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(54) **MAGNETIC PEN TIP ASSEMBLY AND TABLET SYSTEM USING THE SAME**

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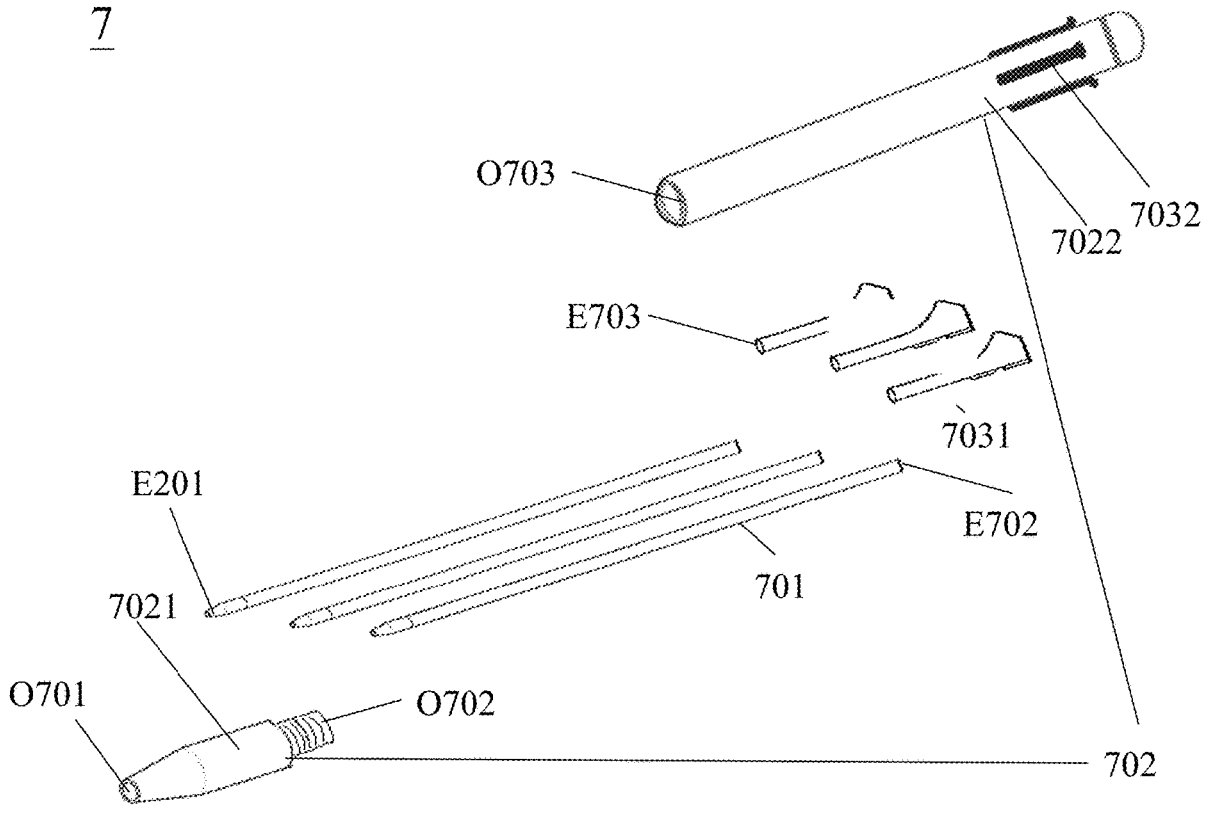
(52) **U.S. Cl.**

CPC ***G06F 3/03545*** (2013.01); ***G06F 3/046*** (2013.01); ***G06F 3/0442*** (2019.05)

(57) **ABSTRACT**

The magnetic pen tip assembly includes a shielding component and a magnetic component, wherein the shielding component includes an opening and accommodating space, and the magnetic component is disposed in the accommodating space and includes a first end being exposed by the opening. The magnetic leakage of the magnetic component is thereby reduced since the magnetic component is surrounded and covered by the shielding component. The magnetic pen tip assembly is further implemented in a tablet system. When the user writes and draws on a magnetic drawing board with the magnetic pen tip assembly, the undesired drawing of magnetic particles in the magnetic drawing board due to magnetic leakage of the magnetic component is avoided. Therefore, issues such as blurred lines or early-responding, which are encountered by drawing on magnetic drawing boards with a conventional magnetic pen, can be effectively improved. Moreover, the magnetic pen tip assembly also serves as a stylus pen for a capacitance touch panel.



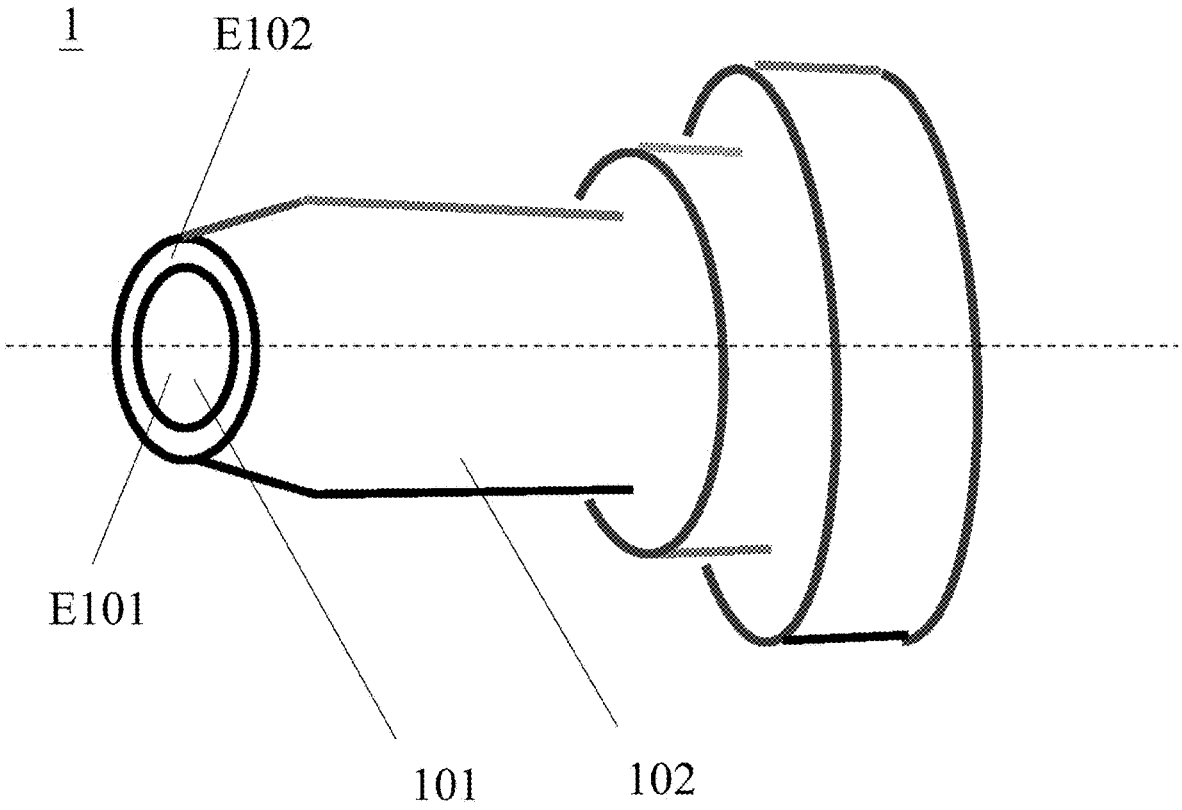


FIG. 1A

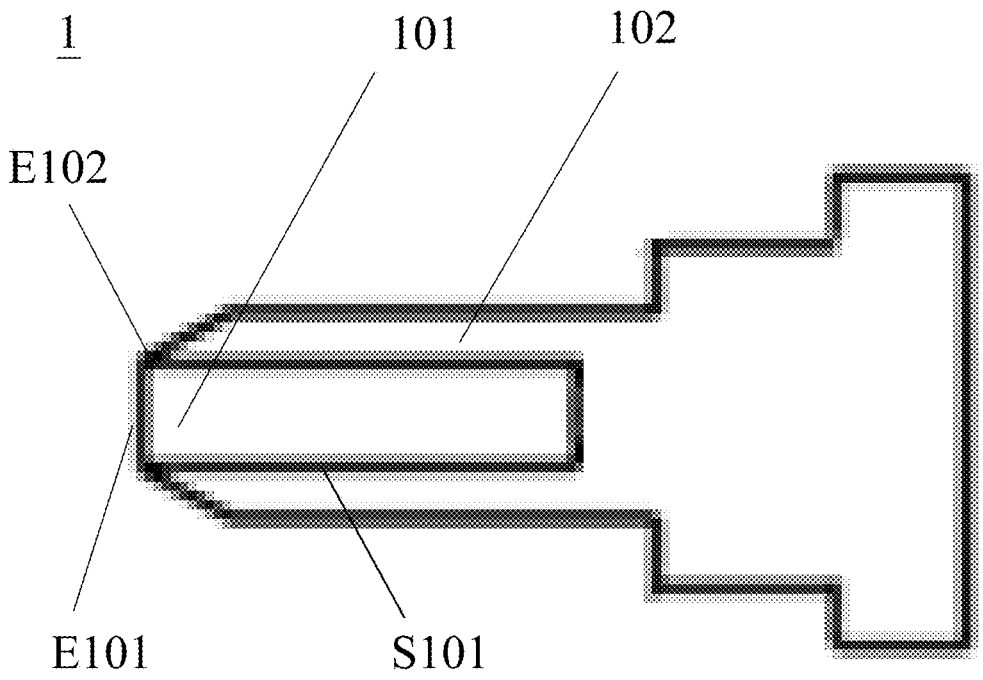


FIG. 1B

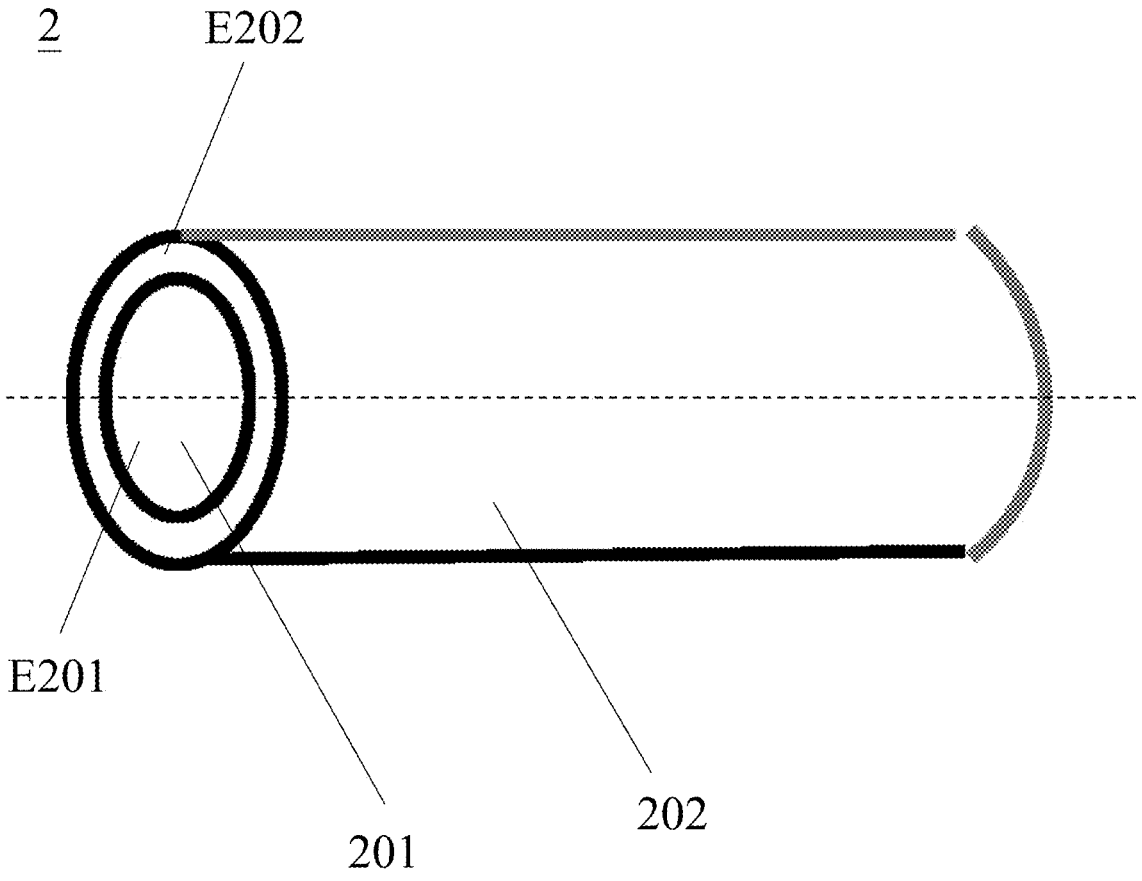


FIG. 2A

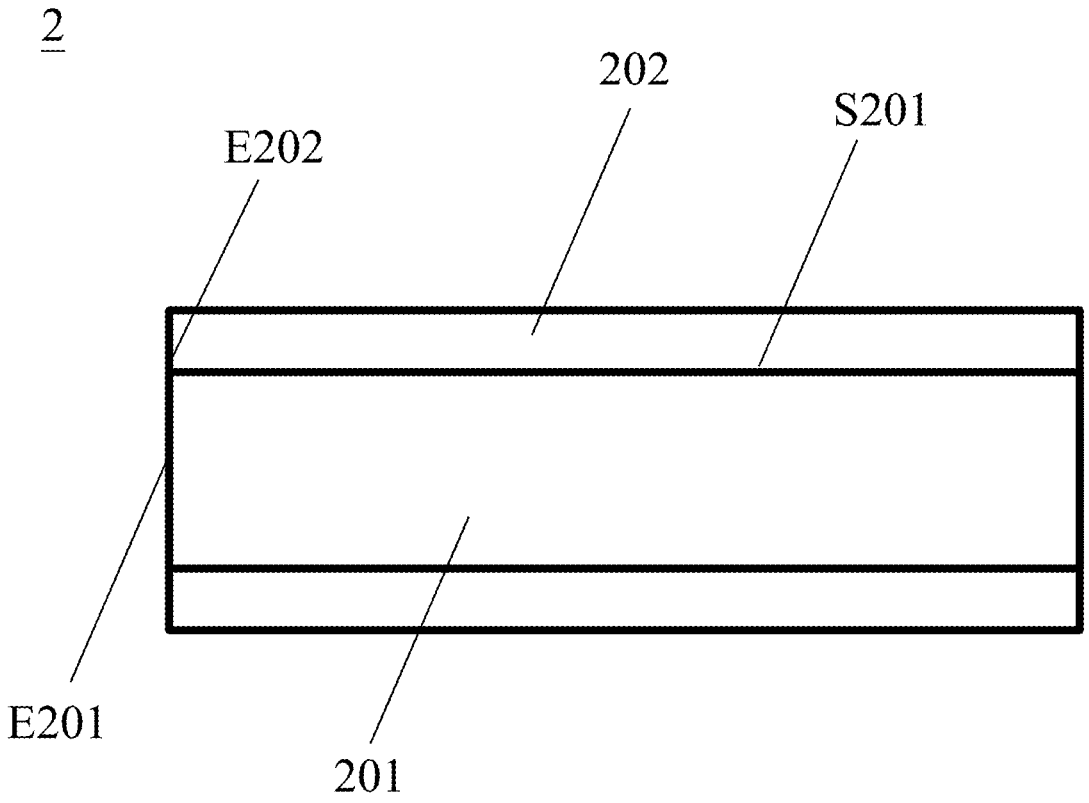


FIG. 2B

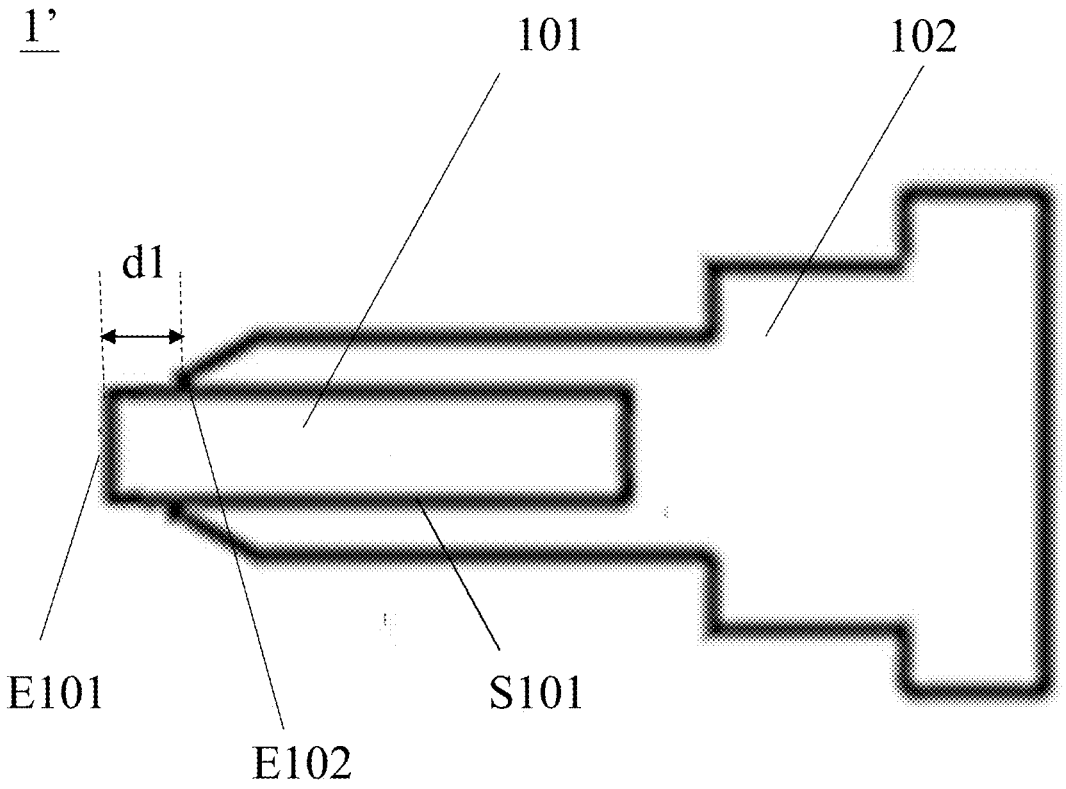


FIG. 3

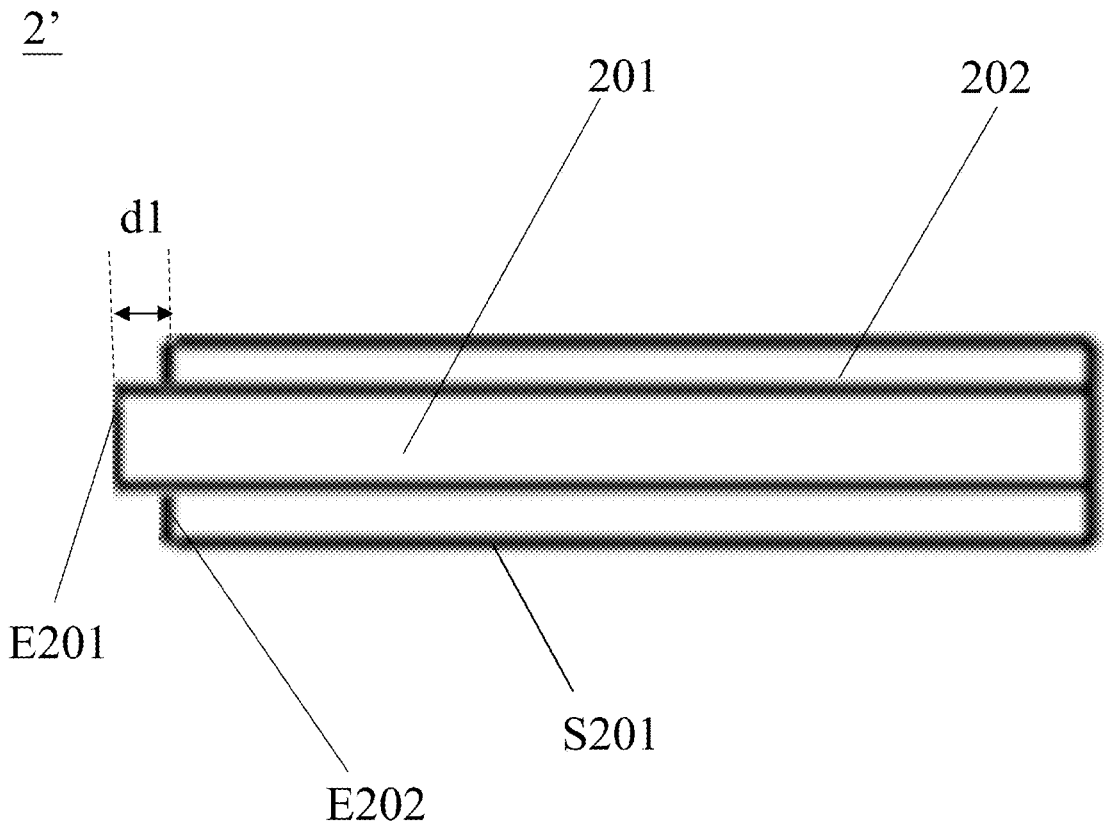


FIG. 4

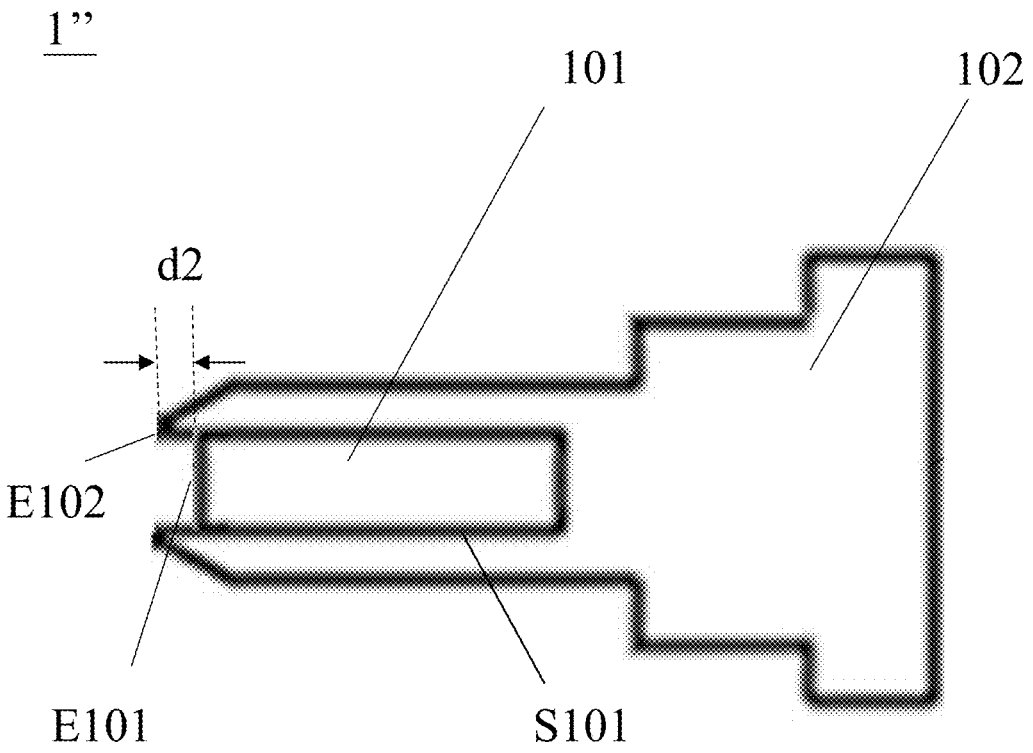


FIG. 5

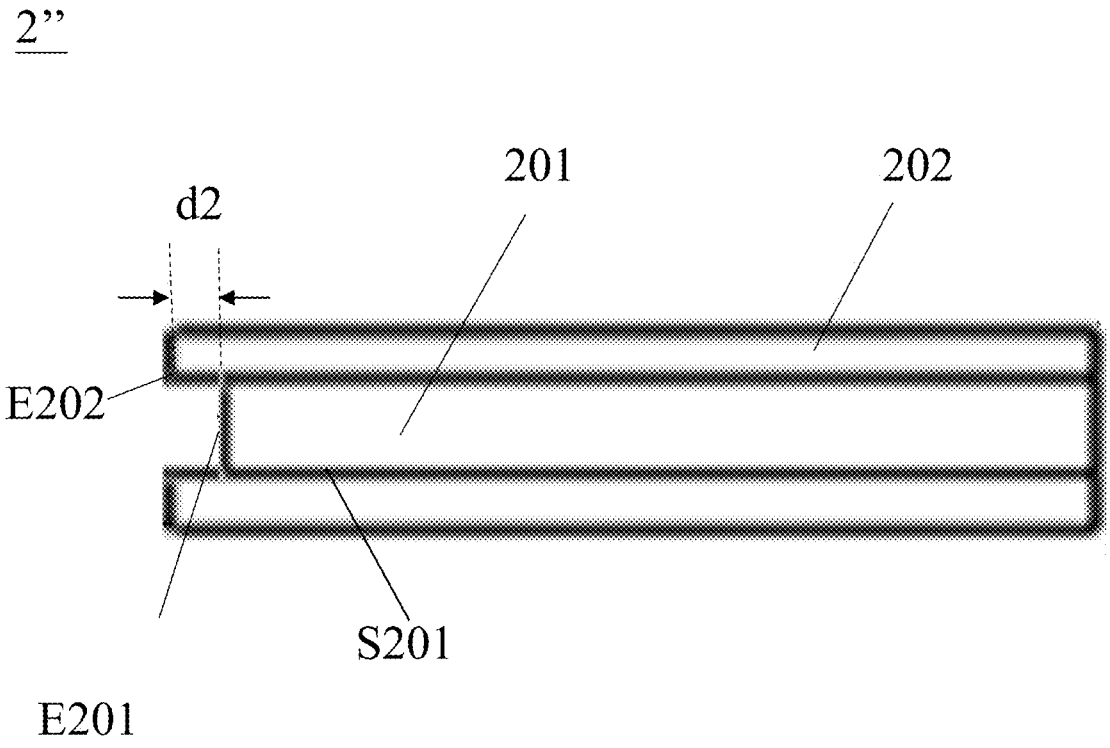


FIG. 6

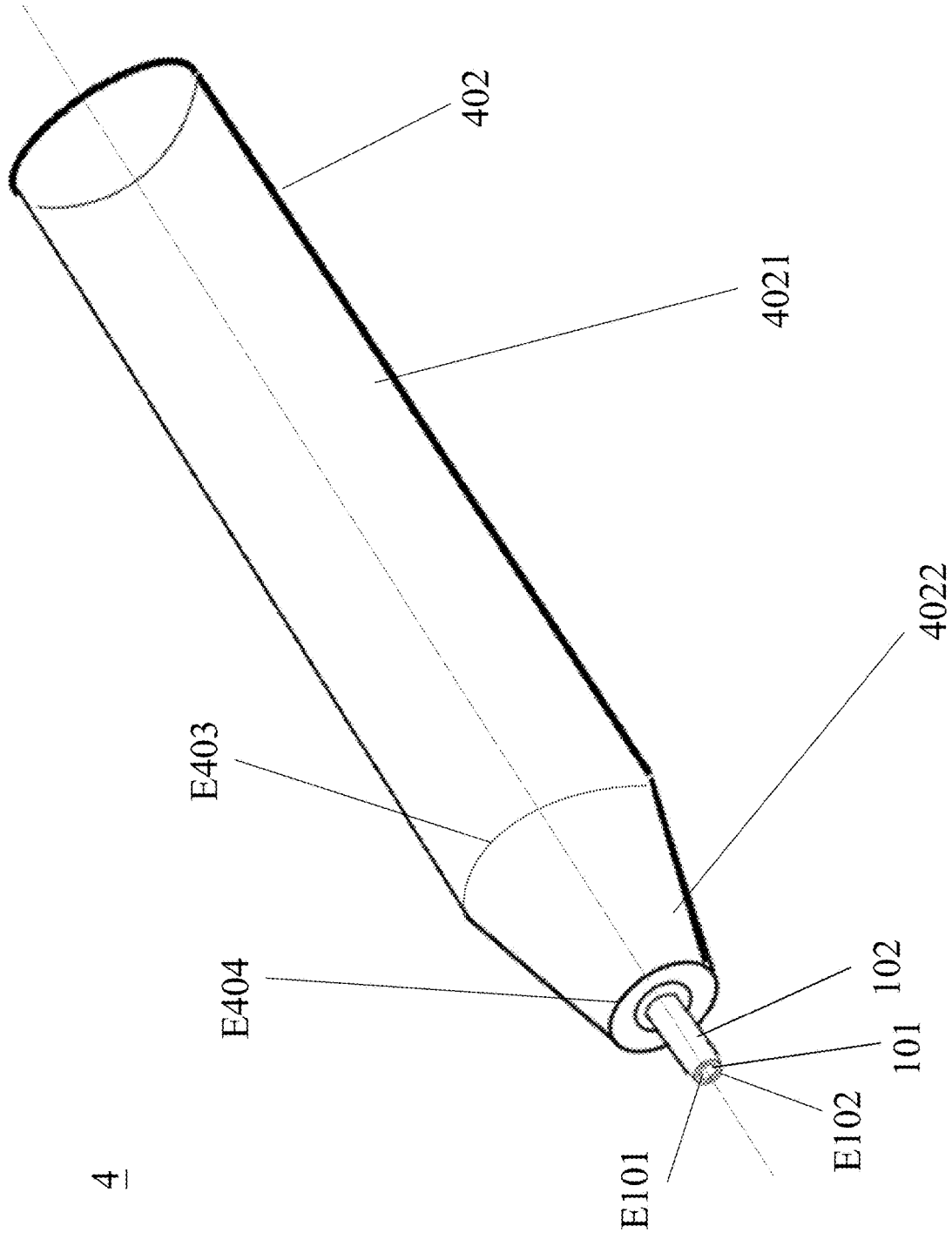


FIG. 7A

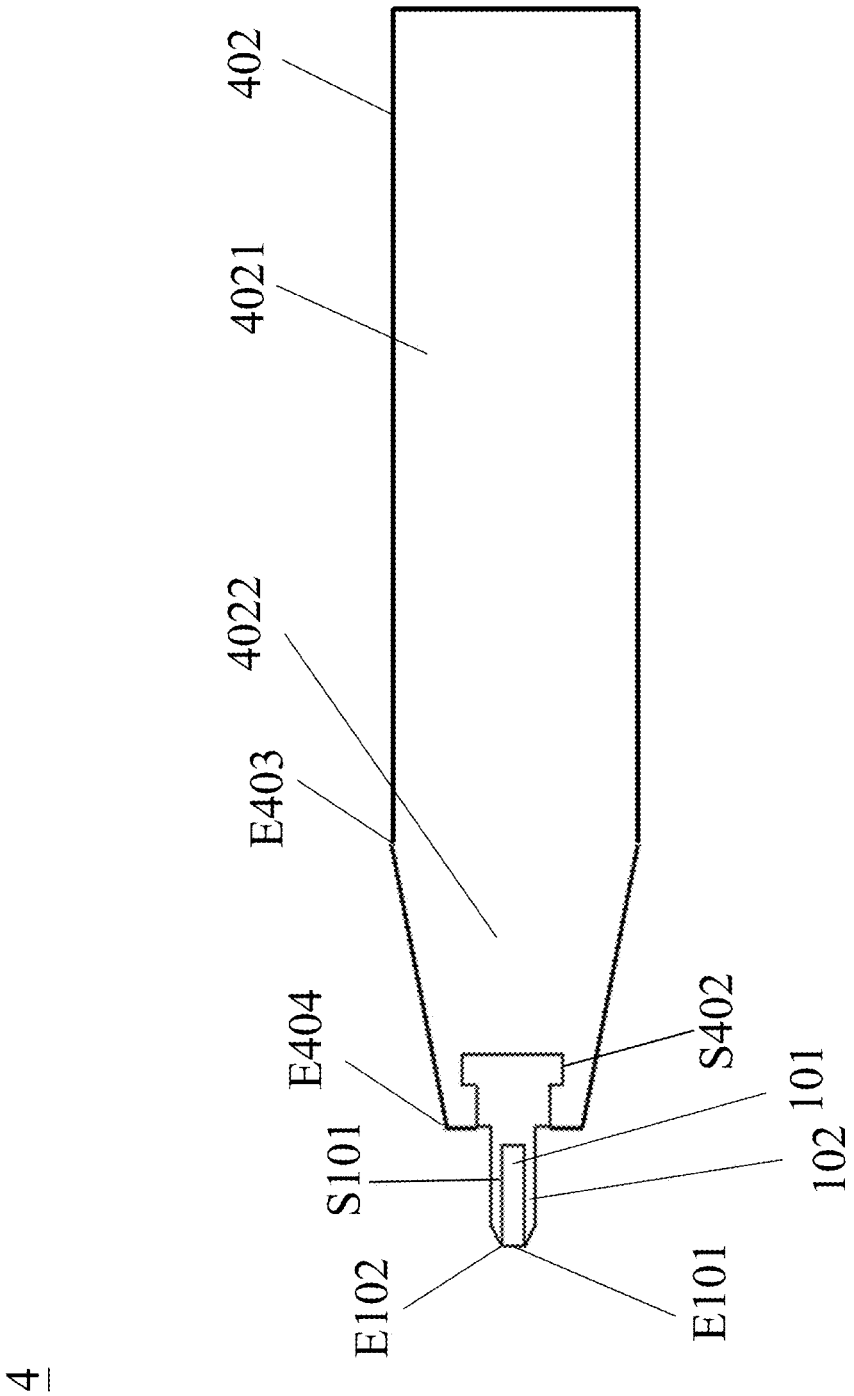


FIG. 7B

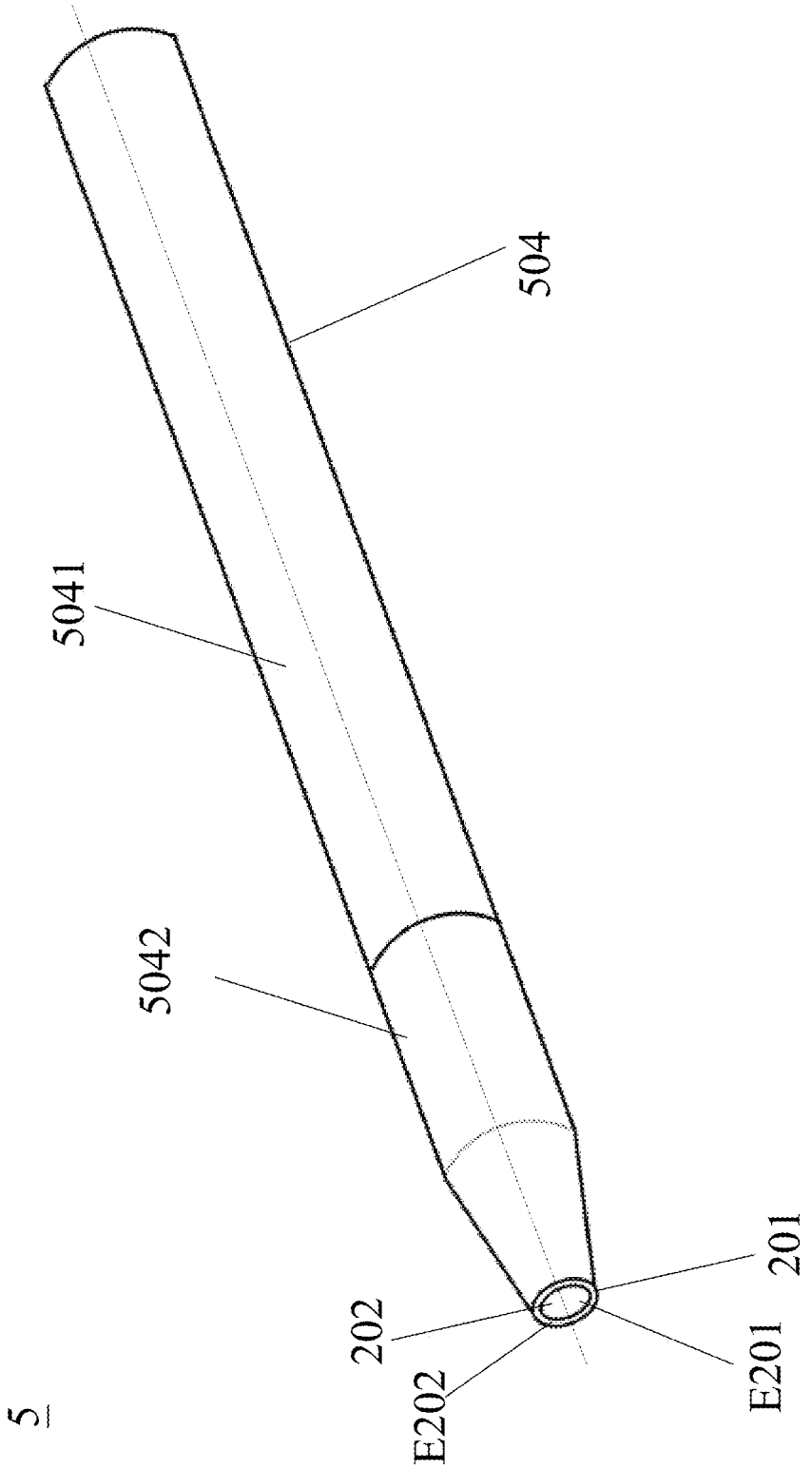


FIG. 8A

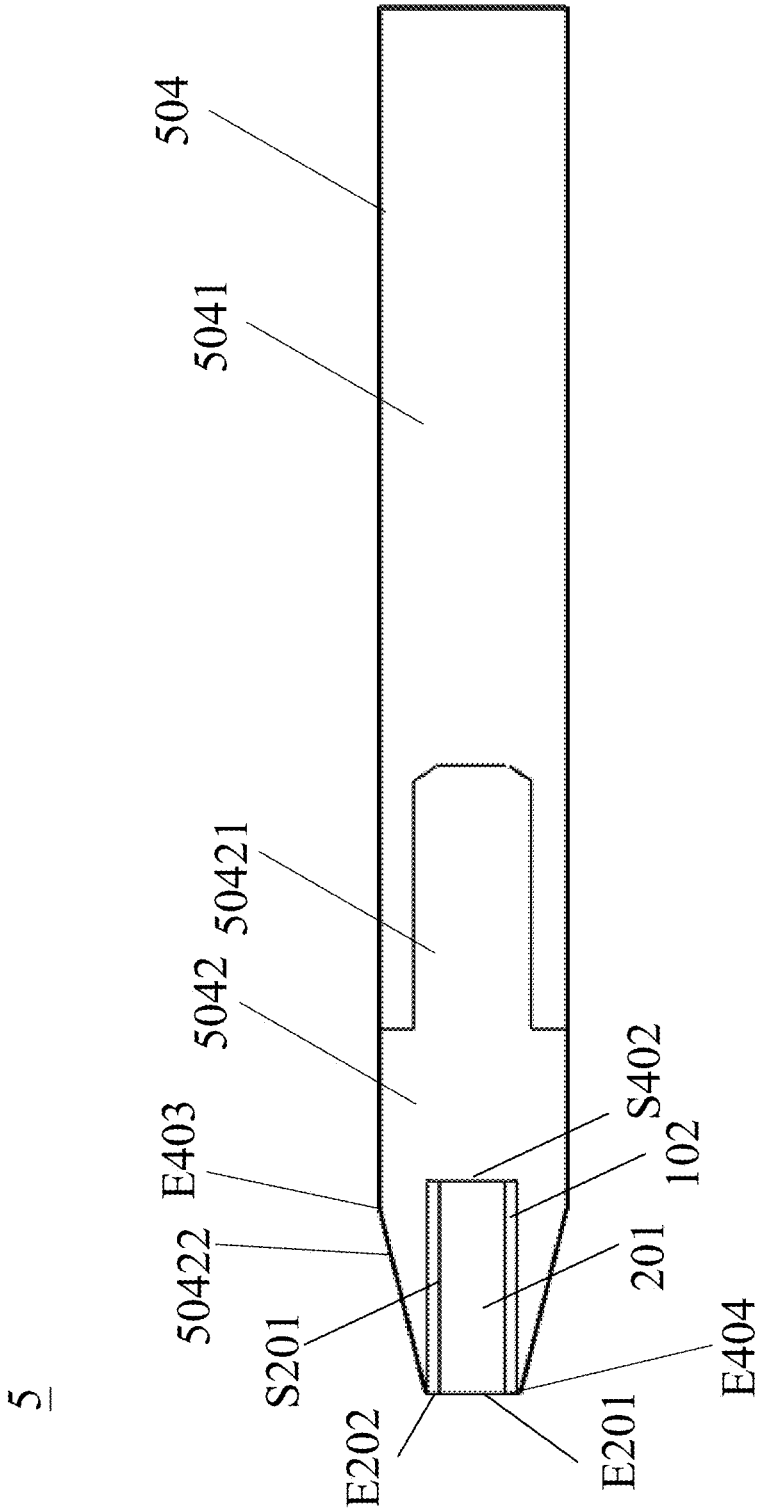

5
504
5041
50421
5042
E403
50422
S201
E202
E201
S402
102
201
E404

FIG. 8B

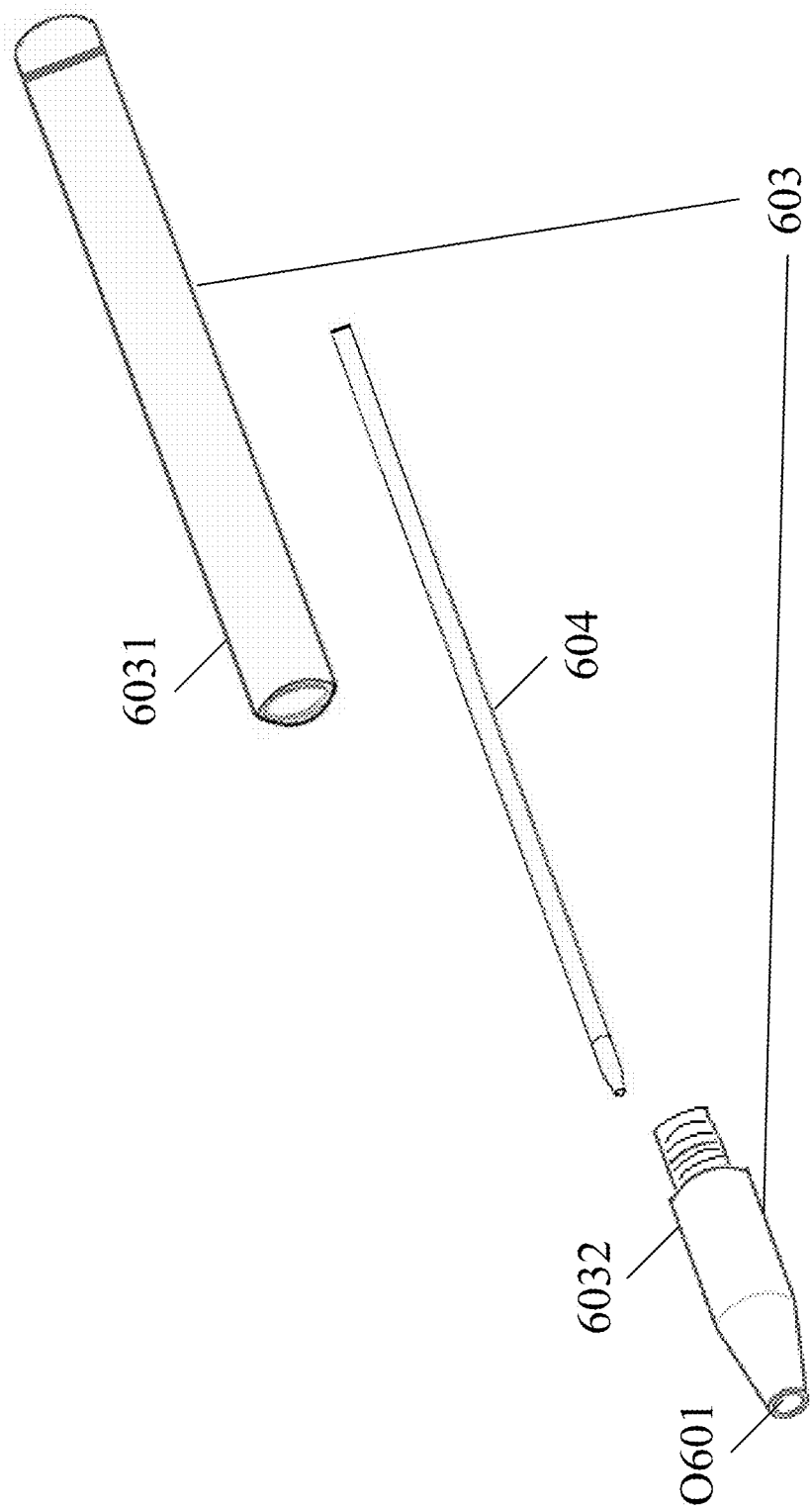


FIG. 9

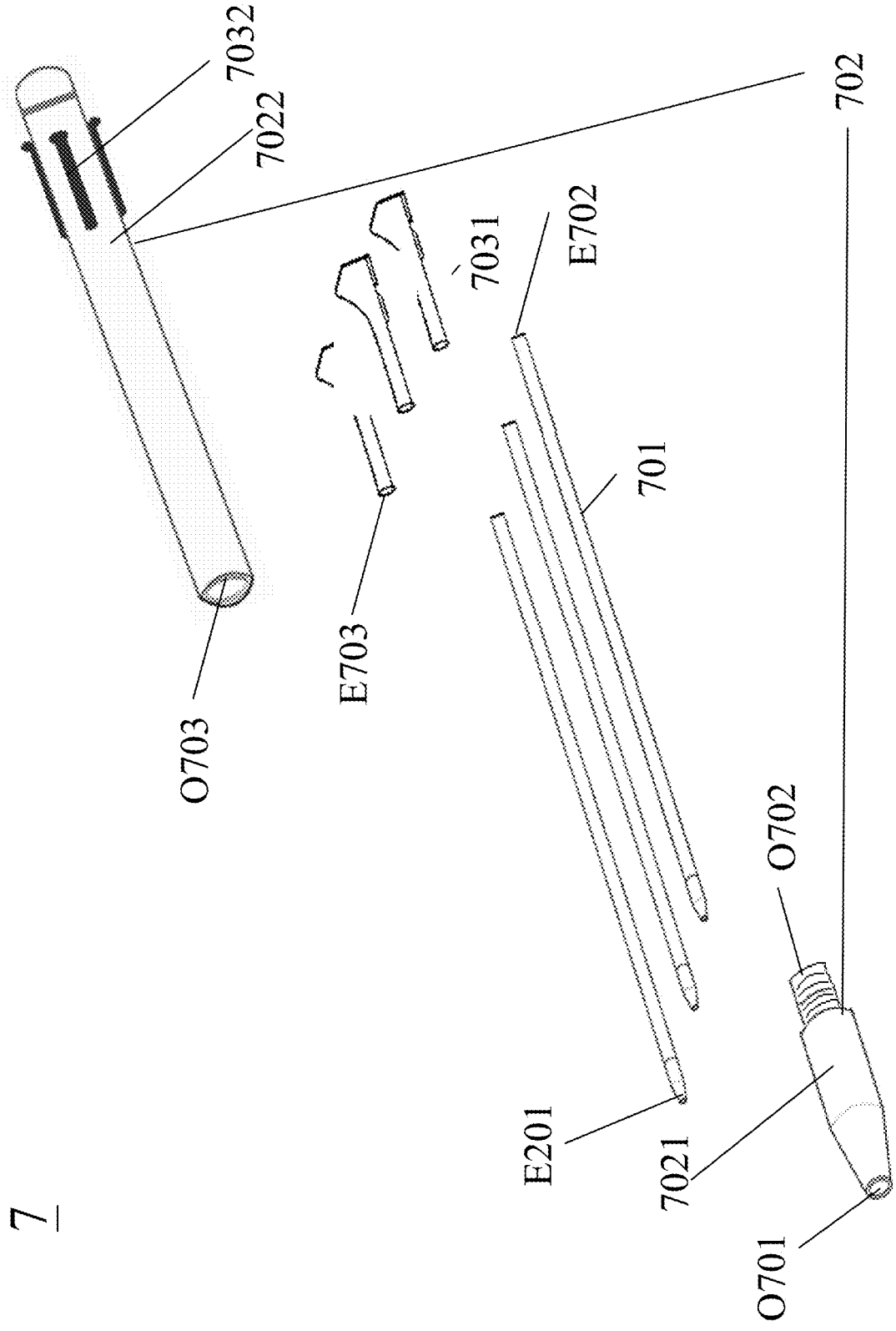


FIG. 10

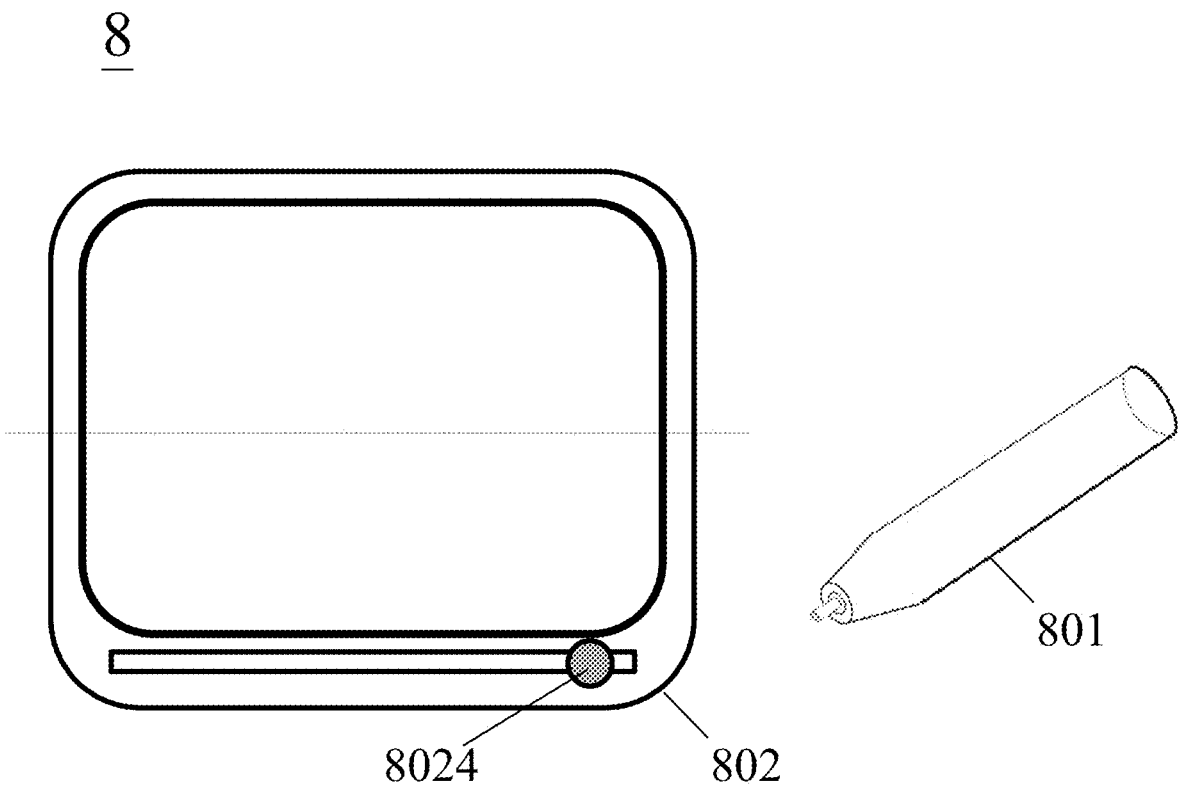


FIG. 11A

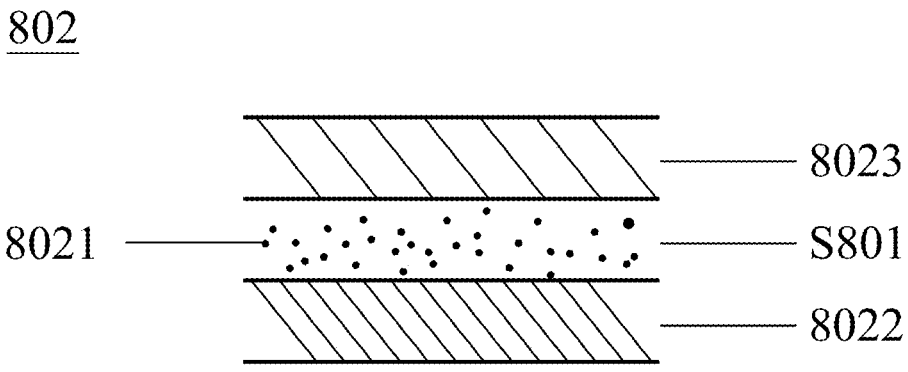


FIG. 11B

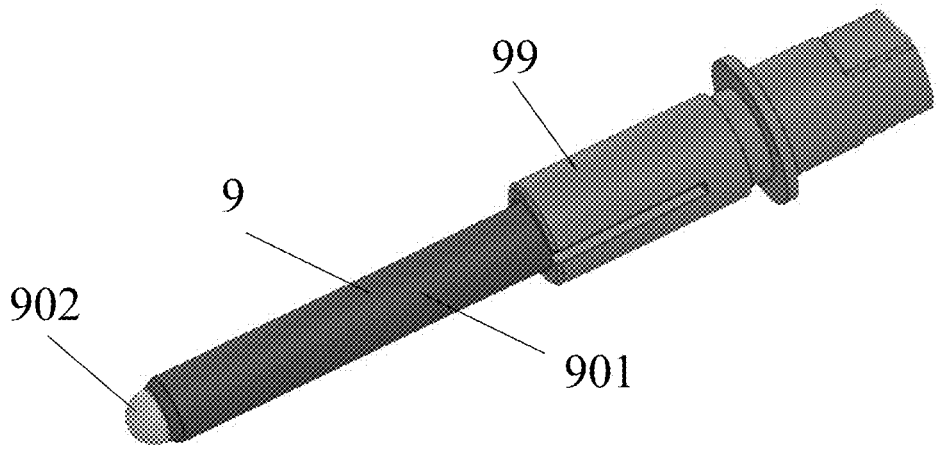


FIG. 12A

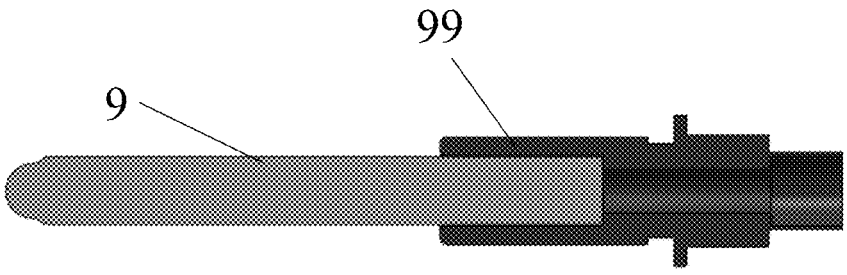


FIG. 12B

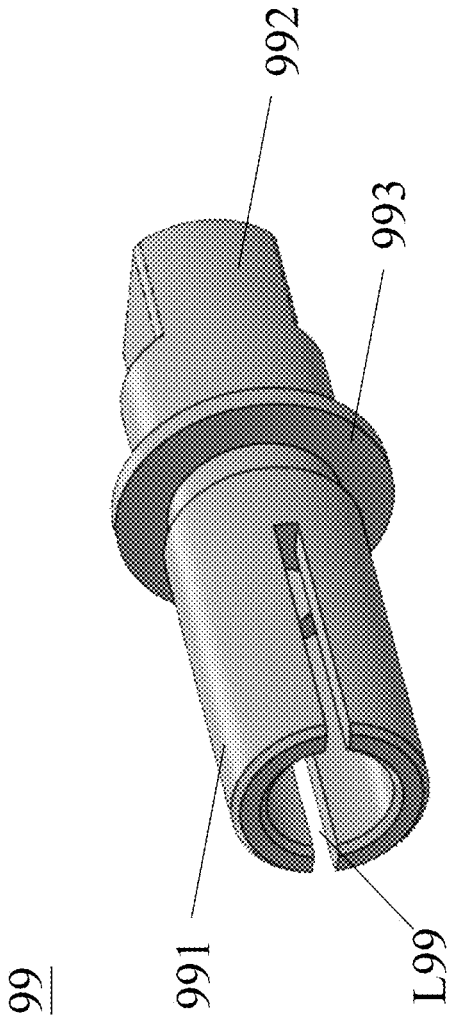


FIG. 12C

MAGNETIC PEN TIP ASSEMBLY AND TABLET SYSTEM USING THE SAME

REFERENCE TO RELATED APPLICATIONS

[0001] This non-provisional application claims priority claim under 35 U.S.C. § 119(a) on Taiwan Patent Application No. 108205018 filed Apr. 23, 2019 and Taiwan Patent Application No. 108205809 filed May 10, 2019 the entire contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention relates to a magnetic pen tip assembly, more particularly, to a magnetic pen tip assembly using a shielding component to reduce magnetic leakage of a magnetic component in the magnetic pen tip assembly.

BACKGROUND

[0003] A magnetic drawing board with a magnetic pen is not only a drawing toy for kids, but also a teaching tool. User can rewrite and redraw on the magnetic drawing board over and over by using the magnetic pen without polluting the environment with garbage such as paper, and unlike the volatile organic solvent in whiteboard pen or the calcium sulfate from chalk, no chemical substance toxic to human is released by the magnetic pen. Therefore, magnetic drawing board in combination with magnetic pen is a writing and drawing tool that is environmentally friendly and convenient to use.

[0004] The magnetic drawing board is usually composed of a layer of substrate and a layer of translucent or semi-translucent that is laid on top, and the middle layer between the substrate and the cover is filled with white thick liquid containing magnetic particles. When a magnetic substance, like a magnet or a magnetic component at the front tip of a magnetic pen, touches the cover of the magnetic drawing board, the magnetic particles are drawn to the surface of the cover and dark lines are visible on the surface. If the user wishes to erase what was on the magnetic drawing board, simply move a slider, which comes with the magnetic writing board and contains a magnet bar, across the magnetic writing board on the underside, and thus the magnetic particles are dragged downward and the visible lines disappear from the surface of the cover.

[0005] However, early-responding and blurred lines are two issues that are often encountered by users with the current magnetic drawing boards on the market. Early-responding is the early appearance of dark lines before the magnetic pen actually touches the cover surface. Blurred lines refer to the dark lines drawn on the cover surface that are not crisp on the edges. Both issues relate to the magnetic leakage of a magnetic component in the magnetic pen, wherein the magnetic particles in the magnetic drawing board are drawn by the magnetic field created by magnetic flux that detoured away from its desired path in the magnetic component at the front tip of the magnetic pen.

SUMMARY

[0006] An object of the invention is to solve the aforementioned issue in the conventional magnetic pen and thus a magnetic pen tip assembly structured to reduce magnetic leakage is provided. The magnetic pen tip assembly uses a shielding component to cover around a magnetic component, wherein when the magnetic pen tip is used to draw a tablet, only a first end of the magnetic component is exposed by an opening of the shielding component to touch a magnetic drawing board. Moreover, the magnetic pen tip assembly can be used as a magnetic pen or a stylus pen for use in the tablet, such as a magnetic drawing board or a capacitance touch panel.

[0007] It is an object of the invention to provide a magnetic pen tip assembly. The magnetic pen tip assembly includes a shielding component and a magnetic component. The shielding component includes a first end, an opening and an accommodating space for accommodating the magnetic component. The magnetic component is disposed in the accommodating space and includes a first end. The magnetic component is surrounded and covered by the shielding component. The first end of the magnetic component is exposed by the opening of the shielding component, and a distance between the first end of the magnetic component and the first end of the shielding component is less than 2 millimeters.

[0008] Optionally, the distance is less than 0.05 millimeter.

[0009] Optionally, the magnetic component is a permanent magnet, a temporary magnet, an electromagnet, or an electric permanent magnet.

[0010] Optionally, the shielding component is made of a magnetically conductive metal or a plastic material.

[0011] Optionally, the shielding component is a turned part formed by turning processing a magnetically conductive material or a magnetically insulating material, or is a curled part formed by curling a sheet of a magnetically conductive material or a magnetically insulating material.

[0012] Optionally, the magnetic pen tip assembly is a magnetic pen for a magnetic drawing board or a stylus pen for a capacitance touch panel and further includes a barrel component that is connected to or accommodates the shielding component.

[0013] Optionally, the barrel component includes a tube portion and a tapered portion. The tube portion includes a first end and the tapered portion includes a first end and a second end opposite the first end. The first end of the tube portion is connected to the first end of the tapered portion and the tapered portion is tapered from its first end to its second end. The tapered portion further includes a space in which the shielding component is inserted or engaged, or alternatively, the shielding component is bonded to the second end of the tapered portion.

[0014] Optionally, the magnetic pen tip assembly is a magnetic pen refill of a magnetic pen for a magnetic drawing board or of a stylus pen for a capacitance touch panel and further includes a refill body that is connected to or accommodates the shielding component. A barrel component of the magnetic pen accommodates the magnetic tip assembly and an opening of the barrel component corresponds to the first end of the magnetic component.

[0015] Optionally, the refill body includes a first component and a second component. The second component is connected to or accommodates the first component. The first component includes a tube portion with a first end and a tapered portion with a first end and a second end opposite to the first end. The first end of the tube portion is connected to the first end of the tapered portion and the tapered portion is tapered from its first end to its second end. The tapered portion includes a space in which the shielding component

is inserted or engaged, or alternatively, the shielding component is bonded to the second end of the tapered portion.

[0016] Optionally, the magnetic pen tip assembly is a magnetic pen for a magnetic drawing board or a stylus pen for a capacitance touch panel and further includes a refill body and a barrel component with an opening. The refill body is connected to or accommodates the shielding component, wherein the refill body, the shielding component, and the magnetic component form a magnetic pen refill. The barrel component accommodates the magnetic pen refill and the opening of the barrel component corresponds to the first end of the magnetic component.

[0017] Optionally, the barrel component includes a first component and a second component, wherein the opening of the barrel component is on the first component and the first component is detachably connected to the second component.

[0018] Optionally, the magnetic pen tip assembly further includes a plurality of refill switch components, at least one other magnetic pen refill, and a plurality of switch control components. The plurality of refill switch components are disposed in the barrel component and each of the plurality of magnetic pen refills is correspondingly connected to one of the plurality of refill switch components. The plurality of switch control components are disposed on the barrel component and control the plurality of refill switch components to switch the plurality of magnetic pen refills.

[0019] Optionally, the magnetic pen tip assembly is detachably disposed on a holder that is connected to a pen body.

[0020] It is another object of the invention to provide a tablet system. The tablet system includes a tablet and a magnetic pen (or a stylus pen), wherein the tablet is a magnetic drawing board or a capacitance touch panel, and the magnetic pen is any of the aforementioned magnetic pen (or any one of the aforementioned stylus pen).

[0021] The magnetic pen tip assembly provided by the invention resolves the early-responding and the blurred-line issues encountered by conventional magnetic pens. And, besides being used on a magnetic drawing board, the magnetic pen tip assembly is also usable as a stylus pen on a capacitance touch panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The structure as well as preferred modes of use, further objects, and advantages of this invention will be best understood by referring to the following detailed description of some illustrative embodiments in conjunction with the accompanying drawings, in which:

[0023] FIGS. **1**A and **1**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to a first embodiment of the invention.

[0024] FIGS. **2**A and **2**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to a second embodiment of the invention.

[0025] FIG. **3** is a sectional view of a magnetic pen tip assembly according to a third embodiment of the invention.

[0026] FIG. **4** is a sectional view of a magnetic pen tip assembly according to a fourth embodiment of the invention.

[0027] FIG. **5** is a sectional view of a magnetic pen tip assembly according to a fifth embodiment of the invention.

[0028] FIG. **6** is a sectional view of a magnetic pen tip assembly according to a sixth embodiment of the invention.

[0029] FIGS. **7**A and **7**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to a seventh embodiment of the invention.

[0030] FIGS. **8**A and **8**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to an eighth embodiment of the invention.

[0031] FIG. **9** is an exploded view of a magnetic pen tip assembly according to a ninth embodiment of the invention.

[0032] FIG. **10** is an exploded view of a magnetic pen tip assembly according to a tenth embodiment of the invention.

[0033] FIGS. **11**A and **11**B are respectively a schematic diagram and a sectional view of a magnetic writing board system according to an eleventh embodiment of the invention.

[0034] FIGS. **12**A and **12**B are respectively a schematic diagram and a sectional view of a changeable magnetic pen tip assembly according to a twelfth embodiment of the invention.

[0035] FIG. **12**C is a schematic diagram illustrating a holder according to the twelfth embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0036] According to embodiments of the invention, a magnetic pen tip assembly which resolves the magnetic leakage issue in conventional magnetic pens is provided, and hence issues evolved from magnetic leakage, such as blurred lines while writing or drawing on a magnetic drawing board with conventional magnetic pen, or early-responding of magnetic particles in the magnetic drawing board which leads to pattern appearance before the conventional magnetic pen touches the surface of the magnetic drawing board, are also avoided. In addition, the invention uses a shielding component to cover around a magnetic component and only a first end of the magnetic component is exposed, thereby further improving the magnetic leakage phenomenon. The shielding component is formed by a magnetically conductive material or a magnetically insulating material.

[0037] FIGS. **1**A and **1**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to a first embodiment of the invention, wherein the dotted line in FIG. **1**A is the sectional line. The magnetic pen tip assembly **1** includes a magnetic component **101** and a shielding component **102**. The shielding component **102** includes an opening and an accommodating space S**101** for accommodating the magnetic component **101**. The magnetic component **101** is disposed in the accommodating space S**101** and is surrounded and covered by the shielding component **102**. A first end E**101** of the magnetic component **101** is exposed by the opening of the shielding component **102** and is approximately aligned to a first end E**102** of the shielding component **102**.

[0038] In the first embodiment, the magnetic component **101** is a permanent magnet, a temporary magnet, an electromagnet, or an electric permanent magnet. The shielding component **102** is a turned part formed by turning processing a magnetically conductive material or a magnetically insulating material, such as a magnetically conductive metal or a plastic material. It is to be noted that the invention is not limited by the types of magnetic component **101** and shielding component **102**.

[0039] FIGS. **2**A and **2**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly

according to a second embodiment of the invention, wherein the dotted line in FIG. **2**A is the sectional line. The magnetic pen tip assembly **2** includes a magnetic component **201** and a shielding component **202**. The shielding component **202** is a curled part formed by curling a sheet of a magnetically conductive material or a sheet of a magnetically insulating material, unlike the shielding component **102** in FIGS. **1**A and **1**B which is formed by turning process.

[0040] Moreover, similar to the first embodiment, the shielding component **202** in the second embodiment also includes an opening and an accommodating space S**201** for accommodating the magnetic component **201**, and the magnetic component **201** is disposed in the accommodating space S**201** and surrounded and covered by the shielding component **202**. A first end E**201** of the magnetic component **201** is exposed by the opening of the shielding component **202** and is approximately aligned to a first end E**202** of the shielding component **202**.

[0041] In the first and second embodiments, only the first end of the magnetic component **101**, **201** is exposed and the rest of the magnetic component **101**, **201** is covered by the shielding component **102**, **202**, and therefore the magnetic leakage issue is effectively improved so as to solve the blurred-line and early-responding issues caused by conventional magnetic pens. It is to be noted that although the shielding component **102**, **202** is formed by turned parts or curled sheets, the invention is not limited by the forming method of the shielding component **201**, **202**.

[0042] FIGS. **3** and **4** are sectional views of a magnetic pen tip assembly according to a third embodiment and a fourth embodiment of the invention, respectively. The magnetic pen tip assemblies **1'** and **2'** are respectively similar to the magnetic pen tip assemblies **1** and **2**, wherein the difference is that in the third and the fourth embodiments, the first end E**101**, E**201** of the magnetic component **101**, **201** of the magnetic pen tip assembly **1'**, **2'** protrudes outside of the first end E**102**, E**202** of the shielding component **102**, **202** of the magnetic pen tip assembly **1'**, **2'**, wherein a distance d**1** between the two first ends E**101**, E**201** and E**102**, E**202** is less than 2 millimeters and preferably less than 0.05 millimeter.

[0043] FIGS. **5** and **6** are respectively sectional views of a magnetic pen tip assembly according to a fifth embodiment and a sixth embodiment of the invention. Unlike the first and second embodiments where the two first ends E**101**, E**102** and E**201**, E**202** are aligned, the first end E**101**, E**201** of the magnetic component **101**, **201** of the magnetic pen tip assembly **1"**, **2"** is positioned inside the accommodating space S**101**, S**102** and a distance d**2** away from the first end E**201**, E**202** of the shielding component **102**, **202** of the magnetic pen tip assembly **1"**, **2"**, wherein the distance d**2** between the two first ends E**101**, E**102** and E**201**, E**202** is less than 2 millimeters and preferably less than 0.05 millimeter.

[0044] The magnetic pen tip assemblies **1**, **1'**, **1"**, **2**, **2'**, **2"** in the first to sixth embodiments are substantially magnetic pen tips but the invention is not limited thereby. The magnetic pen tip assemblies **1**, **1'**, **1"**, **2**, **2'**, **2"** can be further processed to become, or implemented in, magnetic pens or magnetic pen refills.

[0045] FIGS. **7**A and **7**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to a seventh embodiment of the invention, wherein the dotted line in FIG. **7**A is the sectional line. The magnetic pen tip assembly **4** of the seventh embodiment is an implementation of the magnetic pen tip assembly **1** of the first embodiment and serves as a magnetic pen for a magnetic drawing board or as a stylus pen for a capacitance touch panel.

[0046] In the seventh embodiment, the magnetic pen tip assembly further includes a barrel component **402**. The barrel component includes a tube portion **4021** and a tapered portion **4022**, wherein the tapered portion **4022** includes a first end E**402** and a second end E**403** opposite the first end E**402** and is tapered from its first end E**402** to its second end E**403**. The tube portion **4021** is connected to the first end E**402** of the tapered portion **4022**. In this embodiment, the tapered portion **4022** includes a space S**402** for accommodating the shielding component **102**, such that the shielding component **102** is inserted or engaged to connect to the barrel component **402** and the first end E**101** of the magnetic component **101** is exposed by an opening of the barrel component **402**.

[0047] However, the connecting method between the barrel component **402** and the shielding component **102** of the invention is not limited thereby. In other embodiments, the shielding component **102** can be bonded directly to the tapered portion **4022** of the barrel component **402** and the barrel component **402** does not have the space S**402**. In addition, the invention is not limited by the embodiments of the aforementioned barrel component **402**. For example, the barrel component **402** can include only the tube portion **4021** and the shielding component **102** is connected to the tube portion **4021**.

[0048] FIGS. **8**A and **8**B are respectively a schematic diagram and a sectional view of a magnetic pen tip assembly according to an eighth embodiment of the invention, wherein the dotted line in FIG. **8**A is the sectional line. The magnetic pen tip assembly **5** of the eighth embodiment is an implementation of the magnetic pen tip assembly **2** of the second embodiment and is to be used as a magnetic pen refill of a magnetic pen for a magnetic drawing board or of a stylus pen for a capacitance touch panel.

[0049] The magnetic pen tip assembly **5** includes a refill body **502** with a first component **5021** and a second component **5022**, wherein the second component **5022** includes an opening and an accommodating space S**502** for accommodating the first component **5021**. The first component **5021** includes a tube portion P**501** and a tapered portion P**502** and the tapered portion P**502** includes a first end E**502** and a second end E**503** opposite the first end E**502**, wherein the tapered portion P**502** is tapered from its first end E**502** to its second end E**503**. The tube portion P**501** is connected to the first end E**502** of the tapered portion P**502**. Moreover, the tapered portion P**502** of the first component **5021** includes an opening at its second end E**503**, which in turn forms an accommodating space S**503** to accommodate the shielding component **202**. Thus, the shielding component **202** is inserted in or engaged to connect to the refill body **502**, such that the first end E**201** of the magnetic component **201** is exposed by the opening of the refill body **502**.

[0050] It is to be noted that the connecting method between the refill body **502** and the shielding component **202** of the invention is not limited thereby. In other embodiments, the shielding component **502** can be bonded directly to the tapered portion P**502** of the first component **5021** of the refill body **502** and the refill body **502** does not have the opening and the aforementioned space S**503**. In addition, the

invention is not limited by the embodiments of the aforementioned refill body **502**. For example, the first component **5021** of the refill body **502** can have just the tube portion P**501** and the shielding component **202** is connected to the tube portion P**501**.

[0051] FIG. **9** is an exploded view of a magnetic pen tip assembly according to a ninth embodiment of the invention. The magnetic pen tip assembly **6** of the ninth embodiment is a further implementation of the magnetic pen tip assembly **5** of the eighth embodiment and is utilized as a magnetic pen for a magnetic drawing board or as a stylus pen for a capacitance touch panel. The magnetic pen tip assembly **6** includes a magnetic pen refill **601**, which is the magnetic pen tip assembly **5** of the eighth embodiment, and a barrel component **602**. The barrel component includes a first component **6021** and a second component **6022**, wherein the first component **6021** has an opening O**601** and another opening O**602** opposite the opening O**601**, and the second component **6022** has an opening O**603**.

[0052] Each of the first component **6021** and the second component **6022** of the barrel component **602** has an accommodating space for accommodating the magnetic pen refill **601**. The other opening O**602** of the first component **6021** corresponds to the opening O**603** of the second component **6022** such that the first component **6021** is detachably connected to the second component **6022**, wherein the detachable connection can be achieved via screw threads. The opening O**601** of the first component **6021** of the barrel component **602** corresponds to the first end E**201** of the magnetic component of the magnetic pen refill **601**.

[0053] FIG. **10** is an exploded view of a magnetic pen tip assembly according to a tenth embodiment of the invention. The magnetic pen tip assembly **7** of the tenth embodiment is another further implementation of the magnetic pen tip assembly **5** of the eighth embodiment and serves as a magnetic pen for a magnetic drawing board or as a stylus pen for a capacitance touch panel. The magnetic pen tip assembly **7** includes a plurality of magnetic pen tip assemblies **5**, and when utilized as the magnetic pen, the magnetic components of the magnetic pen tip assemblies **5** have different magnetic forces to correspondingly draw lines with different thicknesses on the magnetic drawing board.

[0054] The magnetic pen tip assembly **7** includes a plurality of magnetic pen refills, which are the plurality of magnetic pen tip assemblies **5** of the eighth embodiment, a plurality of refill switch components **7031**, and a barrel component **702**. The barrel component **702** includes a first component **7021** and a second component **7022**, wherein the first component **7021** has an opening O**701** and another opening O**702** opposite the opening O**701**. The second component **7022** includes an opening O**703** and the magnetic pen tip assembly **7** further includes a plurality of switch control components **7032** disposed on the second component **7022**.

[0055] Both of the first component **7021** and the second component **7022** of the barrel component **702** have accommodating space for accommodating the plurality of magnetic pen refills **701** and the plurality of refill switch components **7031**. Each magnetic pen refill **701** is connected to one of the refill switch component **7031** by bonding or insertion/engagement, wherein the connection is made between a second end E**702** of the magnetic pen refill **701** and a third end E**703** of the refill switch component **7031**. The other opening O**702** of the first component corresponds to the opening O**703** of the second component **7022** and the first component **7021** is detachably connected to the second component **7022** by, for example, screw threads. The opening O**701** of the first component **7021** of the barrel component **702** corresponds to the plurality of first ends E**201** of the plurality of magnetic components of the plurality of magnetic pen refills **701**.

[0056] In this embodiment, user is able to switch between the magnetic pen refills **701** through operating the switch control components **7032** on the second component **7022** of the barrel component **702**. Each of the plurality of magnetic pen refills **701** includes a magnetic component with a magnetic force that differs from other magnetic components, thereby forming a magnetic pen having pen tip selections for drawing lines with different thicknesses on the magnetic drawing board. Moreover, the magnetic pen tip assembly **7** can further includes at least one ink refill disposed in the barrel component **702** so as to act as a multifunctional pen for writing on a magnetic drawing board and on paper.

[0057] FIGS. **11**A and **11**B are respectively a schematic diagram and a sectional view of a magnetic drawing board system according to an eleventh embodiment of the invention, wherein the dotted line in the FIG. **11**A is the sectional line. The magnetic pen tip assembly of the invention is utilized in the magnetic drawing system **8**. The magnetic drawing system **8** includes a magnetic pen **801** and a magnetic drawing board **802**, wherein the magnetic pen **801** is the magnetic pen tip assembly **4** of the seventh embodiment but the invention is not limited thereby.

[0058] The magnetic drawing board system **802** includes a magnetic substance **8021**, a substrate **8022**, and a cover **8023**. A common configuration of the magnetic drawing board **802** is a layer of substrate **8022** and a layer of translucent or semi-translucent cover **8023** stacked together, wherein an intermediate layer S**801** is formed between the stacked substrate **8022** and cover **8023**. The magnetic substance **8021** is placed in the intermediate layer **8021** and is often colored magnetic particles. When the magnetic pen **801** touches the cover **8023**, the magnetic substance **8021** is drawn to the surface of the cover **8023** in response to the magnetic force of the magnetic pen **801** and become visible on the transparent/semitransparent cover **8023**; a pattern is then drawn base the movement of the magnetic pen **801**. If the user wishes to erase the pattern on the cover **8023**, a slider **8024** of the magnetic drawing board **802** is used to move a long magnetic bar across the magnetic drawing board **802**, which in turn draws the magnetic substance **8021** downwards and thus removing the appearance on the cover **8023**. It is to be noted that the invention is not limited by the embodiment of the magnetic drawing board **801**.

[0059] FIGS. **12**A to **12**C are respectively a schematic diagram and a sectional view of a changeable magnetic pen tip assembly and a schematic diagram of a holder according to a twelfth embodiment of the invention. The changeable magnetic pen tip assembly consists of a magnetic pen tip assembly **9** and a holder **99**, and in this embodiment, the magnetic pen tip assembly **9** includes a magnetic component **901** and a shielding component **902**. The magnetic component **901** is dispose in an accommodating space of the shielding component **902** and is surrounded and covered by the shielding component **902**. A first end of the magnetic component **901** is exposed by an opening of the shielding component **902**. A distance between the first end of the magnetic component **901** and a first end of the shielding

component **902** is less than 2 millimeters. The magnetic pen tip assembly **9** is disposed in an accommodating space of the holder **99**, wherein user can change or replace the magnetic pen tip assembly **9** by taking the magnetic pen tip assembly **9** out of the holder **99** and inserting a new magnetic pen tip assembly **9** into the holder **99**.

[0060] The holder **99** includes a holding part **991**, a fastening part **992**, and a positioning part **993** connected between the holding part **991** and the connecting part **992**. The holding part **991** includes a slit L**99** and an accommodating space. In this embodiment, the magnetic pen tip assembly **9** is inserted into the accommodating space of the holding part **991** and through the design of the slit L**99**, and the magnetic pen tip assembly **9** is able to be detachably disposed in the accommodating space of the holding part **991**. The fastening part **992** is engaged to a barrel body and the positioning part **993** acts as a stopper to position the holder **99** relative to the barrel body.

[0061] In conclusion, the embodiments of the invention provides a magnetic pen tip assembly utilizing a shielding component with an opening and an accommodating space to cover around a magnetic component, so that only a first end of the magnetic component is exposed to reduce the magnetic leakage of the magnetic component. The aforementioned magnetic pen tip assembly is used as a magnetic pen in a tablet system, wherein the tablet system includes a tablet that can be a magnetic drawing board or a capacitance touch panel. Therefore, when user draws on a magnetic drawing board with the magnetic pen of the invention, issues like blurred lines and early-responding caused by magnetic particles in the magnetic drawing board being drawn due to magnetic leakage of the magnetic component can be avoided. Furthermore, the magnetic pen tip assembly of the invention acting as a magnetic pen can also be used as a stylus pen for a capacitance touch panel. In addition, the manufacturing of the magnetic pen tip assembly according to the embodiments of the invention is easy and low in cost, and thus the invention has market advantage and can be effectively used in the industry.

[0062] The above disclosure is only the preferred embodiment of the present invention, and not used for limiting the scope of the present invention. All equivalent variations and modifications on the basis of shapes, structures, features and spirits described in claims of the present invention should be included in the claims of the present invention.

What is claimed is:

1. A magnetic pen tip assembly comprising:

a shielding component comprising a first end, an opening and an accommodating space; and

a magnetic component disposed in the accommodating space and comprising a first end;

wherein the magnetic component is surrounded and covered by the shielding component, the first end of the magnetic component is exposed by the opening of the shielding component, and a distance between the first end of the magnetic component and the first end of the shielding component is less than 2 millimeters.

2. The magnetic pen tip assembly of claim **1**, wherein the distance is less than 0.05 millimeter.

3. The magnetic pen tip assembly of claim **1**, wherein the magnetic component is a permanent magnet, a temporary magnet, an electromagnet, or an electric permanent magnet.

4. The magnetic pen tip assembly of claim **1**, wherein the shielding component is made of a magnetically conductive metal or a plastic material.

5. The magnetic pen tip assembly of claim **1**, wherein the shielding component is a turned part formed by turning processing a magnetically conductive material or a magnetically insulating material, or is a curled part formed by curling a sheet of a magnetically conductive material or a magnetically insulating material.

6. The magnetic pen tip assembly of claim **1**, wherein the magnetic pen tip assembly is a magnetic pen for a magnetic drawing board or a stylus pen for a capacitance touch panel, and the magnetic pen tip assembly further comprises:

a barrel component connected to or accommodating the shielding component.

7. The magnetic pen tip assembly of claim **6**, wherein the barrel component comprises a tube portion with a first end and a tapered portion with a first end and a second end opposite the first end, the first end of the tube portion is connected to the first end of the tapered portion, the tapered portion is tapered from its first end to its second end, and the shielding component is bonded to the second end of the tapered portion or the tapered portion comprises a space in which the shielding component is inserted or engaged.

8. The magnetic pen tip assembly of claim **1**, wherein the magnetic pen tip assembly is a magnetic pen refill of a magnetic pen for a magnetic drawing board or of a stylus pen for a capacitance touch panel, and the magnetic pen tip assembly further comprises:

a refill body connected to or accommodating the shielding component;

wherein a barrel component of the magnetic pen accommodates the magnetic pen tip assembly and an opening of the barrel component corresponds to the first end of the magnetic component.

9. The magnetic pen tip assembly of claim **8**, wherein the refill body comprises a first component and a second component, the second component is connected to or accommodates the first component, the first component comprises a tube portion with a first end and a tapered portion with a first end and a second end opposite the first end, the first end of the tube portion is connected to the first end of the tapered portion, the tapered portion is tapered from its first end to its second end, and the shielding component is bonded to the second end of the tapered portion or the tapered portion comprises a space in which the shielding component is inserted or engaged.

10. The magnetic pen tip assembly of claim **1**, wherein the magnetic pen tip assembly is a magnetic pen for a magnetic drawing board or a stylus pen for a capacitance touch panel, and the magnetic pen tip assembly further comprises:

a refill body connected to or accommodating the shielding component, wherein the refill body, the shielding component, and the magnetic component form a magnetic pen refill; and

a barrel component for accommodating the magnetic pen refill and comprises an opening that corresponds to the first end of the magnetic component.

11. The magnetic pen tip assembly of claim **10**, wherein the barrel component comprises a first component and a second component, and the opening of the barrel component is on the first component and the first component is detachably connected to the second component.

12. The magnetic pen tip assembly of claim 10, further comprising:

a plurality of refill switch components disposed in the barrel component;

at least one other magnetic pen refill; and

a plurality of switch control components disposed on the barrel component;

wherein each of the magnetic pen refills correspondingly connects to one of the refill switch components, and the plurality of switch control components control the refill switch components to switch the magnetic pen refills.

13. The magnetic pen tip assembly of claim 1, wherein the magnetic pen tip assembly is detachably disposed in a holder that is connected to a pen body.

14. A tablet system comprising:

a tablet, wherein the tablet is a magnetic drawing board or a capacitance touch panel; and

a magnetic pen or a stylus pen, comprising:

a shielding component comprising a first end, an opening, and an accommodating space; and

a magnetic component disposed in the accommodating space and comprising a first end, wherein the magnetic component is surrounded and covered by the shielding component, the first end of the magnetic component is exposed by the opening of the shielding component, and a distance between the first end of the shielding component and the first end of the magnetic component is less than 2 millimeters.

15. The tablet system of claim 14, wherein the shielding component is a turned part formed by turning processing a magnetically conductive material or a magnetically insulating material, or is a curled part formed by curling a sheet of a magnetically conductive material or a magnetically insulating material.

16. The tablet system of claim 14, wherein the magnetic pen or the stylus pen further comprises:

a barrel component connected to or accommodating the shielding component.

17. The tablet system of claim 14, wherein the magnetic pen or the stylus pen further comprises:

a refill body connected to or accommodating the shielding component, wherein the refill body, the shielding component, and the magnetic component form a magnetic pen refill; and

a barrel component for accommodating the magnetic pen refill and comprises an opening to which the first end of the magnetic component corresponds.

18. The tablet system of claim 17, wherein the magnetic pen or the stylus pen further comprises:

a plurality of refill switch components disposed in the barrel component;

at least one other magnetic pen refill; and

a plurality of switch control components disposed in the barrel component;

wherein each of the magnetic pen refills correspondingly connects to one of the refill switch components, and the plurality of switch control components control the refill switch components to switch the magnetic pen refills.

19. The tablet system of claim 14, wherein the distance between the first end of the magnetic component and the first end of the shielding component is less than 0.05 millimeter.

20. The tablet system of claim 14, wherein the magnetic component is a permanent magnet, a temporary magnet, an electromagnet, or an electric permanent magnet, and the shielding component is made of a magnetically conductive metal or a plastic material.

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