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Description

BACKGROUND OF THE INVENTION

The present invention relates to a paper leaf cutting instrument which is used for making weakened a desired linear portion on a leaf of paper so that the leaf of paper may be cut along the linear fragile portion when necessary.

The present inventor has studied a cutting pen which may be used like an ordinary writing pen relative to a leaf of paper and, simultaneously, may be used for cutting the paper leaf along the writing locus by tensioning or pressing the paper leaf.

Since a piece of paper is a sheet made by entangling fibers with each other and filling fillers therein, paper normally has only little wet strength. When paper, maintained under conditions in which it locally contains a large amount of moisture is scratched by a needle-like hard element, the entanglement of contained fibers is easily released, effectively making the paper fragile along scratch lines. In this connection, the present inventor has proposed in Japanese Utility Model Unexamined Publication 62-104900 a cutting instrument in which a water-absorbing material is surrounded by a hard element having a tip end to which a rough surface-machining is applied. According to this technique, a large amount of water is first supplied to a portion of the paper, to be made fragile, from the water-absorbing material of the writing end of the instrument, and at the same time, the hard element having the rough surface is moved on the paper under writing pressure. As a result, a flaw is generated therein. Even in the drying condition of the paper, the paper may be cut along the writing locus simply by tensioning the paper.

However, when the hard element surrounds the periphery of the water-absorbing material in such a cutting instrument, wettability is not sufficient upon contact between the hard element and the paper since moisture is supplied to the paper after the contact between the hard element and the paper, so that the writing scratching operation requires strong writing pressure and the cutting feeling is not satisfactory. Also, when the paper is scratched by a hard element having a rough surface tip end, the entanglement of fibers can be released without cutting the fibers of the paper, so that the paper cutting instrument can not be smoothly moved on the paper and a wide portion of the paper is made fragile. In this case, there is a tendency for the cut portion have a shaggy area.

SUMMARY OF THE INVENTION

Accordingly, an object of the invention is to provide a paper leaf cutting instrument which is

capable of scratching a leaf of paper under a somewhat large writing pressure to supply moisture to such an extent that the paper may be made fragile, immediately thereafter, scratching the wet portion, and then cutting the paper, when necessary, simply by tensioning the paper without adversely affecting the outer appearance of the paper. Furthermore, the instrument may be normally used as a writing instrument.

As is known from JP-U-62104900 a paper leaf cutting instrument constructed in accordance with the invention comprises a barrel means for receiving and holding a liquid supply, the barrel means having a wetting end;

liquid absorbent and compressible means at the wetting end for transmitting liquid from the liquid supply and extending from within the barrel means beyond the wetting end of the barrel means and

a paper leaf expanding/opening means.

In contrast to JP-U-62104900, according to this invention the expanding/opening means is a blade which extends axially from the barrel means in the same direction and for substantially the same distance as the liquid absorbent and compressible means and the blade is in contact with a side surface of the liquid absorbent and compressible means.

In the specification, the "wetting end portion" refers to a tip end portion of a water-absorbent property and compressible material, the tip end portion being exposed from the barrel means. The other end of the wetting end portion comes into contact with the liquid accommodated in the barrel and is always wetted to form a wetting end portion. When the wetting end portion is pressed against the paper, the liquid of the barrel portion is always supplied to the wetting end portion. It is preferable to use writing liquid, such as ink, as the liquid for wetting the paper because the instrument may be also used as a writing instrument.

It is preferable to use an assembly of fiber, a felt, a hydrophilic porous material, a sponge or the like as the water-absorbing material according to the present invention. Among these materials, the assembly of fiber may supply a sufficient amount of moisture due to the capillary phenomenon of the fiber forming the material, even if the assembly is concentrated at high density. In addition, the assembly of fiber is durable in service life.

These materials at the wetting end portion are inserted into an end of the barrel and project from the end thereof.

The end of the wetting end portion can be so shaped that it is cut on a slant at from about 30 to 80 degrees, preferably at about 40 to 80 degrees, in order to carry out writing even when the instrument is slightly slanted in the same manner as the

writing instrument for supplying the writing liquid.

The periphery of the wetting end portion can be surrounded in a ring shape by the paper leaf expanding/opening portion having the paper leaf expanding/opening blade projecting like a needle. A ring of hard material from which the expanding/opening blade is formed, then surrounds the wetting end portion. It is possible to insert the wetting end portion made of water-absorptive and compressible material into the ring. However, it is preferable to use a plate member made of metal or the like and bent into a ring, as shown in Fig. 5. In this case, it is easy to perform molding, and in addition, it is possible to provide a ring shape having one discontinuous portion to impart a flexibility to the expanding/opening blade and the wetting end portion. Furthermore, it is easy to insert the water-absorbing material into the ring. Even after the insertion, the wetting end portion may be positively gripped due to its flexibility.

The expanding/opening blade is formed so as to project from the ring. The end of the blade is sharpened like a needle and is finished to have a flat smooth surface so as to slide well on the paper surface. Also, in order to enhance the cutting effect, it is preferable to use a sharp inverted V-shaped top as a tip end of the expanding/opening blade. The corner portion (indicated by reference numeral 7 in Fig. 4) actually works as a weakened linear machined portion.

The ring and expanding/opening blade of the paper leaf expanding/opening portion and made of material, which is hard and dense, such as stainless, brass, other non-corroding metal, ceramics and the like. In particular, the expanding/opening blade requires a strength of 150 to 200 g, which is larger than that of an average absolute writing pressure of 60 g, which is applied to a conventional writing instrument. It is also preferable that the ring of the proximal portion of the paper leaf expanding/opening portion be inserted into the barrel portion. By inserting the proximal portion of the ring into the barrel portion in this manner, the wetting end portion and the paper leaf expanding/opening portion are fixed together without fail.

It is necessary that the wetting end portion extends substantially in the same length as the end of the expanding/opening blade in an axial direction of the barrel portion, as shown in Fig. 2.

When the instrument is used for cutting the paper leaf, in order to make the paper fragile in a linear manner, the paper leaf cutting instrument should be held in an upright condition as much as possible and the writing should be performed while imparting downwards the somewhat stronger pressure to the writing instrument, in conformity with a desired line. In this case, the pressure causes the water-absorbent and compressible material to be

compressed to provide a large amount of liquid. As a result, the paper is sufficiently wet to be fragile. Keeping on the writing operation, as shown in Fig. 3, the wetting end portion is compressed to be substantially shorter than the expanding/opening blade, and the inverted V-shaped expanding/opening blade pushes and opens the paper fibers of the paper made fragile by the moisture provided from the end portion, thus cutting a part of the fiber. Accordingly, in a dry condition of the paper, the fiber remains open by the expanding/opening blade. A portion of the paper which is partially cut becomes extremely fragile but its outer appearance would be kept almost unchanged. In addition, if a colored liquid is used, the traversed portion of the paper is colored. Therefore, if the colored portion is tensioned, the paper leaf may be cut along the locus of the fragile portion.

In case of colored liquid, it is sufficient to use colored water, that is, a water-soluble coloring agent, such as dye. It is also possible to mix it with other wetting material, such as glycerin or the like. In the case where the instrument is used for cutting paper, a flow rate of the writing liquid from the wetting end portion is in the range of 0.3 g/m to 1.6 g/m.

A wetting liquid may be filled directly into a cavity of the barrel portion, or otherwise may be absorbed into the water-absorbing material, such as a sponge, inserted into the barrel.

According to the present invention, the proximal portion of the wetting end portion which communicates with the liquid supply portion containing a liquid to wet the paper surface and is accommodated or held in the barrel portion is surrounded by the ring-like hard element, and the expanding/opening blade projects from the ring-like hard element. When the instrument is somewhat strongly depressed against the paper surface to scratch it while the instrument is kept substantially in an upright condition, the tip end of the wetting end portion is compressed to thereby supply a large amount of liquid for wetting the paper surface. At the same time, the corner portion of the expanding/opening blade whose end is sharpened in the form of an inverted V-shape as shown in Fig. 7 and is ground into a flat smooth surface will open the fiber of the paper leaf to cut a part of the paper which is wetted with the liquid. Accordingly, even when the paper is in a dry condition, it is possible to cut the paper along the scratched flaw simply by tensioning the fragile portion.

The ring made of hard material only surrounds the proximal end portion of the wetting end portion. Thus, the ability of the wetting end portion to supply water is not obstructed.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Fig. 1 is a side view of a tip end portion of one embodiment of the instrument according to the invention;

Fig. 2 is a side view in a writing position of an embodiment of the instrument according to the invention;

Fig. 3 is a side view in a cutting position of an embodiment of the instrument according to the invention;

Fig. 4 is a perspective view of a paper leaf expanding/opening portion of the embodiment of the instrument according to the invention;

Fig. 5 is a perspective view of an expanding/opening blade of another embodiment of the instrument according to the invention;

Fig. 6 is a perspective view of a paper leaf expanding/opening portion of another embodiment of the instrument according to the invention; and

Fig. 7 is an illustration of an operation of the blade of these embodiments of the instrument according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described with reference to the accompanying drawings. Fig. 1 is a side view of an embodiment of a cutting instrument in accordance with the invention, in which reference numeral 1 denotes a barrel portion of the cutting instrument, and reference numeral 2 denotes a wetting end portion which has a diameter of about 3 mm and which is made, e.g., of polyester fiber, its top end is cut at about 70 degrees. Reference numeral 3 denotes a paper leaf expanding/opening portion which surrounds the wetting end portion 2 at a proximal end portion thereof. The wetting end portion 2 is inserted into a distal end of the barrel portion 1 and is fixed therein while being surrounded at the proximal portion 4. The wetting end portion 2 optionally extends into the barrel portion and serves as a wick in controlling fluid flow from the barrel to a paper surface. An expanding/opening blade 5 is provided in intimate contact with an outer longest portion of the wetting end portion 2, which is obliquely cut at its distal end. The proximal portion 4 may be in the form of a ring which is slightly opened and discontinuous at one end as shown in Fig. 4, or otherwise may be in the form of a closed ring 4B, as shown in Fig. 6 (in accordance with another embodiment of the invention). The distal end of the wetting end portion 2 is substantially projected to the same length as the expanding/opening blade 5.

The tip end of the expanding/opening blade 5 projects in the form of an inverted V-shape in a cross section thereof as shown in Fig. 4. Reference numeral 6 denotes a projecting portion. A corner portion of the projecting portion 6 serves as a cutting portion 7 which expands or opens and partially cuts fiber of the wetted portion of the paper and which actually works to make the paper fragile.

In assembling the paper leaf cutting instrument according to the present invention, it is preferable to use a method in which the wetting end portion 2 is surrounded in a ring by the paper leaf expanding/opening portion 3. Also, it is possible to manufacture the instrument by inserting the wetting end portion 2 into the paper leaf expanding/opening portion 3B made in a ring shape in advance as shown in Fig. 6. The internal structure of the barrel portion is the same as that of a conventional writing instrument so that colored writing liquid is supplied to the wetting end portion 2. A supply rate of the writing liquid is, e.g., at 1 g/100 m when the writing operation is always performed.

When the instrument is used as a cutter, when the cutting instrument is gripped substantially in the upright position, pressed strongly toward the paper 8 and writingly moved in a direction indicated by an arrow as shown in Fig. 3, the tip end of the wetting end portion 2 is depressed to thereby bring the expanding/opening blade 5 into direct contact with the paper 8. At this time, since the paper 8 is pressed in advance by the wetting end portion 2 as shown in Fig. 7, the paper surface is wetted with the water so that a wet portion 9 is formed where the fiber swells. Since the expanding/opening blade 5 presses the wet portion 9, forces indicated by arrows are applied to expand the fiber to cut a part of fiber to make the writing locus fragile along a sharp linear portion. In this paper there is left only color after the paper is dried. Thus, the outer appearance of the paper is kept unchanged from the normal condition. By applying a tension to that portion, it is possible to cut the paper with ease.

Claims

1. A paper leaf cutting instrument comprising:

barrel means (1) for receiving and holding a liquid supply, the barrel means having a wetting end;

liquid absorbent and compressible means (2) at the wetting end of the barrel means for transmitting liquid from the liquid supply and extending from within the barrel means beyond the wetting end of the barrel means and

a paper leaf expanding/opening means; characterised in that the paper leaf expanding/opening means comprises a blade (5)

- which extends axially from the barrel means (1) in the same direction and for substantially the same distance as the liquid absorbent and compressible means (2) and the blade (5) is in contact with a side surface of the liquid absorbent and compressible means (2). 5
2. An instrument according to claim 1, wherein the paper leaf expanding/opening means also has a tip end remote from the barrel means (1) and which projects in V-shape form in cross-section. 10
3. An instrument according to claim 2 wherein the tip end is ground. 15
4. An instrument according to any one of claims 1 to 3 in combination with a supply of liquid in the barrel means (1) and wherein the liquid is a water-soluble ink. 20
5. An instrument according to any one of claims 1 to 4 wherein the paper leaf expanding/opening means also has a proximal ring-shaped end portion (4) which is discontinuous at one position thereof. 25
6. An instrument according to claim 5, wherein the proximal end portion (4) is inserted in and held by the wetting end of the barrel means (1). 30
7. An instrument according to any one of claims 1 to 6, wherein the liquid absorbent and compressible means has an end portion which is slanted at an angle of from 30 to 80 degrees relative to the barrel means (1) so as to form a writing end portion and wherein a longer side of the liquid absorbent and compressible means end portion is in contact with the blade (5). 35 40
8. An instrument according to any one of claims 1 to 7, wherein the liquid absorbent and compressible means is composed of a fibre assembly. 45
9. An instrument according to any one of claims 1 to 8, wherein the liquid absorbent and compressible means serves to conduct liquid from the barrel means (1) at a flow rate in the range of from 0.3 to 1.6 g/100 m. 50
- Patentansprüche** 55
1. Trennwerkzeug für Papierblätter mit:
- einer Zylindereinrichtung (1) zum Aufnehmen und Speichern einer Zuführflüssigkeit, welche Zylindereinrichtung ein Benetzungsende aufweist;
 - einer Flüssigkeit absorbierenden und zusammendrückbaren Einrichtung (2) am Benetzungsende der Zylindereinrichtung zum Transportieren von Flüssigkeit von der Flüssigkeitszuführung, und die sich von innerhalb der Zylindereinrichtung über das Benetzungsende der Zylindereinrichtung hinaus erstreckt; und
 - einer Papierblatt-Auseinanderdrück/Öffnen-Einrichtung;
- dadurch gekennzeichnet**, daß die Papierblatt-Auseinanderdrück/Öffnen-Einrichtung eine Klinge (5) aufweist, die sich axial von der Zylindereinrichtung (1) aus in derselben Richtung und im wesentlichen über denselben weg wie die Flüssigkeit absorbierende und zusammendrückbare Einrichtung (2) erstreckt, welche Klinge (5) in Kontakt mit einer Seitenfläche der Flüssigkeit absorbierenden und zusammendrückbaren Einrichtung (2) steht.
2. Werkzeug nach Anspruch 1, bei dem die Papierblatt-Auseinanderdrück/Öffnen-Einrichtung auch über ein Spitzenende verfügt, das entfernt von der Zylindereinrichtung (1) liegt und das mit V-förmigem Querschnitt übersteht.
3. Werkzeug nach Anspruch 2, bei dem das Spitzenende geschliffen ist.
4. Werkzeug nach einem der Ansprüche 1 bis 3 in Kombination mit einer Flüssigkeitszuführung in der Zylindereinrichtung (1) und bei dem die Flüssigkeit eine wasserlösliche Tinte ist.
5. Werkzeug nach einem der Ansprüche 1 bis 4, bei dem die Papierblatt-Auseinanderdrück/Öffnen-Einrichtung auch über einen proximalen, ringförmigen Endabschnitt (4) verfügt, der an einer Stelle unterbrochen ist.
6. Werkzeug nach Anspruch 5, bei dem der proximale Endabschnitt (4) in das Benetzungsende der Zylindereinrichtung (1) eingesetzt ist und von diesem gehalten wird.
7. Werkzeug nach einem der Ansprüche 1 bis 6, bei dem die Flüssigkeit absorbierende und zusammendrückbare Einrichtung über einen Endabschnitt verfügt, der unter einem Winkel von 30 bis 80° bezogen auf die Zylindereinrichtung (1) geneigt ist, um einen Schreibendabschnitt zu bilden, und bei dem die längere Seite des Endabschnitts mit der Flüssigkeit

absorbierenden und zusammendrückbaren Einrichtung in Kontakt mit der Klinge (5) steht.

8. Werkzeug nach einem der Ansprüche 1 bis 7, bei dem die Flüssigkeit absorbierende und zu-

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sammendrückbare Einrichtung aus einer Fase-

9. Werkzeug nach einem der Ansprüche 1 bis 8, bei dem die Flüssigkeit absorbierende und zu-

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sammendrückbare Einrichtung dazu dient, Flüssigkeit aus der Zylindereinrichtung (1) mit einer Strömungsrate im Bereich von 0,3 bis 1,6 g/100 m zu führen.

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Revendications

1. Un instrument de coupe d'une feuille de papier comprenant :

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un réservoir (1) destiné à recevoir et à conserver une réserve de liquide, le réservoir ayant une extrémité de mouillage;

des moyens compressibles et d'absorption de liquide (2) à l'extrémité de mouillage du réservoir, pour transmettre le liquide à partir de la réserve de liquide, et qui s'étendent à partir de l'intérieur du réservoir jusqu'au-delà de l'extrémité de mouillage du réservoir; et

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des moyens d'expansion/ouverture de feuille de papier;

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caractérisé en ce que les moyens d'expansion/ouverture de feuille de papier comprennent une lame (5) qui s'étend axialement à partir du réservoir (1) dans la même direction et pratiquement sur la même distance que les moyens compressibles et d'absorption de liquide (2), et la lame (5) est en contact avec une surface latérale des moyens compressibles et d'absorption de liquide (2).

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2. Un instrument selon la revendication 1, dans lequel les moyens d'expansion/ouverture de feuille de papier comportent également une extrémité pointue éloignée du réservoir (1) et qui s'étend en saillie avec une forme en V, lorsqu'on l'observe en coupe.

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3. Un instrument selon la revendication 2, dans lequel l'extrémité pointue est meulée.

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4. Un instrument selon l'une quelconque des revendications 1 à 3, en combinaison avec une réserve de liquide dans le réservoir (1), et dans lequel le liquide est une encre soluble dans l'eau.

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5. Un instrument selon l'une quelconque des revendications 1 à 4, dans lequel les moyens

d'expansion/ouverture de feuille de papier ont également une partie d'extrémité proximale de forme annulaire (4) qui est discontinue dans l'une de ses positions.

6. Un instrument selon la revendication 5, dans lequel la partie d'extrémité proximale (4) est introduite dans l'extrémité de mouillage du réservoir (1) et est maintenue par cette dernière.

7. Un instrument selon l'une quelconque des revendications 1 à 6, dans lequel les moyens compressibles et d'absorption de liquide ont une partie d'extrémité qui est inclinée sous un angle de 30 à 80 ° par rapport au réservoir (1), de façon à former une partie d'extrémité d'écriture, et dans lequel le côté le plus long de la partie d'extrémité des moyens compressibles et d'absorption de liquide est en contact avec la lame (5).

8. Un instrument selon l'une quelconque des revendications 1 à 7, dans lequel les moyens compressibles et d'absorption de liquide sont constitués par un assemblage de fibres.

9. Un instrument selon l'une quelconque des revendications 1 à 8, dans lequel les moyens compressibles et d'absorption de liquide ont pour fonction d'acheminer un liquide à partir du réservoir (1) avec un débit dans la plage de 0,3 à 1,6 g/100 m.

FIG. 1

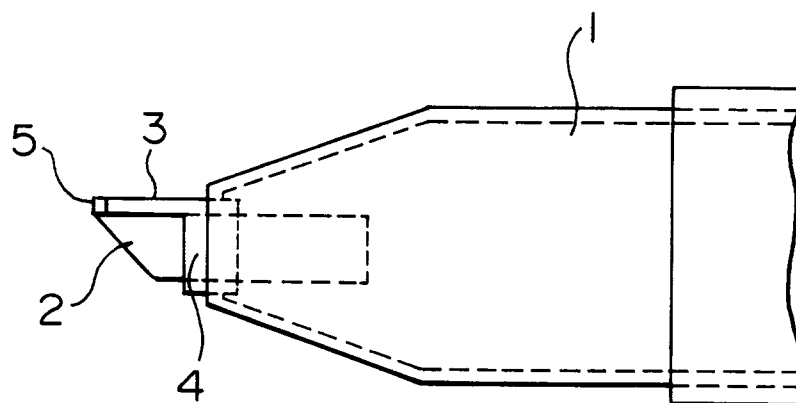


FIG. 2

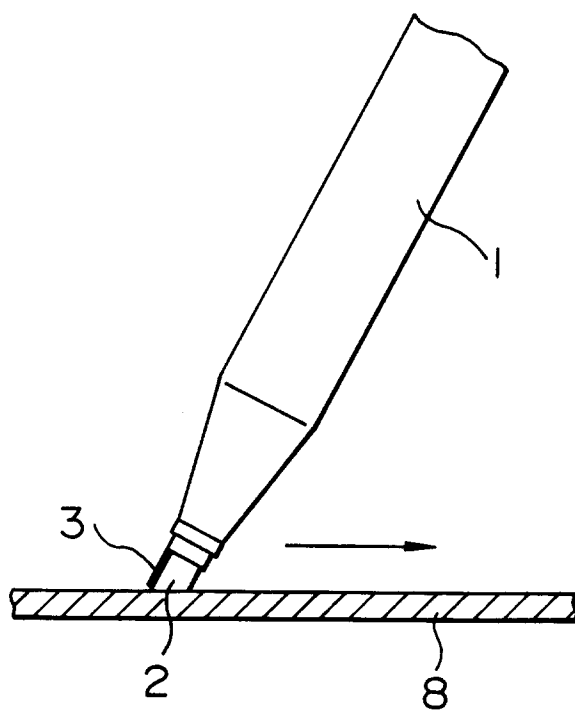


FIG. 3

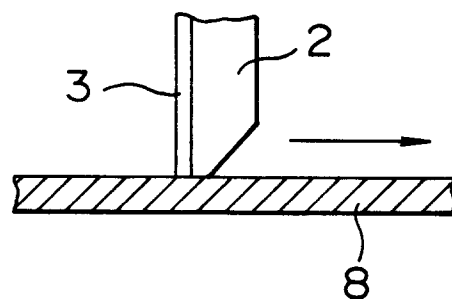


FIG. 4

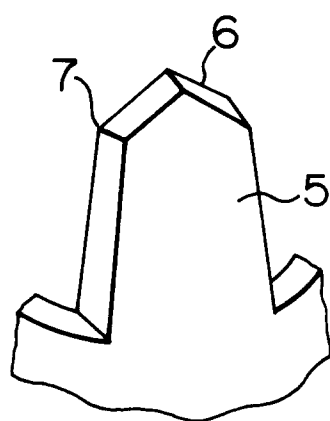
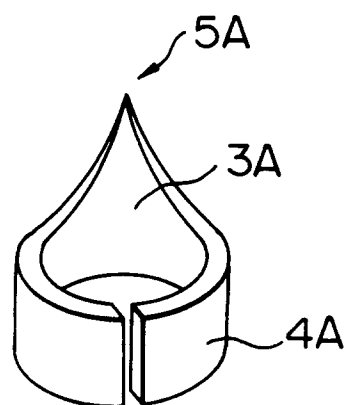
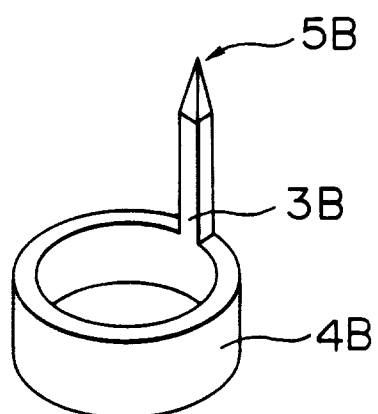


FIG. 5



F I G. 6



F I G. 7

