone embedded within the medium once it has cooled.

**[0019]** In the exemplary embodiments that follow, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

**[0020]** Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

**[0021]** With reference to the figures, the reference numeral 1 designates a medium, such as a writing instrument, constituted for example by a pen and/or a fountain pen composed of a cap 2 and a body 3.

**[0022]** The medium 1 is made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, and natural or synthetic stones or brilliant-cut glass pieces 5 are embedded on its lateral surface 4.

**[0023]** The method provides for a first step, in which at least one milling of the lateral surface 4 of the medium 1 is performed by means of a milling cutter 6, which has a bit 7 whose dimensions are approximately equal to those of the stone or glass 5 so as to obtain at least one seat 8 which is shaped approximately complementarily with respect to a pavilion 9 and corresponds to the lower half of the stone 5.

**[0024]** This means that the height H1 of the pavilion 9 is approximately equal to the depth H2 of the seat 8.

**[0025]** The method then provides for heating the medium 1 at the at least one seat 8 so as to achieve the partial softening of the material. Advantageously, the temperature can be approximately 80°C. Subsequently (or, as an alternative, before or simultaneously with the preceding step), the method provides for picking up the natural or synthetic stone or brilliant-cut glass piece 5, for example by means of appropriately provided tweezers or by means of a tool 10 which has a bit 11 that is adapted

to form a vacuum so as to engage the stone 5 at a table 12 (constituted by the upper flat face of the stone) and/or partially at a girdle or crown 13.

**[0026]** The pavilion 9 is then arranged in the at least one seat 8 and then an axial force is imparted such as to force the pavilion 9 within the seat 8 so as to obtain a temporary plastic deformation of the seat 8, as shown in Figure 6, thanks to the temperature to which the medium has been brought.

**[0027]** Once hardening of the surface of the at least one seat 8 has been achieved, a contraction of the material occurs which entails the formation of a perimetric tab 14, which affects at least partially the girdle or crown 13 of the natural or synthetic stone or brilliant-cut glass 5.

**[0028]** A medium made of synthetic or acrylic resin or thermoplastic methacrylate is thus obtained which has, on the outer lateral surface, a plurality of natural or synthetic stones or brilliant-cut glass 5 in which the girdle or crown 13 is partially embedded in said lateral surface, thus protruding from it by a chosen extent.

**[0029]** It has thus been found that the invention has achieved the intended aim and objects, a method having been devised which allows to obtain rapidly and easily the embedding of natural or synthetic stones or brilliant-cut glass on a medium made of synthetic or acrylic resin or thermoplastic methacrylate, such embedding being stable over time and allowing at the same time to increase the aesthetic and qualitative value of the product.

**[0030]** Moreover, the method does not use adhesives and/or intermediate metallic media, so as to increase the aesthetic finish of the product.

**[0031]** The method further can be repeatable over time and is not subject to the drawbacks that can be observed in manual work according to the cited background art, eliminating the percentage of waste, with consequent elimination of reworking, remaking and breakage of stones, obtaining a superior quality of the resin/stone assembly.

**[0032]** The invention is of course susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; thus, for example, the localized heating temperature of the medium, as well as the depth H2 of the seat 8, may be the most appropriate as a function of specific requirements; accordingly, the dimension and shape of the perimetric tab 14 also may be the most appropriate as a function of specific requirements and may therefore affect a more or less extensive region of the crown or girdle 13 of the stone 5.

**[0033]** The materials used, as well as the dimensions that constitute the individual components of the invention, may of course be the most pertinent according to specific requirements.

**[0034]** The various means for performing certain different functions need not certainly coexist only in the illustrated embodiment but can be present per se in many embodiments, including ones that are not illustrated.

**[0035]** The characteristics indicated as advantageous, convenient or the like may also be omitted or be replaced

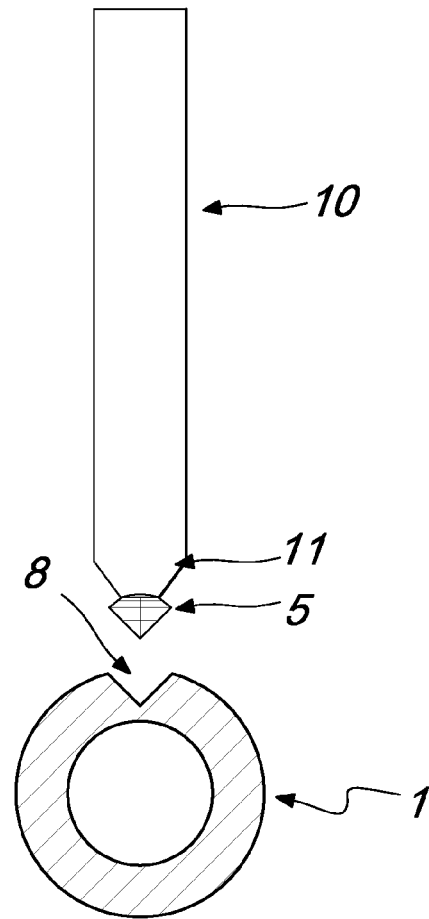
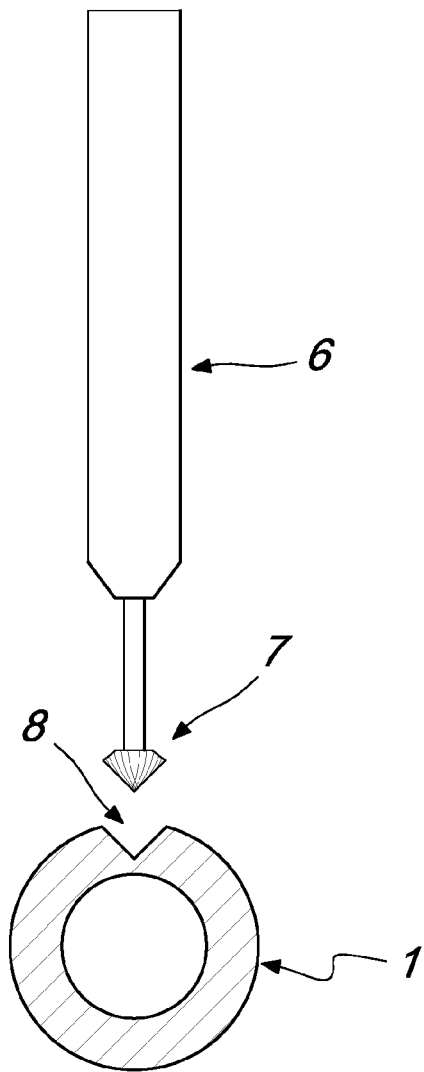
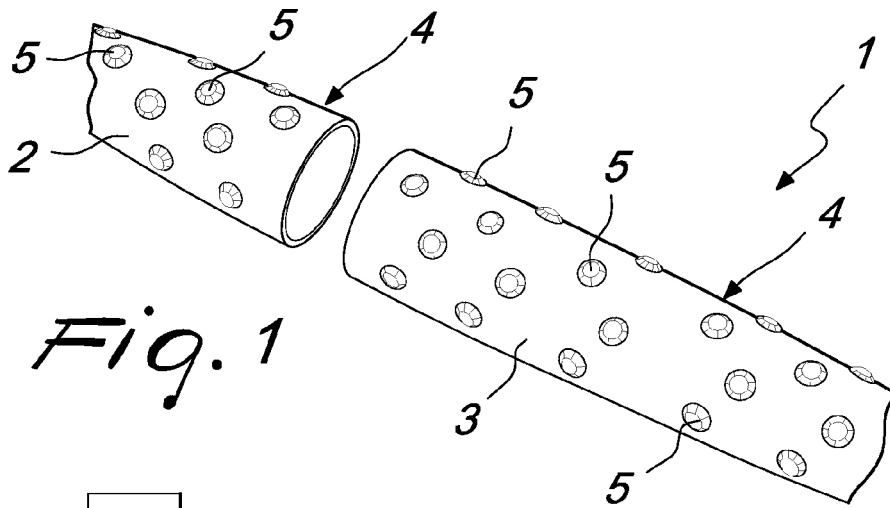
with equivalents.

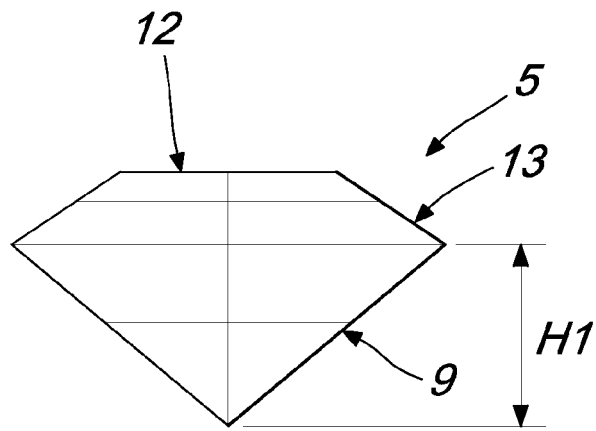
**[0036]** The disclosures in Italian Patent Application No. TV2008A000146 from which this application claims priority are incorporated herein by reference.

**[0037]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

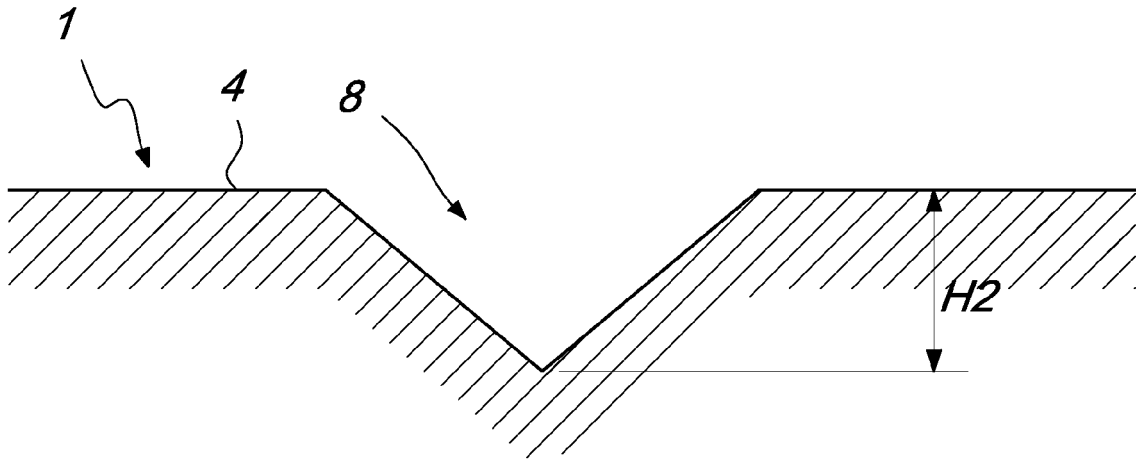
## Claims

1. A method for embedding natural or synthetic stones or brilliant-cut glass (5) on a medium (1) made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, **characterized in that** it comprises, even in a different sequence, the steps of:
  - a) milling the lateral surface (4) of said medium (1) by means of a milling cutter (6) with a bit (7) whose dimensions are approximately equal to those of said stone or glass (5), so as to obtain at least one seat (8) which is shaped approximately complementarily with respect to a pavilion (9);
  - b) heating said medium (1) at said at least one seat (8);
  - c) picking up said natural or synthetic stone or brilliant-cut glass (5) and placing said pavilion (9) in said at least one seat (8);
  - d) axially forcing said pavilion (9) into said at least one seat (8) so as to obtain a temporary plastic deformation thereof;
  - e) hardening the surface of said at least one seat (8) and forming a perimetric tab (14) that affects at least partially the crown (13) of said natural or synthetic stone or brilliant-cut glass (5).
2. The method of claim 1, **characterized in that** said medium is a writing instrument constituted by a pen and/or a fountain pen composed of a cap (2) and a body (3), one or more of said natural or synthetic stones or brilliant-cut glass pieces (5) being embedded on the lateral surface (4) of said medium (1).
3. The method according to claims 1 and 2, **characterized in that** it provides for the milling of said lateral surface (4) of said medium (1) by means of a milling cutter (6) whose bit (7) has dimensions approximately equal to those of said stone or brilliant-cut glass (5) so as to obtain at least one seat (8) which is shaped approximately complementarily to the pavilion (9) and corresponds to the lower half of the stone (5).
  4. The method according to one or more of the preceding claims, **characterized in that** the height (H1) of said pavilion (9) is approximately equal to the depth (H2) of said at least one seat (8).
  5. The method according to one or more of the preceding claims, **characterized in that** after the milling step said medium (1) is heated at said at least one seat (8) so as to obtain the partial softening of the material.
  6. The method according to one or more of the preceding claims, **characterized in that** after the milling step or, as an alternative, before or simultaneously with the milling step, said natural or synthetic stone or brilliant-cut glass (5) is picked up by means of a tool (10) which has a tip (11) adapted to form a vacuum, so as to engage said stone (5) at the table (12), constituted by the upper flat face of said stone and/or partially at the girdle or crown (13).
  7. The method according to one or more of the preceding claims, **characterized in that** after the milling step or, as an alternative, before or simultaneously with the milling step, said natural or synthetic stone or brilliant-cut glass (5) is picked up by means of tweezers.
  8. The method according to one or more of the preceding claims, **characterized in that** it provides for positioning said pavilion (9) in said at least one seat (8) and then imparting such an axial force as to force said pavilion (9) into said at least one seat (8) so as to achieve a temporary plastic deformation of said seat (8).
  9. The method according to one or more of the preceding claims, **characterized in that** once the hardening of the surface of said at least one seat (8) has been achieved, a shrinkage of the material occurs which entails the formation of a perimetric tab (14), which affects at least partially said girdle or crown (13) of said natural or synthetic stone or brilliant-cut glass (5) so as to provide the stable anchoring of said stone (5) to said medium (1).
  10. A medium (1) made of plastics, preferably synthetic or acrylic resin or methacrylate or thermoplastic material or polycarbonate or material known by the trademark Nylon, **characterized in that** it has, on an outer lateral surface (4), a plurality of natural or synthetic stones or brilliant-cut glass pieces (5) in which a crown (13) is partially embedded in said lateral surface (4).

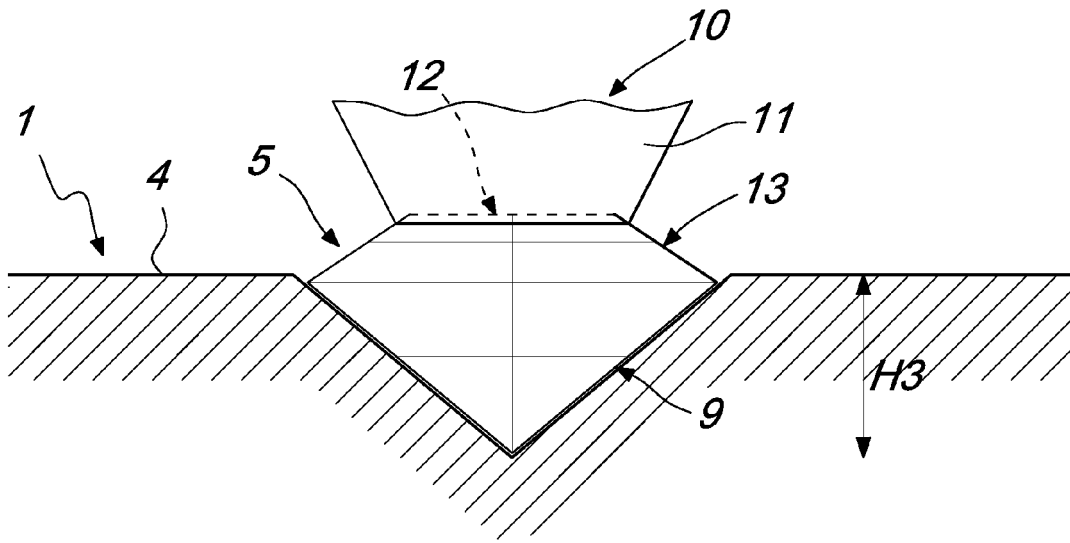




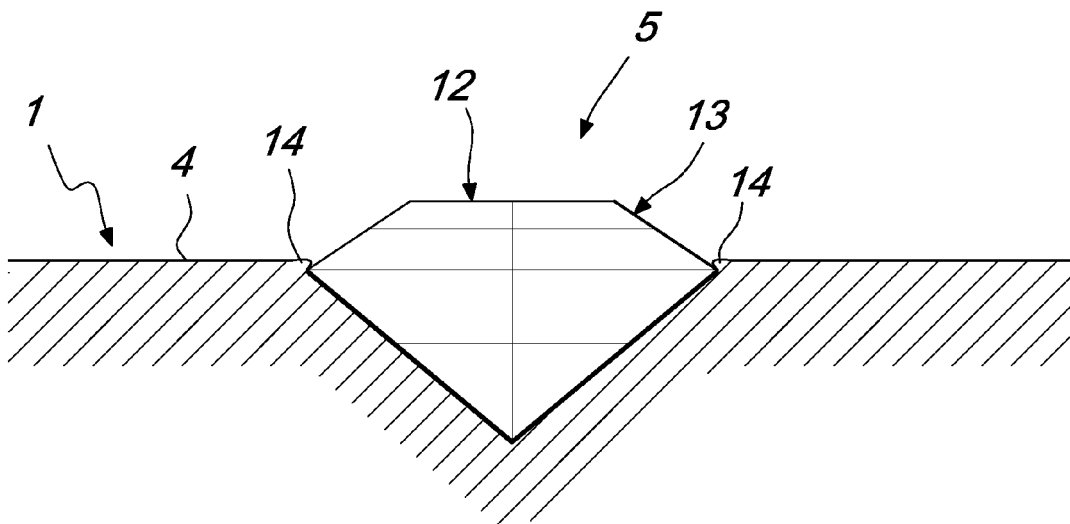
*Fig. 4*



*Fig. 5*



*Fig. 6*



*Fig. 7*



EUROPEAN SEARCH REPORT

Application Number  
EP 09 17 5953

| DOCUMENTS CONSIDERED TO BE RELEVANT  |   |   |   |
|--|---|---|---|
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| X  | FR 2 725 882 A (BARDOU HUGUES [FR])<br>26 April 1996 (1996-04-26)             | 1,4,5,9   | INV.<br>A44C17/02                       |
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|  |   |   | A44C                                    |
| The present search report has been drawn up for all claims                       |   |   |   |
| Place of search  |   | Date of completion of the search  | Examiner                                |
| The Hague  |   | 19 April 2010   | Debard, Michel                          |
| CATEGORY OF CITED DOCUMENTS  |   |   |   |
| X : particularly relevant if taken alone   |   | T : theory or principle underlying the invention                        |   |
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| O : non-written disclosure   |   | L : document cited for other reasons                                    |   |
| P : intermediate document  |   | & : member of the same patent family, corresponding document            |   |

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 09 17 5953

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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