(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 613 603 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
26.02.2020 Bulletin 2020/09

(21) Application number: **19192877.9**

(22) Date of filing: **21.08.2019**

(51) Int Cl.:
B43K 5/02 *(2006.01)* ***B43K 7/02*** *(2006.01)*
B43K 8/03 *(2006.01)* ***B43K 8/14*** *(2006.01)*
B43K 8/16 *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **23.08.2018 JP 2018156026**

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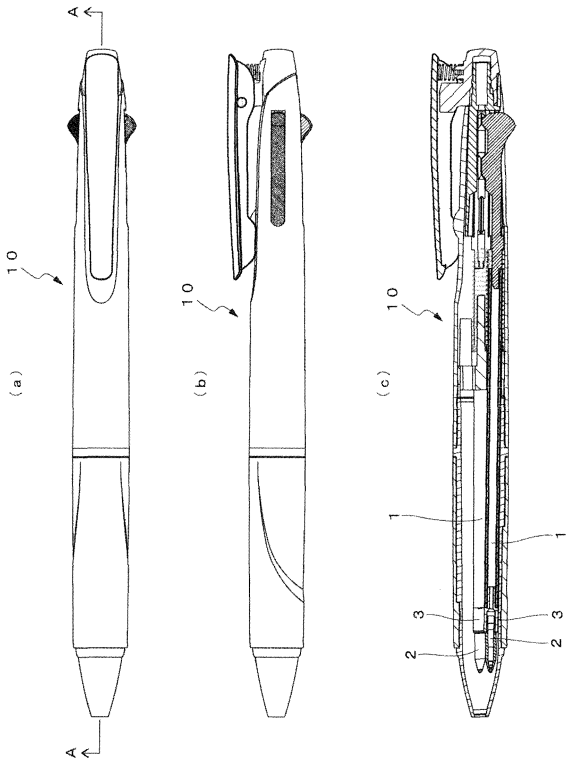
(54) INK STORAGE PIPE FOR WRITING UTENSILS

(57) Provided is an environment-friendly ink storage pipe for writing utensils with reduced use of plastics by using a paper base material instead of plastics such as a polypropylene that used to form the ink storage pipe. The ink storage pipe includes an at least two-layer structure of an inner layer in contact with ink and a base layer, the base layer being formed of a paper base material and the inner layer being formed of a resin. The resin is preferably an acrylic resin, polystyrene, a fluorine resin, silicone or a mixture thereof.

Fig. 1



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Description

BACKGROUND OF THE INVENTION

Field of Invention

[0001] The present invention relates to an ink storage pipe for writing utensils which is, for example, used for ballpoint pens.

Description of the Related Art

[0002] In general, a refill for writing utensils such as ballpoint pens has a structure in which a writing tip is press-fitted to the front end of an ink storage pipe directly or with another part called a joint interposed therebetween. An ink storage pipe forming a refill has employed transparent or semitransparent resin materials such as polypropylenes for a long time to ensure easy formability and visibility of the ink amount.

[0003] Recently attention has been focused on the problem of microplastics flowing into the ocean. While action on global environmental issues has been trying to reduce the use of single-use plastics, a ban on plastics is also required for the writing utensil members. As for writing utensils, a refill for oily inks equipped with a multilayered storage pipe, where one or two or more layers of some other resins are formed on an inner side of a biodegradable resin base substance, has been reported (JP2001-146090A). In this refill, the ink storage pipe is practically usable because any dimensional change due to swelling by the oily ink does not occur, even if the ink storage pipe is made of the biodegradable resin, and said ink storage pipe can contribute to reducing the amount of wastes because the biodegradable resin part naturally decomposes when discarded after use. But when the biodegradable resins are used, there still have some problems, such as durability, heat resistance, and decrease in strength with time.

[0004] JPS62-70097A discloses a writing utensil which is equipped with a barrel produced by spiral forming the composite material prepared by laminating a synthetic resin, a metal or the like is laminated to a paper base material. In this writing utensil, the composite material used for a barrel has a structure where aluminum foil label paper with craft paper on its back, and liner paper are overlaid from the outside, and further on the inside, a polyethylene layer and then a polyester film whose one side is an aluminum deposited film are laminated so that the aluminum deposited film is positioned outside. The structure makes it possible to reduce the volatile amount of ink, in other words, to improve the water resistance and gas barrier properties. It can be said that JPS62-70097A provides a writing utensil with low pollution while giving resistance to content and durability by using the composite material comprising the paper base material.

[0005] As described above, since the products using biodegradable resins or paper base materials are low pollution, by making use of biodegradable resins, composite materials including pulp or paper and so forth, it is considered that an environment-friendly product which can be a substitute material for plastics may be provided.

[0006] In writing utensils, however, a ballpoint pen tip which is fixed to the end of a refill for ballpoint pens is made of metal, for example, therefore it is difficult to substitute the part with biodegradable plastics, etc. Up to now, there is no precedent that an ink storage pipe made of polypropylene etc. , was substituted with one made of materials comprising paper base materials or biodegradable resins while maintaining almost equal performance. In order to apply such materials to an ink storage pipe for writing utensils, there are some points to be improved, such as making them strong and durable enough to be applicable to an ink storage pipe, and making the residual ink amount visible from the outside.

SUMMARY OF THE INVENTION

[0007] The object of the present invention is to provide an environment-friendly ink storage pipe for writing utensils with reduced use of plastics by making use of a paper base material for an ink storage pipe that used to be made of plastics such as polypropylene.

[0008] The ink storage pipe for writing utensils according to the present invention has a structure of at least two layers of an inner layer in contact with ink and a base layer, the base layer being formed of a paper base material, and the inner layer being formed of a resin.

[0009] The resin forming the inner layer is an acrylic resin, polystyrene, a fluorine resin, silicone or a mixture thereof.

[0010] The resin forming the inner layer is preferably a biodegradable plastic.

[0011] The present invention can provide an environment-friendly ink storage pipe for writing utensils with reduced use of plastics by making use of a paper base material for a base layer of ink storage pipe material.

BRIEF DESCRIPTION OF DRAWING

[0012]

Fig. 1 is a plan view (a), a left side view (b) and an A-A line section view (c) of a dual knock type writing utensil equipped with an ink storage pipe of the present invention;

Fig. 2 is a plan view (a) and an A-A line section view (b) of an ink storage pipe of the present invention;

Fig. 3 is a plan view (a), an A-A line section view (b), a B-B line section view (c) and an enlarged B-B line section view (d) of a barrel of an ink storage pipe according to one embodiment of the present invention;

Fig. 4 is a plan view (a), an A-A line section view (b), a B-B line section view (c) and an enlarged B-B line

section view (d) of a barrel of an ink storage pipe according to another embodiment of the present invention;

Fig. 5 is a plan view (a), an A-A line section view (b), a B-B line section view (c) and an enlarged B-B line section view (d) of a barrel of an ink storage pipe according to another embodiment of the present invention;

Fig. 6 shows a laminate sheet (a), an ink storage pipe spiraled with the laminate sheet (b) and an ink storage pipe flat wound with the laminate sheet (c), according to the present invention; and

Fig. 7 shows a slit (a) and windows (b) for visual confirmation.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] The ink storage pipe for writing utensils according to the present invention will be described in detail with reference to the drawings.

[0014] The ink storage pipe 1 of the present invention has a structure of at least two layers of an inner layer 4 in contact with ink and a base layer 5, the base layer 5 being formed of a paper material and the inner layer 4 being formed of a resin, as shown in Fig. 3.

[0015] The ink storage pipe 1 is used, placed in a barrel in a dual knock type writing utensil 10 as shown, for example, in Fig. 1. The dual knock type writing utensil 10 shown in Fig. 1, which is equipped with a refill for writing utensils composed of an ink storage pipe 1, a writing tip 2 and a joint member 3, and a knock part at the rear portion of the barrel, has a knock system where the knock part is pressed forward to make the writing tip push out of the tip hole of the barrel. The ink storage pipe 1 has a structure whose end is equipped with the writing tip 2 through the joint member 3, as shown in Fig. 2. This specification will describe the ink storage pipe 1 of the members forming the dual knock type writing utensil 10 in detail, and the explanation of the other parts will be omitted.

[0016] The ink storage pipe 1 has an inner layer 4 in contact with ink. A resin forming the inner layer 4 is not limited as long as it is easy to work and soluble neither in aqueous nor in oily ink, that is to say, it does not infiltrate to a base layer 5. The resin includes polyethylene, polypropylene, a fluorine resin, poly(vinyl chloride), polystyrene, silicone, acrylonitrile-butadiene-styrene resin (ABS resin), acrylonitrile-styrene resin (AS resin), an acrylic resin (including an emulsified form), a wax-based emulsion alone, a liquid mixture of a wax-based emulsion alone and a synthetic rubber latex, a liquid mixture of an acrylic emulsion and a wax-based emulsion, poly(lactic acid), poly(3-hydroxybutylate-co-hydroxyhexanoate), poly(glycolic acid), poly(butylene succinate), poly(butylene succinate-adipate), and biodegradable plastics such as polybutylene adipate terephthalate and polyethylene terephthalate succinate. Of these, an acrylic resin, polystyrene, a fluorine resin, silicone and a mixture thereof, and biodegradable plastics are preferred in terms of not only excellence in workability and strength but also handleability and easy availability. A biodegradable plastic is preferred as an environment-friendly material, provided that it gives necessary strength and life to the ink storage pipe.

[0017] A method of forming the inner layer 4 can be properly selected from lamination methods, such as extrusion lamination of a resin film, coating of a liquid resin and so on.

[0018] In case the inner layer 4 is formed by coating, the coating quantity is 5 to 30 g/m^2, and preferably 10 to 20 g/m^2.

[0019] In case of applying a resin film, the inner layer 4 has a thickness of typically 3 to 90 μm and preferably 5 to 60 μm.

[0020] A paper base material forming the base layer 5 includes one- or multi-layer paper substrate used for liquid storage. The paper base material for use in the present invention is preferably superior in bending resistance necessary for the formation of the ink storage pipe 1, absorption of drop impact, and water resistance of the end face. From this point of view, it can be said that a multi-layer paper substrate where high density-papers are laminated to both sides of a low-density cardboard is preferred because its low-density layer is superior in bending stress and absorbing drop impact. Concretely, carton base paper or the like having 50 to 500 g/m^2 basis weight is preferred.

[0021] The base layer 5 has a thickness of typically 20 to 2000 μm and preferably 50 to 1000 μm. The base layer may be a sheet of paper or a pile of two or more sheets of paper.

[0022] The ink storage pipe 1 of the present invention may have a three-layer structure of an inner layer 4, a base layer 5 and an outer layer 6. The outer layer 6, being placed on outer surface of the ink storage pipe 1, covers the base layer 5.

[0023] Any resin can be used for the outer layer 6 similar to that for the inner layer 4, provided that it is easy to work and soluble neither in aqueous nor in oily ink, that is to say, it doesn't infiltrate to the base layer 5 being an intermediate layer. Further, the one not absorbing moisture from the air is more preferred.

[0024] The same resin is used for the outer layer 6 as has been mentioned with regard to materials forming the inner layer 4. The resin forming the outer layer 6 may be the same as or different from that of the inner layer 4.

[0025] The outer layer 6 has a thickness of typically 3 to 90 μm, and preferably 5 to 60 μm.

[0026] A preferred embodiment of the ink storage pipe 1 of the present invention is a product with resistance to moisture, water and oil, which is obtained by applying polymer compounds such as an acrylic resin, polystyrene, a fluorine resin, silicone and a mixture thereof, and a biodegradable plastic such as poly (lactic acid) to the front and back surfaces of the paper base material and then pasting them together.

[0027] A structure of at least two layers of the inner layer 4 and the base layer 5 is sufficient for the ink storage pipe (Fig. 3b), and for example, a structure of three to five layers will also do. Another preferred embodiment of the present invention is the ink storage pipe having a structure of three layers of an inner layer 4, a base layer 5 and an outer layer 6 as shown in Fig. 4b, or the ink storage pipe having a structure of five layers of an inner layer 14, a first base layer 15a, a resin layer 17, a second base layer 15b and an outer layer 16 as shown in Fig. 5b. Both of the first base layer 15a and the second base layer 15b in the aforementioned another embodiment have a basis weight of 50 to 500 g/m^2 and a thickness of 20 to 2000 μm. The basis weight and the thickness of the first base layer 15a may be the same or different from that of the second base layer 15b, being properly designed in consideration of the total thickness. The total thickness of the first base layer 15a and the second base layer 15b may be the same as the base layer 5 of the ink storage pipe 1, comprised of a single layer the paper base material.

[0028] Also, in the case where the ink storage pipe 1 has a structure of three layers or more, resins forming an inner layer 4, a resin layer 17 and an outer layer 6 may be the same or different from one another. The thickness is preferably about the same as in the case where the ink storage pipe has a two-layer structure.

[0029] A resin for the resin layer 17 is similar to that for the inner layer 4.

[0030] The ink storage pipe 1 may have layers of a ultraviolet absorbing film, an aluminum deposited film, a colored film and so on between the inner layer 4 and the base layer 5 or between the base layer 5 and the outer layer 6 as long as it does not impair the effect of the present invention.

[0031] The laminate sheet having a structure of the aforementioned at least two layers of the inner layer 4 and the base layer 5 is formed by applying or laminating resins for the inner layer and for the outer layer to the front face and back face of the paper base material, respectively.

[0032] The ink storage pipe 1 of the present invention is formed by rolling up the laminate sheet having a structure of at least two layers of the inner layer 4 and the base layer 5 in a cylindrical shape by means of a spiral winding machine, for example. Forming in a cylindrical shape means that several sheets of laminate, for example, two to four sheets cut in a desired winding width, are wound and bonded on the core bar to make a cylindrical shape. As shown in Fig. 6, the winding process includes either of a process of winding a laminate sheet (Fig. 6a) spirally around the core bar, i.e., "spiral winding" (Fig. 6b) and a process of winding the laminate sheet at right angles to the core bar, i.e., "flatwise winding" (Fig. 6c). From the viewpoint of the strength, the spiral winding is preferred.

[0033] Another process of making the inner layer 4 and the outer layer 6 may include steps of cutting the paper substrate sheet which is the basis layer 5, being an intermediate layer, in a desired winding width, winding it spirally or flatwise to form a cylindrical shape, soaking the cylinder-shaped basis layer 5 in a molten resin, pulling it up, and drying it. In this process, however, the same resin should be used for the inner layer 4 and the outer layer 6, and some adjustments may be required to obtain the laminate sheet with even thickness.

[0034] The size of the ink storage pipe 1 is comparable to that of the writing utensils in common use and is not particularly limited. Mostly the inner diameter is 1.5 to 5 mm, the outer diameter is 1.8 to 10 mm, and the length is 30 to 150 mm.

[0035] The ink storage pipe 1 of the present invention is opaque due to the paper base layer as the base layer 5, which interferes with visual confirmation of the residual amount of ink. Accordingly, the ink storage pipe 1 may be equipped with windows 8 for visual confirmation at a certain interval in the longitudinal direction or a slit 7, as shown in Fig. 7. The windows 8 and the slit 7 are made of a transparent resin with which the laminate sheet was partly replaced. It should be noted that the slit width is about 1.5 mm from the viewpoint of visual confirmation and the strength of the ink storage pipe, and that the size and the number of windows are approximately 2 mm and 2 to 5, respectively.

[Examples]

[0036] The present invention will be described in further detail with reference to examples but the present invention will not be restricted to these examples.

[Example 1]

[0037] An acrylic resin emulsion (Saibinol EK-61; Saiden Chemical) was applied to one side of carton base paper having 80 g/m^2 basis weight with an air knife coater so that the coating quantity could be 10 g/m^2, and the resulting product was dried at 130°C to give the laminate sheet.

[0038] The laminate sheet was placed in a spiral winding machine and wound spirally on a core bar with a diameter of 4 mm and a length of 90 mm to give the ink storage pipe.

[0039] The refill for writing utensils was produced by fixing a joint member and a ballpoint pen tip to the ink storage pipe, and then the writing utensil equipped with the refill was produced.

[Example 2]

[0040] Poly(vinyl alcohol) (PVA-117K; Kuraray Co., Ltd) and fluorine resin (AG-E060; AGC Inc.) were applied to one side of carton base paper having 120 g/m^2 basis weight with an air knife coater so that the coating quantity could be 15 g/m^2 in terms of solid content, and the resulting product was dried at 130°C to give the laminate

sheet.

[0041] The laminate sheet was placed in a spiral winding machine and wound spirally on a core bar with a diameter of 4 mm and a length of 90 mm to give the ink storage pipe.

[0042] The refill for writing utensils was produced by fixing a joint member and a ballpoint pen tip to the ink storage pipe, and then the writing utensil equipped with the refill was produced.

[Example 3]

[0043] Polybutylene succinate-based biodegradable resin was extrusion-laminated on one side of carton base paper having 80 g/m^2 basis weight to give the 20 μm-thick laminate sheet.

[0044] The laminate sheet was placed in a spiral winding machine and wound spirally on a core bar with a diameter of 4 mm and a length of 90 mm to give the ink storage pipe.

[0045] The refill for writing utensils was produced by fixing a joint pipe and a ballpoint pen tip to the ink storage pipe, and then the writing utensil equipped with the refill was produced.

Claims

1. An ink storage pipe (1) for writing utensils having a structure of at least two layers of an inner layer (4) in contact with ink and a base layer (5), **characterized in that** the base layer (5) is formed of a paper base material, and the inner layer (4) is formed of a resin.

2. The ink storage pipe (1) for writing utensils according to claim 1, wherein the resin forming the inner layer (4) is an acrylic resin, polystyrene, a fluorine resin, silicone or a mixture thereof.

3. The ink storage pipe (1) for writing utensils according to claim 1, wherein the resin forming the inner layer (4) is a biodegradable plastic.

Fig. 1

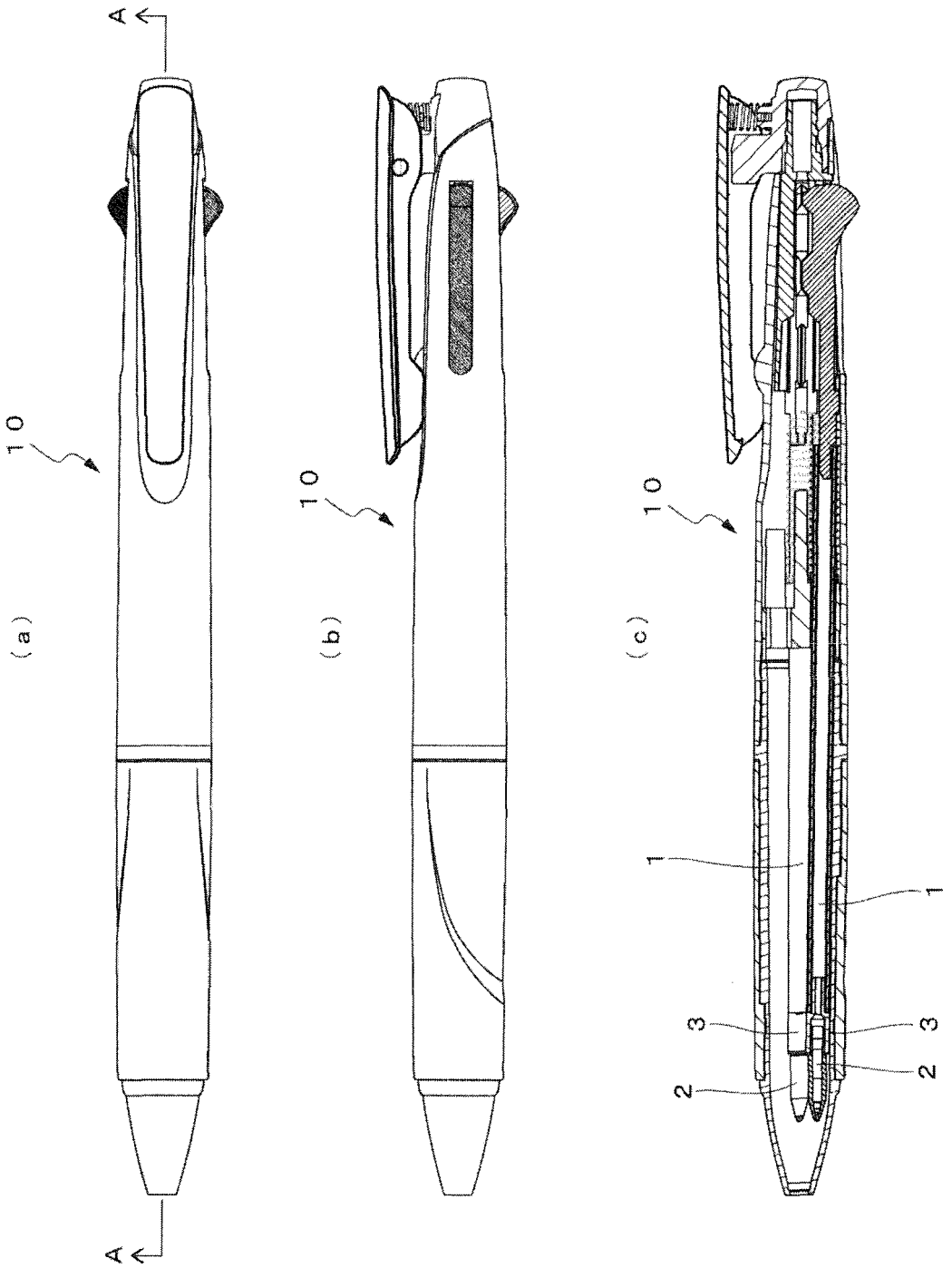


Fig. 2

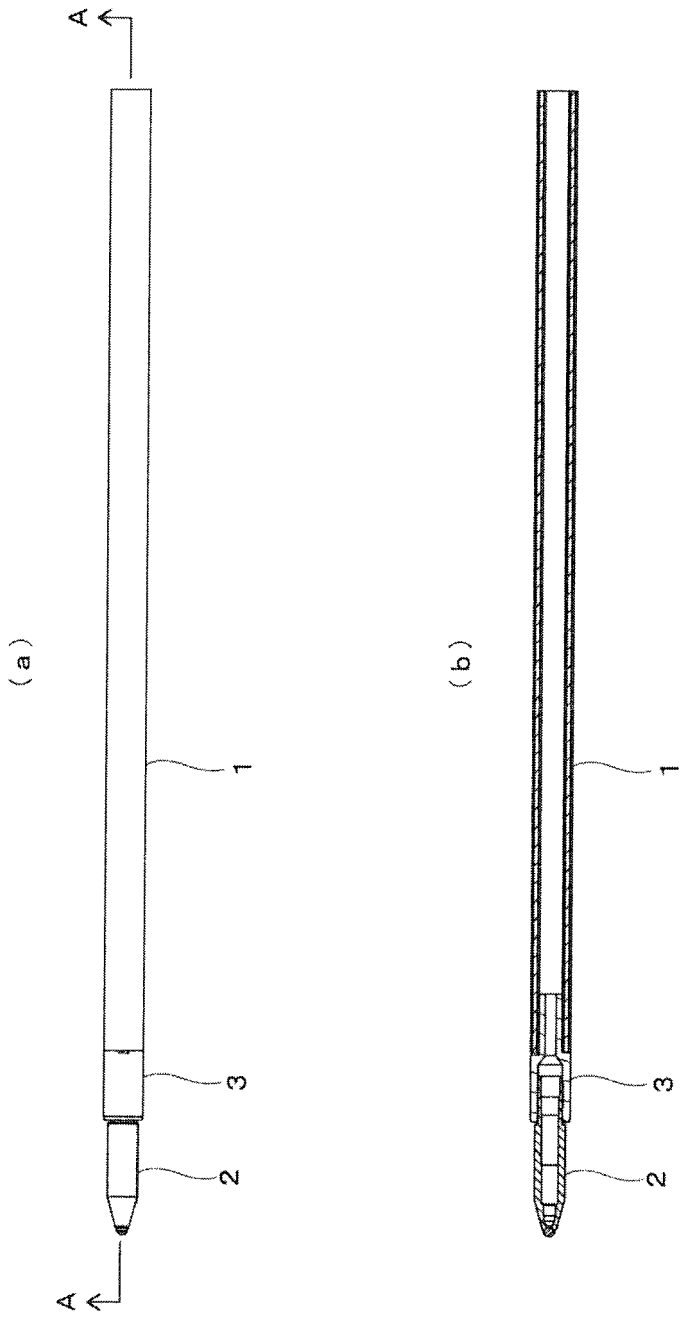


Fig. 3

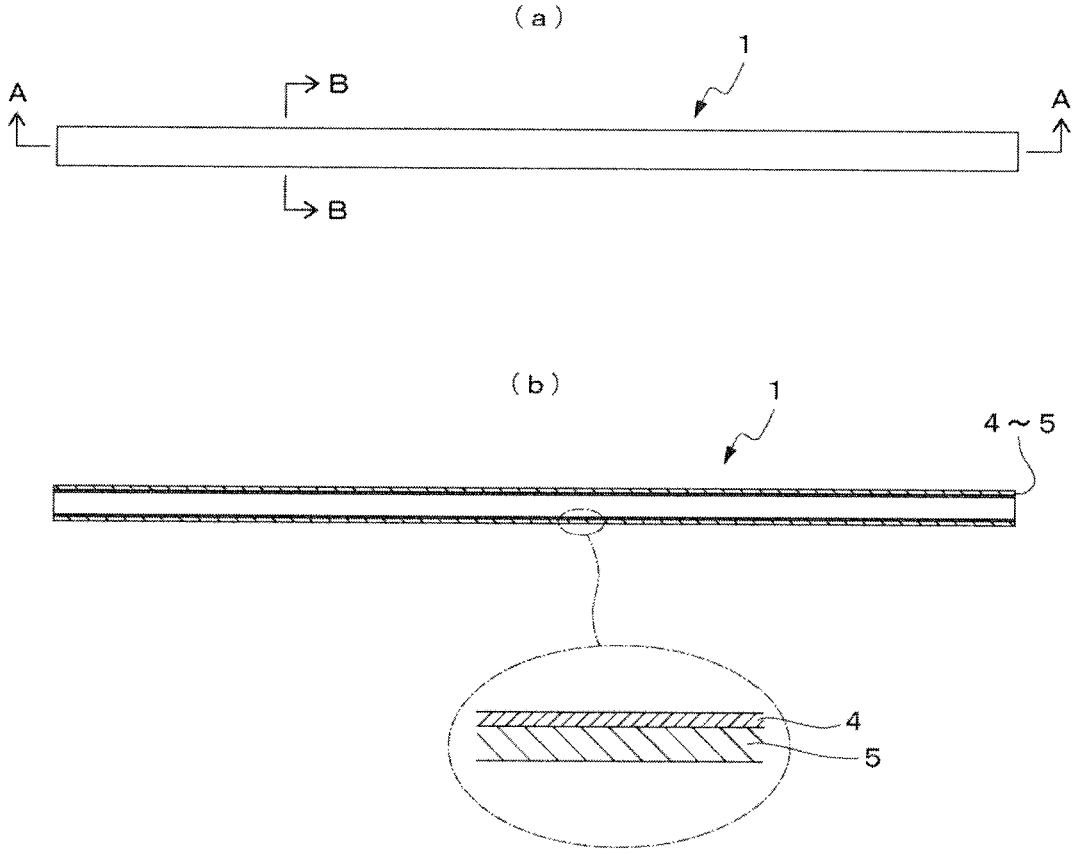


Fig. 4

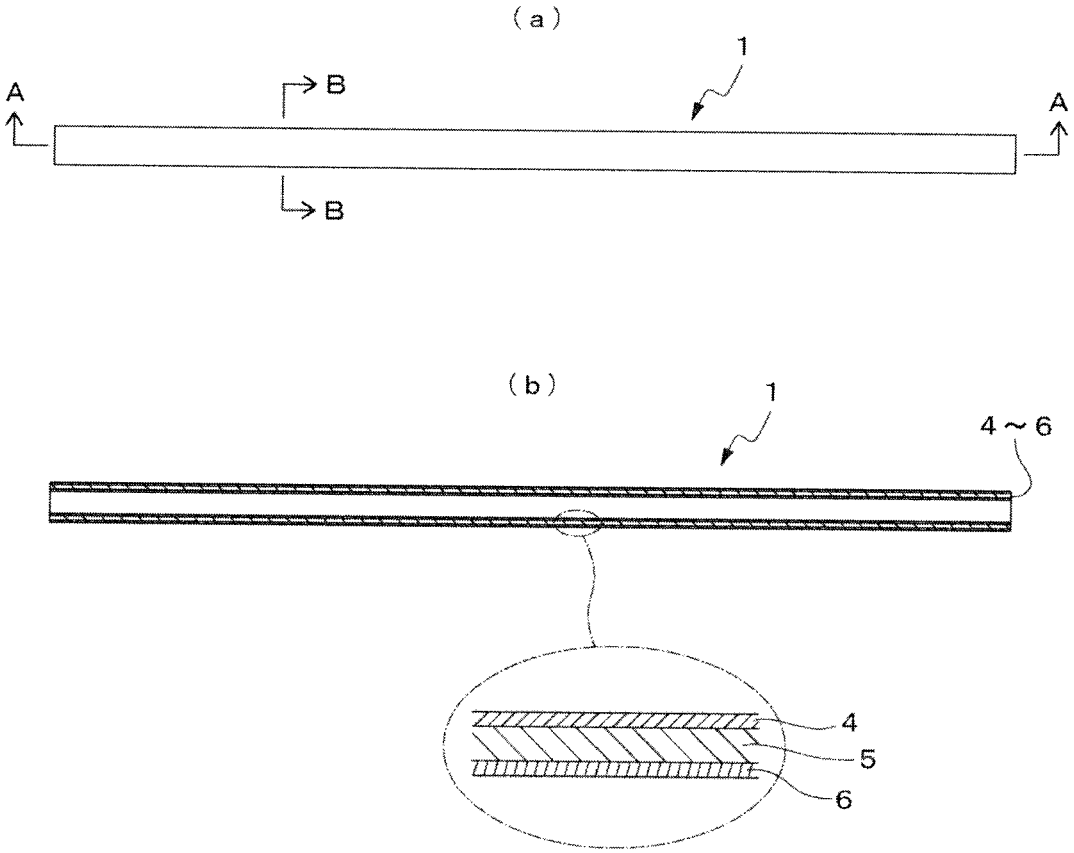


Fig. 5

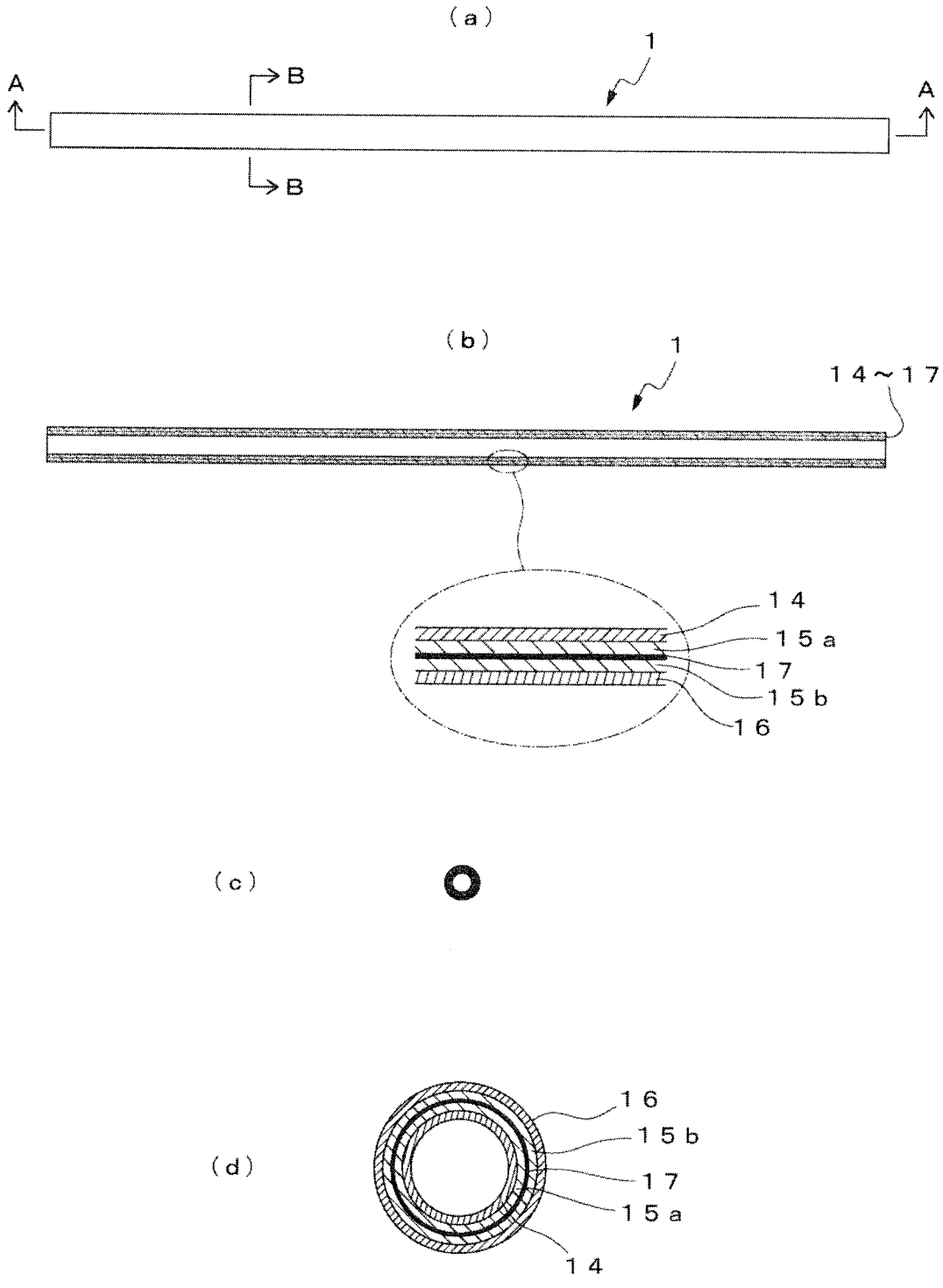


Fig. 6

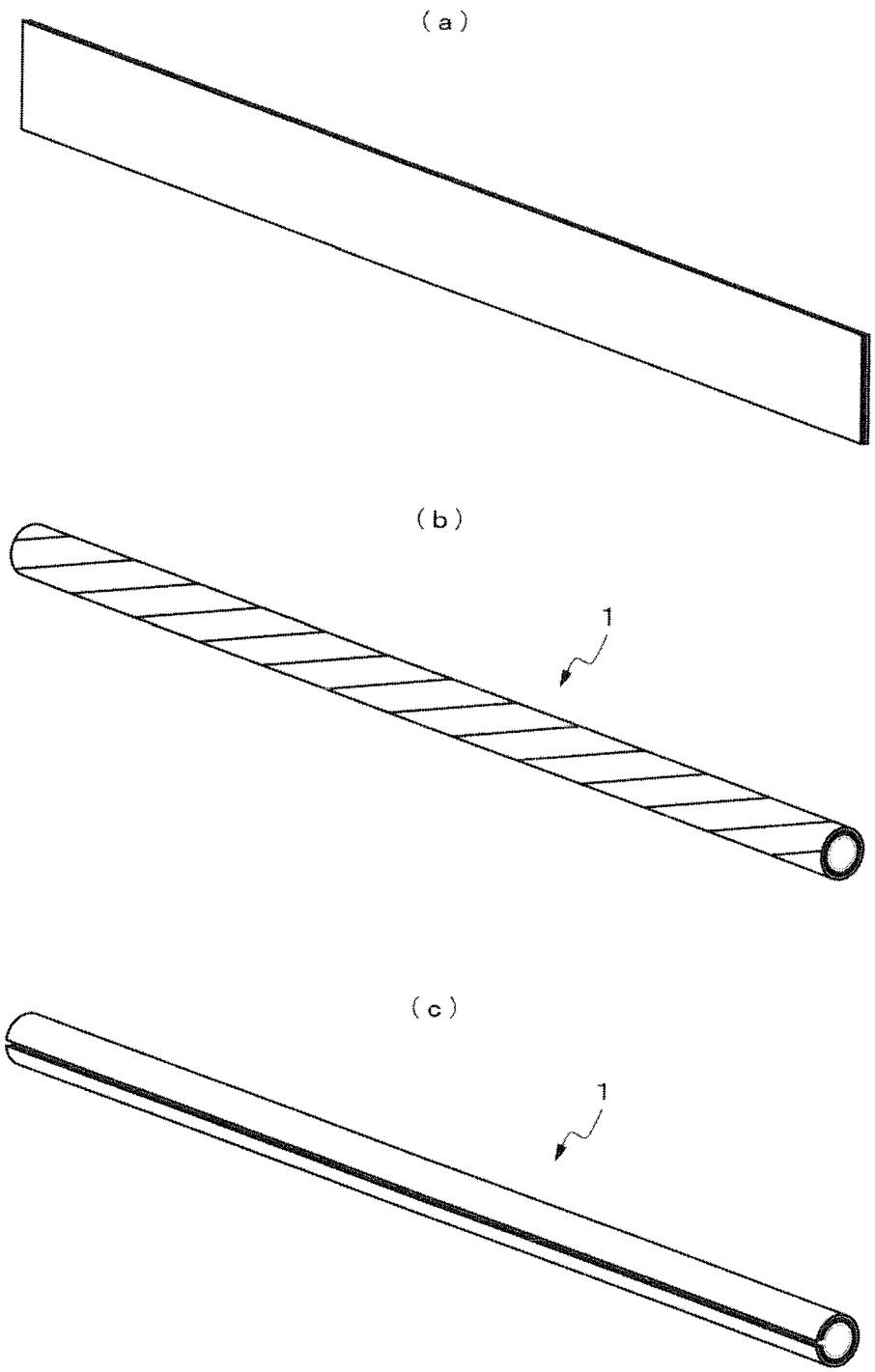
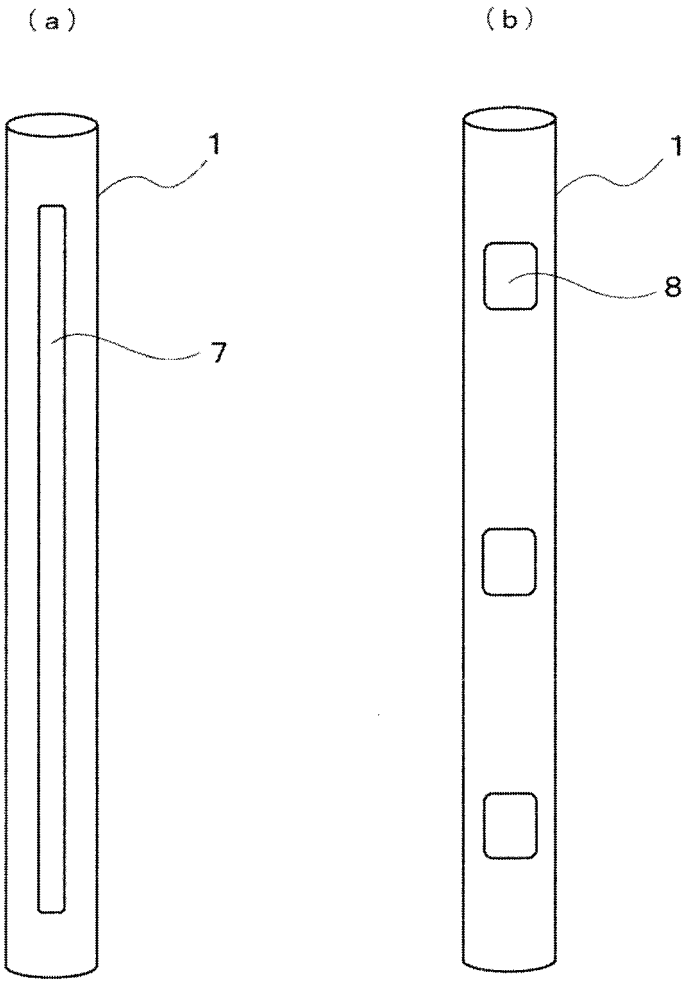


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 19 19 2877

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B43K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 January 2020	Kelliher, Cormac

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