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(54) TIP BODY, APPLICATOR, AND METHOD FOR MAKING THE SAME

SPITZENKÖRPER, APPLIKATOR UND VERFAHREN ZUR HERSTELLUNG DAVON

CORPS DE POINTE, APPLICATEUR ET SON PROCÉDÉ DE FABRICATION

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Description

Technical Field

5 **[0001]** The present invention relates to a tip body, an applicator, and a method for making the same, the tip body or the applicator being both connected to an ink storage body or a coating liquid storage body filled up in a shaft tube enabling to feed ink or coating liquid for writing or painting.

Background Art

10 **[0002]** Some typical examples of applicators may include writing instruments, markers, or eye liners. In general, a shaft tube (or a holding tube) contains an ink tank filled with ink (coating liquid) or a coating liquid storage body impregnated with ink (coating liquid). The back end of a tip body is connected to the ink tank or the coating liquid storage body directly or through a relay core (or a guide core). The opposite end of the tip body is configured to protrude outside from the shaft tube. Here, the shaft tube may include a tip holder.

15 **[0003]** Known examples of the tip body may include a conical bundle of plastic fibers, a fiber aggregate made by which plastic short fibers are impregnated with a thermosetting resin and then thermosetted, the one produced by a plastic extrusion, and the one with a porous body made by which granulated plastics are combined by means of sintering or the like. These tip bodies have been conventionally used for writing a letter, a line, or a mark, or for a make-up including eye shadow and mascara. According to the intended use, the point of the tip body may be sharp, hemispherical, or flat with a linear edge or an inclined edge.

20 **[0004]** Examples of the coating liquid may include aqueous pigment ink, aqueous dye ink, oil-based pigment ink, oil-based dye ink, liquid eye shadow, liquid mascara, liquid paste, and drugs for application use. These coating liquids are applied by being filled in an ink tank, or absorbed in a coating liquid storage body made of, for example, a porous body such as sponge, or a sliver of many fibers. The coating liquid is properly guided from the ink tank or coating liquid storage body to the tip body, and used for writing or painting.

25 **[0005]** JP 2006-296936 A discloses an embodiment where a tip used for cosmetics is called a porous pen and made of a urethane resin with open cells, and that a relay core Y is inserted in the base of the tip X (see Fig. 6).

30 **[0006]** JP 11-129668 A discloses a pen body and a method for making the same, the pen body being composed of: an shell part made of ultra-high molecular weight polyethylene having an average molecular weight of about 2,500,000 to 5,000,000 and in the form of fluffy powder having an average particle size of 50 to 300 μm , the contacts between the powder being fused together to have a percentage of voids (or porosity) of about 40% to 85%; and a guide core placed in the center of the shell and having a back end protruded from the shell.

35 **[0007]** As shown in JP 2006-296936 A, it is a well-known art to place a relay core (guide core) between the ink tank or coating liquid storage body and the coating body (urethane resin porous body) of an applicator for feeding ink to the tip body for writing or painting.

40 **[0008]** The relay core (guide core) commonly used is a rod made of fibers bonded with resin, and has many capillary porosity (having a percentage of voids of less than 70%) in a longitudinal direction formed between the fibers.

45 **[0009]** The relay core connected to the ink tank is a plastic rod having many fine grooves in a longitudinal direction.

50 **[0010]** JP 2004-223 907 discloses a sintered core and a relay core for a writing utensil.

Summary of Invention

Technical Problem

45 **[0011]** There are many applicators for fine writing, medium writing, thick writing, and special characters. The line thickness of these characters and diagrams drawn by these applicators are various. Particularly, considering an applicator with a tip for thick writing, which is different from a brush soaked in India ink, when the applicator uses the ink (coating liquid) which is fed from the ink tank or the coating liquid storage body, it would be difficult to draw a thick line due to the structure of the relay core (guide core) and the structure of the tip body.

50 **[0012]** Under the above circumstances, white boards or electronic blackboards are recently more used in wide rooms and halls. Therefore, it is more required to make the lines of characters and diagrams drawn on the whiteboard or electronic blackboard to be thick and dense, so that people at the back of the hall are allowed to see the characters and diagrams easily.

55 **[0013]** Further, in case of liquid drugs, it is necessary to apply the drugs sufficiently to wide affected areas of, for example, skin.

60 **[0014]** Moreover, wide and sufficient application is also demanded in the application of cosmetics such as hair dye or manicure.

[0015] Also, in case of a liquid paste, sufficiently applying the paste in thick lines is required for quick applications over wide areas.

[0016] In the above circumstances, the present invention relates to a tip body, an applicator, and a method for making the same, the tip body and applicator allowing sufficient feeding of a coating liquid in a wide area.

Solution to Problem

[0017] A tip body according to a first aspect of the present invention is characterized by including a tip main body with a hole opened toward the rear and a reserver or a padding contained in the hole of the tip main body, the tip main body being configured to have a cylindrical body with a point shape suitable for application, and being made through sintering of an ultra-high molecular weight polyethylene powder having a percentage of voids of about 75% to 85%, specifically about 80%, wherein the reserver has a percentage of voids of 80% to 90%. Here, when discussing the reserver or the padding throughout this specification, it should be taken as that the percentage of voids of the reserver or the padding always have a smaller ratio than the one of a coating liquid storage body impregnated with coating liquid (for example, ink) housed in a shaft tube. Further, the reserver usually contains randomly oriented many fibers including crimp fibers, but the present invention is surely not limited thereto.

[0018] Further, the tip body according to the first aspect of the present invention is characterized in that the tip body is formed by sintering a powder mixture composed of an ultra-high molecular weight polyethylene powder and a high molecular weight polyethylene powder, the ultra-high molecular weight polyethylene powder having a molecular weight of 3,900,000 to 5,000,000 and having an average particle size of 85 μm to 150 μm , the high molecular weight polyethylene powder having a molecular weight of 450,000 to 750,000 and having an average particle size of 100 μm to 140 μm , the weight ratio between the ultra-high molecular weight polyethylene powder and the high molecular weight polyethylene powder being 1 : 0.5 to 1, and the percentage of voids in the tip body being from 75% to 85%.

[0019] An applicator according to a second aspect of the present invention is characterized by including the tip body according to the first aspect whose back end of the tip body is connected to and embedded into a coating liquid storage body which is housed in the shaft of the applicator.

[0020] A method for making a tip body according to a third aspect of the present invention is characterized by including: a step of sticking a rod-like reserver into a pin placed on a mount attached to a lower plate of a die, a step of placing a middle plate of a die from the top so as to form a space at the upper circumferential area (or around and on the top surface) of the rod-like reserver while holding the rod-like reserver on the mount in an upright state; a step of filling a powder mixture into the space, which is made by mixing an ultra-high molecular weight polyethylene powder or a mixture of an ultra-high molecular weight polyethylene powder and a high molecular weight polyethylene powder with 75 wt% to 85 wt% of an water-soluble inorganic substance; a step of pressing the powder mixture from the top toward the lower plate of the die with a push pin attached to an upper plate of a die; a step of heating the lower, middle and upper plates for sintering the polyethylene powder to form a tip body; and a step of washing the formed tip body (3) to remove the water-soluble inorganic substance from the tip main body (1).

[0021] According to the first aspect of the present invention, the tip body includes a tip main body, which is made by sintering an ultra-high molecular weight polyethylene powder to have a percentage of voids about 75% to 85%, and the reserver which is housed in the hole of the tip main body opened toward the rear. Therefore, the sintered body of the tip main body has a high percentage of voids, and contains the reserver having high flexibility and a high percentage of voids. Accordingly, the tip body itself has a flexibility and elasticity, and contains a sufficient amount of the application liquid, so that the tip body is easily distorted by a writing pressure for consuming more liquids enabling to allow a thick-line writing.

[0022] According to the first aspect of the present invention, the tip body is harder than the tip body of the first aspect, so that the feeling of writing is harder and distortion is smaller than those of the tip body of the first aspect. However, the tip body of the second aspect is far more easily distorted than the tip with a middle core placed therein thereby allowing a thick line writing.

[0023] The second aspect of the present invention is an applicator including the tip body of the first or second aspect, so that the applicator has both of their features. In addition, the back end of the tip body is connected to and embedded in the application liquid storage body housed in the shaft of the applicator, so that the application liquid contained in the application liquid storage body in the shaft contacts with both of the tip main body and the reserver exposed at the back end of the tip main body, and at the same time feeds the liquid to them. Accordingly, the application liquid is sufficiently and smoothly fed to the tip main body, even if the application liquid is a pigment ink or a highly viscous cosmetic liquid.

[0024] The application liquid storage body in the shaft and the reserver of the tip body are preferably made of generally same materials and preferably have a similar level of percentage of voids around 90%.

[0025] The third aspect of the present invention includes: a step of sticking rod-like reserver into a pin placed on a mount attached to a lower plate of a die, a step of placing a middle plate of a die from the top so as to form a space at the upper circumferential area (or around and on the top surface) of the rod-like reserver while holding the rod-like

reserver on the mount in an upright state; a step of filling a powder mixture into the space, which is made by mixing an ultra-high molecular weight polyethylene powder or a mixture of an ultra-high molecular weight polyethylene powder and a high molecular weight polyethylene powder with 75 wt% to 85 wt% of an water-soluble inorganic substance (sodium hydrogen carbonate); a step of pressing the powder mixture from the top toward the lower plate of the die with a push pin attached to an upper plate of a die; a step of heating the lower, middle and upper plates for sintering the polyethylene powder to form a tip body; and a step of washing the tip body to remove the water-soluble inorganic substance from the tip main body. Therefore, the soft rod-like reserver is housed in the tip main body and adhered to the inner surface of the tip main body. The tip body is formed in that the back end of the rod-like reserver is configured to show itself from the back end of the tip main body.

Brief Description of Drawings

[0026]

Fig. 1 is a plan view of a tip body according to the present invention;

Fig. 2 is a cross-sectional view along line A-A of the tip body of the present invention shown in Fig. 1;

Fig. 3 is a cross-sectional view of the tip body of the present invention according to another example;

Fig. 4 is an applicator of the present invention including the tip body shown in Fig. 1;

Figs. 5(A) to 5(F) show the steps for making the tip body of the present invention; and

Fig. 6 is a plan view showing a partial cross-section of the pen body of prior art.

Description of Embodiments

[0027] An ultra-high molecular weight polyethylene for forming a tip main body of the present invention may be a powder having an average molecular weight of 3,900,000 to 5,000,000, preferably about 4,500,000, and having an average particle size of 85 μm to 150 μm , preferably about 115 μm .

[0028] Examples of a high molecular weight polyethylene include those having an average molecular weight of 450,000 to 750,000, preferably about 610,000, and having an average particle size of 100 μm to 140 μm , preferably about 120 μm . Specific examples include the ultra-high molecular weight polyethylene having a trade name of GUR (registered trademark), and the high molecular weight polyethylene having a trade name of GHR (registered trademark) manufactured by Ticona.

[0029] The shape of the polyethylene powder may be spherical, or may be used a confetti-shaped GUR2126, a botryoidal GUR2122, or a potato-like GUR4120, manufactured by Ticona. These powders may be used alone or in combination.

[0030] The weight ratio between the ultra-high molecular weight polyethylene and the high molecular weight polyethylene is preferably 1 : 0.5 to 1.

[0031] The percentage of voids in the tip main body is from 75% to 85%, and preferably about 80%, though the value depends on the ink and reserver to be used.

[0032] The shape of tip body may be a cylindrical body having a point shape suitable for application, more specifically, a cylindrical body having a generally hemispherical point, a cylindrical body having a conical point, and a cylindrical body having a flat wedge-shaped point.

[0033] According to the present invention, as shown in Figs. 1 and 2, a tip body 3 includes a tip main body 1 and a reserver (or a padding) 2.

[0034] The tip main body 1 is a tubular porous body having open cells, which is made by sintering particulates of an ultra-high molecular weight polyethylene. The point 1a of the tip main body 1 has a shape suitable for application, such as a hemispherical shape. The back end has a columnar shape with a reduced diameter, and an approximately tubular-shaped hole 1c is formed from the rear end surface 1b toward the point 1a. The hole 1c is as deep as almost the full length of the inside of the tip main body.

[0035] The hole 1c of the tip main body 1 contains the approximately rod-shaped reserver 2, which is composed of randomly oriented many fibers (including crimp fibers) and has a percentage of voids of about 80% to 90%, in such a manner that the end of the reserver 2 reaches the lower part of the hole 1c. The back end of the reserver 2 has almost the same length as the back end of the tip main body 1, so that it faces the opening of the hole 1c. The back end of the reserver 2 may be slightly protruded from the rear end surface 1b of the tip main body 1.

[0036] The reserver 2 is a similar material to the ink storage body used in conventional writing instruments, the reserver 2 having a percentage of voids of about 80% to 90%, and being able to hold the sufficient amount of coating liquid. Here, for making handling of the reserver 2 easier at production stages, a binder may be applied to only the outer periphery of the reserver 2, or synthetic resin fibers (if used) may be slightly heated so as to weld some of the fibers of the outer periphery to form a rod-like body. When the reserver 2 is formed into a rod form, closure of the gaps formed around the rod by a binder or welding should be minimized.

[0037] The tip body 3 shown in Fig. 2 is integrally formed with the reserver 2 and the tip main body 1, so that the boundary therebetween is tangled to each other.

[0038] Alternatively, as shown in Fig. 3, it is possible in advance to have the tip i main body 1 with the above structure, and then the reserver 2 can be inserted through the hole 1c opened in the rear end surface 1b of the tip main body 1. The reserver 2 is thus placed in the tip main body 1.

[0039] The method for producing the tip body 3 with the structure shown in Fig. 2 is explained based on Figs. 5A to 5F.

[0040] In Fig. 5A, a pin 12 stuck at the top surface of a mount 11 is directed upward on a lower plate 10 of a die, and a rod-like reserver 2 is stuck to the pin 12 in an upright position thereby being fixed on the mount 11. The diameter of the mount 11 is larger than the one of the reserver 2. A recess 11A with a frusto-conical shape is formed on the top surface of the mount 11, and the diameter of the reserver 2 is equal to or slightly smaller than the flat area of the recess, so that the reserver 2 is fixed in the recess 11 A.

[0041] As shown in Fig. 5B, a middle plate 13 with a through hole 13A is laid over the lower plate 10 of the die in such a manner that the reserver 2 mounted on the lower plate 10 is inserted through the through hole 13A. The inside diameter of the through hole 13A formed in the middle plate 13 is larger than the outer diameter of the reserver 2, and the upper surface of the through hole 13A is high enough to exceed the top end of the reserver 2 mounted. Accordingly, a space 15 to be filled with a synthetic resin powder for sintering is formed between the reserver 2 and the through hole 13A, more specifically at the upper circumferential area (or around and on the top surface) of the reserver 2.

[0042] In the figures, the reference numeral 14 indicates a guide pin for aligning the upper plate 18 and lower plate 10 of the die.

[0043] As shown in Fig. 5C, a powder mixture 16 composed of an ultra-high molecular weight polyethylene powder or a mixture of an ultra-high molecular weight polyethylene powder and a polymer polyethylene powder and 75 wt% to 85 wt% of sodium hydrogen carbonate is filled into the space 15 formed around the reserver 2.

[0044] Subsequently, the upper plate 18 of the die, which holds a push pin 17 in a certain position, is descended along a guide pin 14 from top of the middle plate 13 filled with the powder mixture 16, the powder mixture 16 is pressurized by the push pin 17, and the die (10, 13, and 18) is heated by an appropriate means 20 while keeping this condition (see Fig. 5E).

[0045] After completion of sintering of the powder mixture 16, the die is opened, and the tip body 3, which is molded together with the reserver 2 to be a sintered body, is taken out (see Fig. 5F).

[0046] As shown in Fig. 4, when producing a marking pen, a coating liquid storage body 23 impregnated with coating liquid such as ink is housed in a shaft tube 21, and the tip holder 22 having the tip body 3 is mounted on the connector of the shaft tube 21 by a screw means. In this mounting operation, it is preferred that the back end of the tip body 3 be connected to and embedded in the front end of the coating liquid storage body 23.

Test Example

[0047] The tip body of the present invention composed of the tip main body and the reserver is based on the following findings through experiments.

[0048] The ultra-high or high molecular weight polyethylene powders manufactured by Ticona used in this test were as follows.

(1) GUR2126 has an average molecular weight of 4,500,000, an average particle size of 35 μm , an average bulk specific gravity of 0.23 g/cm^3 , and a confetti-shaped form.

(2) GUR2122 has an average molecular weight of 4,500,000, an average particle size of 115 μm , an average bulk specific gravity of 0.22 g/cm^3 , and a botryoidal form.

(3) GUR4120 has an average molecular weight of 5,000,000, and average particle size of 120 μm , an average bulk specific gravity of 0.47 g/cm^3 , and a potato-like form.

(4) GHRJ8110 has an average molecular weight of 610,000, an average particle size of 120 μm , an average bulk specific gravity of 0.45 g/cm^3 , and a potato-like form.

[0049] The polyethylene powders of (1) to (4) were mixed as appropriate with 70 wt% of a soluble inorganic substance (sodium hydrogen carbonate) to obtain a sintered porous body having a percentage of voids of 75% to 85%.

[0050] The ink consumption and bending strength, which varied according to the type of the polyethylene composing the tip main body and the tip body content to be combined, were compared.

[Table 1]

	Formula No.	Ink consumption (g/100m)	Bending strength (kgf)	Particle shape	Tip body content
1	GUR2122 (Control)	2.1	12~13	Botryoidal	Relay core
2	GUR2122·4120 (Control)	1.7	1.9~2.1	Botryoidal, potato-like	Reserver
3	GUR2122·2126 (Control)	1.8	2.4~2.6	Botryoidal, confetti-shaped	Reserver
4	GUR4120·2126·2122 (Control)	1.8	2.2~2.4	Potato-like, confetti-shaped, botryoidal	Reserver
5	GUR4120·2126 (Control)	1.7	1.1~1.3	Potato-like, confetti-shaped	Reserver
6	GUR2122 (Present invention)	2.7	1.8~2.0	Botryoidal	Reserver
7	GUR2122·GHRJ 8110 (Present invention)	2.5	4.2~4.4	Botryoidal, potato-like	Reserver

(Note)

[0051]

1) Relay core ... outer diameter: 8 mm, a fiber core made of polyester fibers bonded with a binder, percentage of voids: about 70%

2) Reserver ... outer diameter: 8 mm, polyester fiber aggregate, percentage of voids: about 90%

3) Writing conditions ... writing speed: 7 m/minute, load: 150 g, angle: 65°

4) Ink ... black ink for board

5) Marker ink tank ... reserver type

[0052] In the (6) and (7), the excellent tracking property of the ink (good flowability of ink) was observed.

Example 1

(1) Materials of tip main body

[0053] As the materials of the tip main body, the powder of GUR2122 (Ticona Japan) having an average particle size of 115 μm and an average bulk specific gravity of 0.23 (g/cm³) as ultra-high molecular weight polyethylene, the powder of GHRJ8110 (Ticona Japan) having a particle size of 120 μm and an average bulk specific gravity of 0.45(g/cm³) as high molecular weight polyethylene, and a water-soluble inorganic substance (sodium hydrogen carbonate) having an average particle size 25 μm , which has been ground so as to increase the percentage of voids of the sintered tip main body, were provided.

[0054] GUR2122 and GHRJ8110 are mixed at a weight ratio of 1 : 1, and the water-soluble inorganic substance (sodium hydrogen carbonate) is added to the mixture at 70 wt%. The mixture is stirred at a room temperature.

(2) Material of reserver

[0055] The reserver contained in the tip main body is an aggregate of polyester fibers having a percentage of voids of 80% to 90%.

[0056] The reserver may be an aggregate of fibers or crimp fibers such as acryl or nylon.

(3) Soluble inorganic substance

[0057] The water-soluble inorganic substance is preferably sodium hydrogen carbonate, and added in an amount of 70 wt%.

[0058] If the ultra-high molecular weight polyethylene and/or high molecular weight polyethylene is used without the addition of the water-soluble inorganic substance as a filler, the upper limit of the percentage of voids of the sintering tip main body is about 50%.

(4) Production method

[0059] Reserver (percentage of voids 85%) having a diameter of 8 mm and a length of 30 mm is fixed in a die (in a cavity), and a powder mixture, which has been sieved to pass 40 mesh, is filled in the die. After mounting the upper plate of the die, the die is heated in an electric furnace at 200 °C for 20 minutes, thereby sintering the powder mixture.

[0060] The sintering temperature for the powder mixture containing the water-soluble filler (sodium hydrogen carbonate) must be higher than the sintering temperature for the ordinary material composed of 100% polyethylene powder, thereby ensuring the bond strength between the particles.

(5) Washing

[0061] After completion of sintering, the object is boiled for washing, thereby eluting the water-soluble filler (sodium hydrogen carbonate) from the sintered tip main body.

[0062] The percentage of voids in the sintering tip main body was about 80%.

Example 2

[0063] As the materials of the tip main body, the powder of GUR2122 (Ticona Japan) having an average particle size of 115 μm and an average bulk specific gravity of 0.23 (g/cm³) as ultra-high molecular weight polyethylene, the powder of GHRJ8110 (Ticona Japan) having an average particle size of 120 μm and an average bulk specific gravity of 0.45(g/cm³) as high molecular weight polyethylene, and a water-soluble inorganic substance (sodium hydrogen carbonate) having an average particle size of 25 μm, which has been ground so as to increase the percentage of voids of the sintered tip main body, were provided.

[0064] GUR2122 and GHRJ8110 were mixed at a weight ratio of 1 : 0.5, and the water-soluble inorganic substance (sodium hydrogen carbonate) was added to the mixture at 70 wt%. The mixture is stirred at a room temperature.

[0065] The subsequent procedure was carried out in the same manner as in Example 1, and a sintered tip body having a percentage of voids about 80% was obtained.

Example 3

[0066] As the materials of the tip main body, the powder of GUR2122 (Ticona Japan) having an average particle size of 115 μm and an average bulk specific gravity of 0.23 (g/cm³) as ultra-high molecular weight polyethylene, and a water-soluble inorganic substance (sodium hydrogen carbonate) having an average particle size 25 μm, which has been ground so as to increase the percentage of voids of the sintered tip main body, were provided. The water-soluble inorganic substance (sodium hydrogen carbonate) were added to GUR2122 at 70 wt%. The mixture is stirred at a room temperature.

[0067] The subsequent procedure was carried out in the same manner as in Example 1, and a sintered tip body having a percentage of voids about 80% was obtained.

Claims

1. A tip body (3) comprising a tip main body (1) with a hole (1c) opened toward the rear, and a reserver (2) housed in the hole (1c) of the tip main body (1), the tip main body (1) being configured to have a cylindrical body with a point shape suitable for application, and being made through sintering of an ultra-high molecular weight polyethylene powder having a percentage of voids of 75% to 85%, **characterized in that** the reserver (2) has a percentage of voids of 80% to 90%.

2. The tip body (3) according to claim 1, **characterized in that** the tip main body (1) is made through sintering of an

ultra-high molecular weight polyethylene powder having a percentage of voids of 80%.

3. The tip body (3) according to claim 1 or 2, **characterized in that** the tip main body (1) is formed by sintering a powder mixture composed of an ultra-high molecular weight polyethylene powder and a high molecular weight polyethylene powder, the ultra-high molecular weight polyethylene powder having a molecular weight of 3,900,000 to 5,000,000 and having an average particle size of 85 μm to 150 μm , the high molecular weight polyethylene powder having a molecular weight of 450,000 to 750,000 and having an average particle size of 100 μm to 140 μm , a weight ratio between the ultra-high molecular weight polyethylene powder and the high molecular weight polyethylene powder being 1 : 0.5 to 1.
4. The tip body (3) according to claims 1 to 3, **characterized in that** synthetic resin fibers of the reserver (2) are slightly heated so as to weld some of the fibers of the outer periphery thereof to form a rod-like body.
5. The tip body (3) according to claims 1 to 3, **characterized in that** a binder is applied to the outer periphery of the reserver (2) to form a rod-like body.
6. An applicator comprising the tip body (3) according to claims 1 to 5, **characterized in that** the back end of the tip body (3) is connected to and embedded into a coating liquid storage body (23) which is housed in a shaft of the applicator.
7. A method for making a tip body (3) according to claims 1 to 5, **characterized in that** it comprises:

a step of sticking a rod-like reserver (2) into a pin (12) placed on a mount attached to a lower plate of a die, a step of placing a middle plate of a die from the top so as to form a space at the upper circumferential area of the rod-like reserver (2) while holding the rod-like reserver (2) on the mount in an upright state, wherein the reserver (2) has a percentage of voids of 80% to 90%;

a step of filling a powder mixture into the space, which is made by mixing an ultra-high molecular weight polyethylene powder or a mixture of an ultra-high molecular weight polyethylene powder and a high molecular weight polyethylene powder with 75 wt% to 85 wt% of an water-soluble inorganic substance;

a step of pressing the powder mixture from the top toward the lower plate of the die with a push pin (17) attached to an upper plate of a die;

a step of heating the lower, middle and upper plates for sintering the polyethylene powder to form a tip body (3); and

a step of washing the formed tip body (3) to remove the water-soluble inorganic substance from the tip main body (1).

Patentansprüche

1. Spitzenkörper (3) umfassend einen Spitzengrundkörper (1) mit einer nach hinten geöffneten Öffnung (1c), und einem in der Öffnung (1c) des Spitzengrundkörpers (1) eingesetzten Reservoirs (2), wobei der Spitzengrundkörper (1) derart ausgestaltet ist, dass er einen zylindrischen Körper mit einer spitz zulaufenden Form aufweist, die zur Auftragung geeignet ist, und durch Sintern eines Pulvers aus ultrahochmolekularem Polyethylen gebildet ist, welches einen Porenanteil von 75% bis 85% aufweist, **dadurch gekennzeichnet, dass** das Reservoir (2) einen Porenanteil von 80% bis 90% aufweist.
2. Spitzenkörper (3) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Spitzengrundkörper (1) durch Sintern eines Pulvers aus ultrahochmolekularem Polyethylen gebildet ist, welches einen Porenanteil von 80% aufweist.
3. Spitzenkörper (3) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Spitzengrundkörper (1) durch Sintern einer Pulvermischung, die ein Pulver aus ultrahochmolekularem Polyethylen und ein Pulver aus hochmolekularem Polyethylen enthält, wobei das Pulver aus ultrahochmolekularem Polyethylen ein Molekulargewicht von 3,900,000 bis 5,000,000 und eine durchschnittliche Partikelgröße von 85 μm bis 150 μm aufweist, das Pulver aus hochmolekularem Polyethylen ein Molekulargewicht von 450,000 bis 750,000 und eine durchschnittliche Partikelgröße von 100 μm bis 140 μm aufweist, und das Gewichtsverhältnis zwischen dem Pulver aus ultrahochmolekularem Polyethylen und dem Pulver aus hochmolekularem Polyethylen 1 : 0.5 bis 1 beträgt.
4. Spitzenkörper (3) nach den Ansprüchen 1 bis 3, **dadurch gekennzeichnet, dass** Kunstharzfasern des Reservoirs

(2) leicht erwärmt werden, sodass einige Fasern des äusseren Umfangs des Reservoirs geschweisst werden, um einen stäbchenförmigen Körper zu bilden.

5 5. Spitzenkörper (3) nach den Ansprüchen 1 bis 3, **dadurch gekennzeichnet, dass** ein Bindemittel auf den äusseren Umfang des Reservoirs (2) aufgetragen wird, um einen stäbchenförmigen Körper zu bilden.

10 6. Auftragsgerät umfassend den Spitzenkörper (3) nach den Ansprüchen 1 bis 5, **dadurch gekennzeichnet, dass** das hintere Ende des Spitzenkörpers an einen Speicherkörper (23) für Beschichtungsflüssigkeit angeschlossen und in den Speicherkörper (23) für Beschichtungsflüssigkeit eingebettet ist, wobei der Speicherkörper (23) in einem Stiel des Auftragsgeräts eingesetzt ist.

7. Verfahren zur Herstellung eines Spitzenkörpers (3) nach den Ansprüchen 1 bis 5, **dadurch gekennzeichnet, dass** es umfasst:

15 einen Schritt, in dem ein stäbchenförmiges Reservoir (2) auf einen Stift (12) gesteckt wird, der auf einem an einer unteren Pressplatte befestigten Träger angeordnet ist, einen Schritt, in dem eine mittlere Pressplatte von oben derart gestellt wird, dass ein Raum in den oberen umlaufenden Bereich des stäbchenförmigen Reservoirs (2) beim Halten des stäbchenförmigen Reservoirs (2) in senkrechter Stellung auf dem Träger gebildet wird, wobei das Reservoir (2) einen Porenanteil von 80% bis 90% aufweist;

20 einen Schritt, in dem der Raum mit einer Pulvermischung aufgefüllt wird, die durch Mischen eines Pulvers aus ultrahochmolekularem Polyethylen, oder einer Mischung eines Pulvers aus ultrahochmolekularem Polyethylen und eines Pulvers aus hochmolekularem Polyethylen, mit 75 Gew.% bis 85 Gew.% einer wasserlöslichen anorganischen Substanz erhalten wird;

25 einen Schritt, in dem die Pulvermischung von oben in Richtung zur unteren Pressplatte durch einen an einer oberen Pressplatte befestigten Pressstift (17) gepresst wird;

einen Schritt, in dem die untere, mittlere und obere Platten zum Sintern des Pulvers aus Polyethylen erwärmt werden, um einen Spitzenkörper (3) zu bilden; und

einen Schritt, in dem der ausgebildete Spitzenkörper (3) zur Entfernung der wasserlöslichen anorganischen Substanz vom Spitzengrundkörper (1) abgewaschen wird.

Revendications

35 1. Corps de pointe (3) comprenant un corps principal de pointe (1) avec une ouverture (1c) ouverte vers l'arrière, et un réservoir (2) logé dans l'ouverture (1c) du corps principal de pointe (1), le corps principal de pointe (1) étant conçu pour présenter un corps cylindrique avec une forme en pointe adéquate pour l'application, et étant fabriquée par frittage d'une poudre de polyéthylène de poids moléculaire ultra-élevé présentant un pourcentage de vides de 75% à 85%, **caractérisé en ce que** le réservoir (2) présente un pourcentage de vides de 80% à 90%.

40 2. Corps de pointe (3) selon la revendication 1, **caractérisé en ce que** le corps principal de pointe (1) est fabriqué par frittage d'une poudre de polyéthylène de poids moléculaire ultra-élevé présentant un pourcentage de vides de 80%.

45 3. Corps de pointe (3) selon la revendication 1 ou 2, **caractérisé en ce que** le corps principal de pointe (1) est formé par frittage d'un mélange poudreux composé d'une poudre de polyéthylène de poids moléculaire ultra-élevé et d'une poudre de polyéthylène de poids moléculaire élevé, la poudre de polyéthylène de poids moléculaire ultra-élevé présentant un poids moléculaire de 3,900,000 à 5,000,000 et présentant une taille moyenne de particules de 85 μm à 150 μm , la poudre de polyéthylène de poids moléculaire élevé présentant un poids moléculaire de 450,000 à 750,000 et présentant une taille moyenne de particules de 100 μm à 140 μm , un rapport de poids entre la poudre de polyéthylène de poids moléculaire ultra-élevé et la poudre de polyéthylène de poids moléculaire élevé étant de 1 : 0.5 à 1.

55 4. Corps de pointe (3) selon les revendications 1 à 3, **caractérisé en ce que** des fibres de résine synthétique du réservoir (2) sont légèrement chauffées de façon à souder certaines des fibres de la périphérie extérieure de celui-ci pour former un corps en forme de tige.

5. Corps de pointe (3) selon les revendications 1 à 3, **caractérisé en ce qu'un** liant est appliqué à la périphérie extérieure du réservoir (2) pour former un corps en forme de tige.

6. Applicateur comprenant le corps de pointe (3) selon les revendications 1 à 5, **caractérisé en ce que** l'extrémité arrière du corps de pointe (3) est connectée à et incorporée dans un corps de réserve de liquide de revêtement (23) qui est logé dans un manche de l'applicateur.

5 7. Méthode pour fabriquer un corps de pointe (3) selon les revendications 1 à 5, **caractérisée en ce qu'elle** comprend:

10 une étape pour ficher un réservoir en forme de tige (2) sur une tige (12) placée sur un support attaché à une plaque inférieure d'une matrice, une étape pour placer une plaque médiane d'une matrice à partir du dessus de façon à former un espace dans la région circonférentielle supérieure du réservoir en forme de tige (2) pendant que le réservoir en forme de tige (2) est maintenu sur le support dans une position verticale; le réservoir (2) présentant un pourcentage de vides de 80% à 90%;

15 une étape pour remplir l'espace d'un mélange poudreux, qui est fabriqué en mélangeant une poudre de polyéthylène de poids moléculaire ultra-élevé, ou un mélange d'une poudre de polyéthylène de poids moléculaire ultra-élevé et une poudre de polyéthylène de poids moléculaire élevé, avec 75 % en poids à 85 % en poids d'une substance inorganique soluble dans l'eau;

20 une étape pour presser le mélange poudreux à partir du dessus en direction de la plaque inférieure de la matrice avec une tige pour pousser (17) attachée à une plaque supérieur d'une matrice;

une étape pour chauffer les plaques inférieure, médiane et supérieure pour fritter la poudre de polyéthylène pour former un corps de pointe (3); et

25 une étape pour nettoyer le corps de pointe (3) formé pour enlever la substance inorganique soluble dans l'eau du corps principal de pointe (1).

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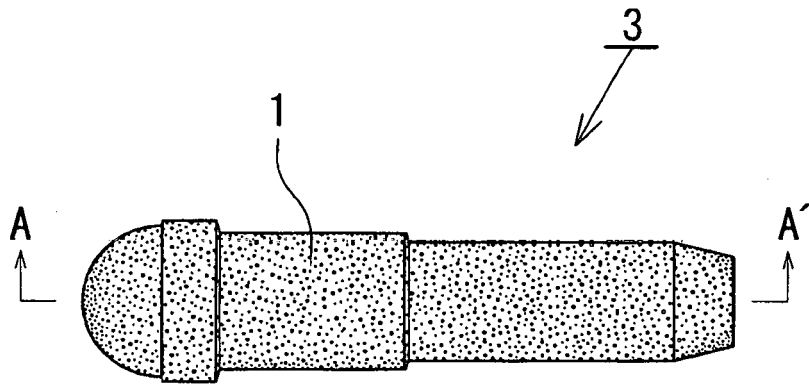
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F I G. 1



F I G. 2

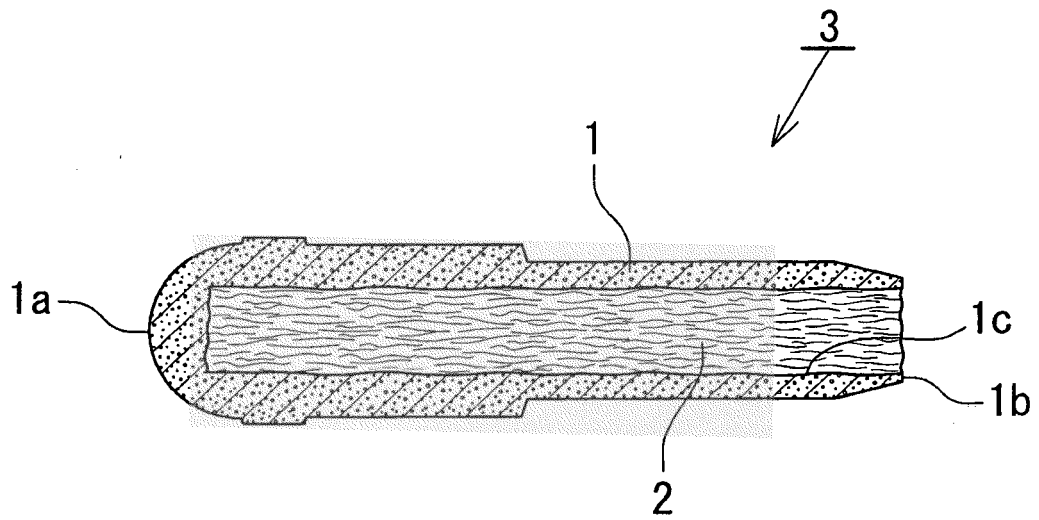


FIG. 3

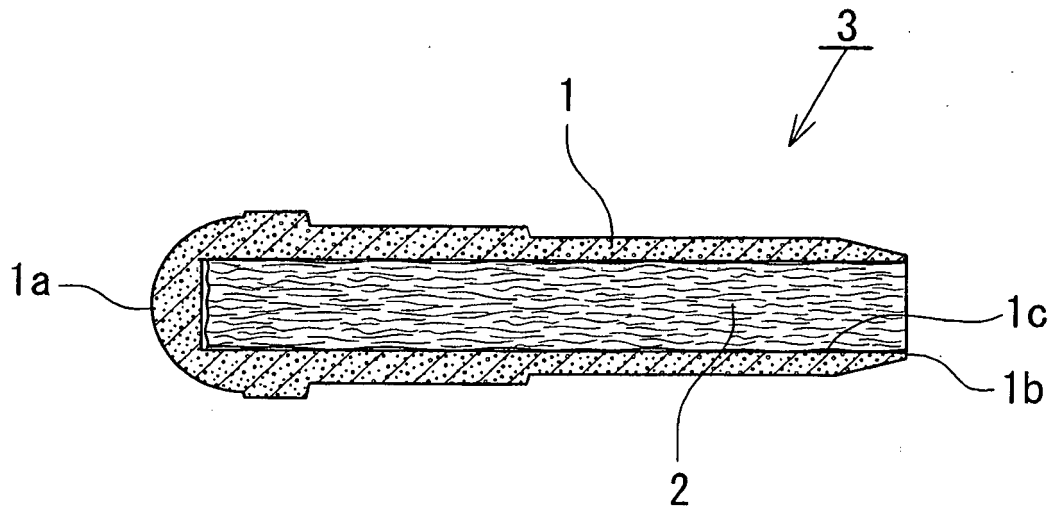


FIG. 4

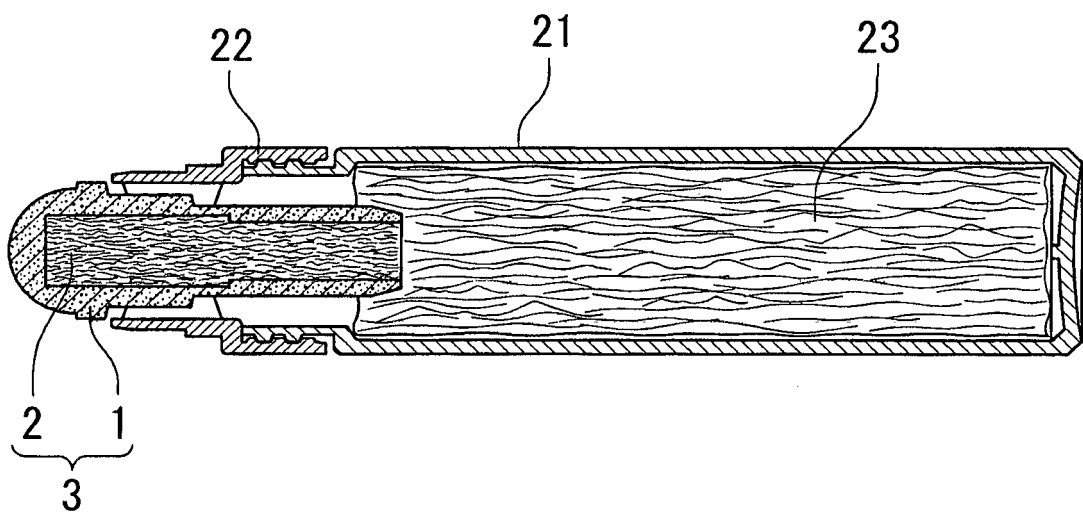


FIG. 5A

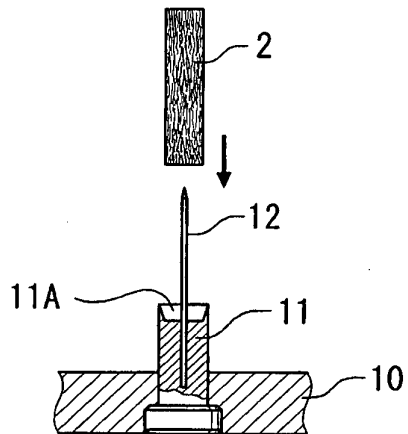


FIG. 5B

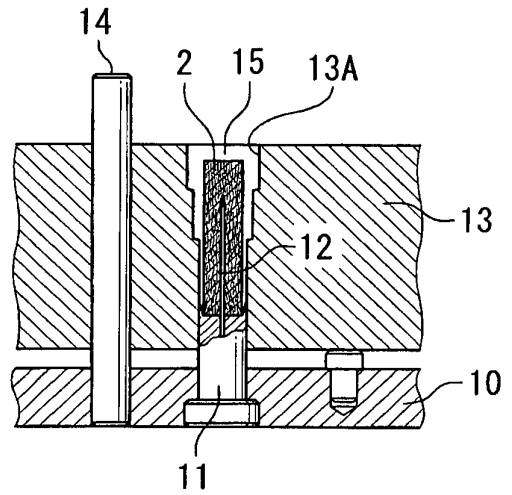


FIG. 5C

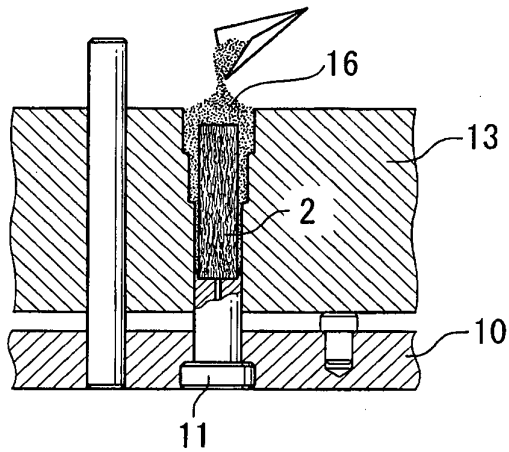


FIG. 5D

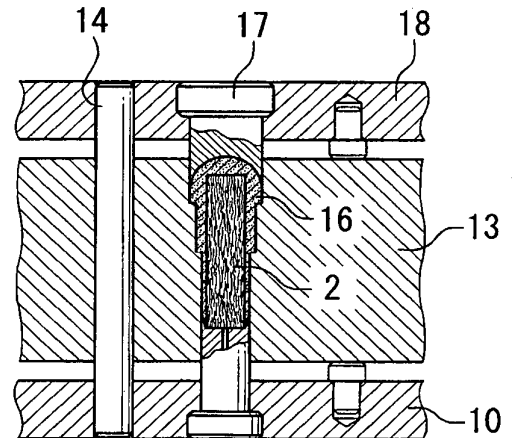


FIG. 5E

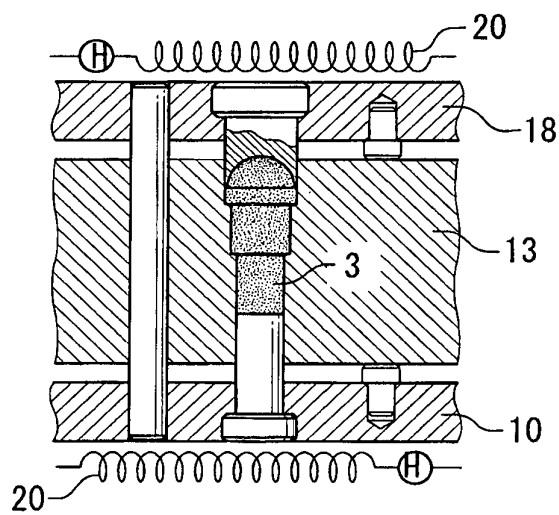
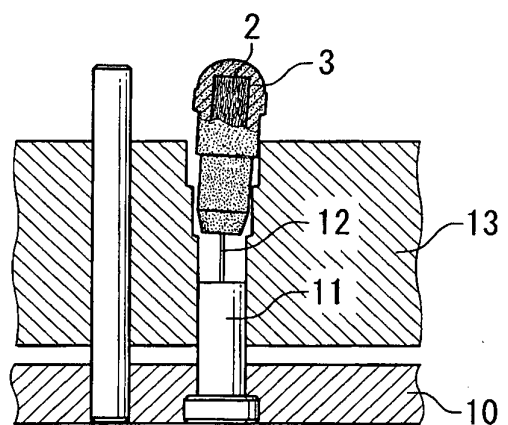
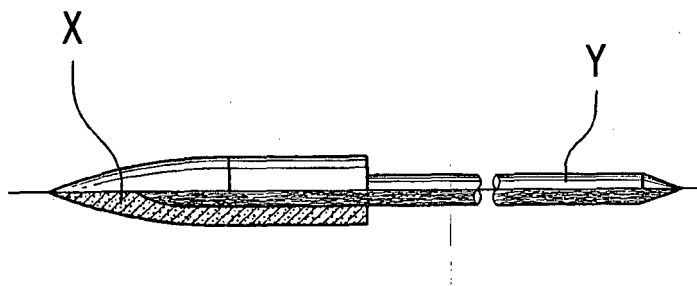


FIG. 5F



F I G. 6 Prior Art



REFERENCES CITED IN THE DESCRIPTION

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