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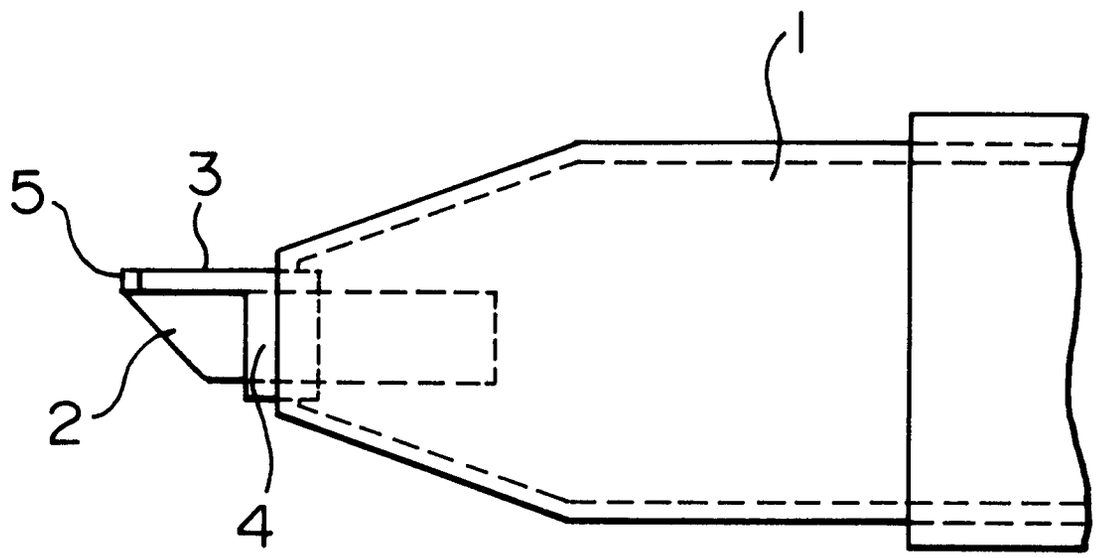
(54) **Paper leaf cutting instrument.**

(57) A paper leaf cutting instrument is disclosed which comprises a barrel portion 1 accommodating a liquid supply portion for supplying a liquid for wetting a paper surface, a wetting end portion 2 mounted on a tip end of said barrel portion and being supplied with the liquid from the liquid supplying portion, the wetting end portion having wettability and compressibility, and a paper leaf expanding/opening 3 portion having an expanding/opening blade 5 provided in contact with a side surface of the wetting end portion. A tip end of the expanding/opening blade extends substantially in the same length as the wetting end portion in an axial direction of the barrel portion.

FIG. 1



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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 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.

In order to achieve these objects of the present invention, there is provided a paper leaf cutting instrument which includes a barrel portion accommodating a liquid supply portion for supplying a liquid for wetting the paper surface, a wetting end portion mounted on a tip end of the barrel portion and being supplied with the liquid from the liquid supplying portion, the wetting end portion having wettability and compressibility, a paper leaf expanding/opening portion having an expanding/opening blade provided in contact with a side surface of the wetting end portion, and the expanding/opening blade extending substantially the same length as the wetting end portion in an axial direction of the barrel portion.

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 portion. The other end of the wetting end portion comes into contact with the liquid accommodated in the barrel portion 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 portion and project from the end thereof.

The end of the wetting end portion is 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 is 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, surrounds the wetting end portion. It is possible to insert the wetting end portion made of water-absorptive and compressibile 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 alway performed.

When the instrument is used as a cutter, when the cutting instrument is gripped substantially is 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 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;

a paper leaf expanding/opening means comprising 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.

2. An instrument according to claim 1, wherein the paper leaf expanding/opening means has a tip end remote from the barrel means, and which projects in V-shape form in cross-section.

3. An instrument according to claim 2 wherein the tip end is ground.

4. An instrument according to claim 1 in combination with a supply of liquid in the barrel and wherein the liquid is a water-soluble ink.

5. An instrument according to claim 1 wherein the paper leaf expanding/opening means has a proximal end portion in ring form and wherein the ring form is discontinuous at one position thereof.

6. An instrument according to claim 5, wherein the proximal end portion is inserted in and held by the wetting end of the barrel means.

7. An instrument according to claim 1, 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 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.

8. An instrument according to claim 1, wherein the liquid absorbent and compressible means is composed of a fiber assembly.

9. An instrument according to claim 1, wherein the liquid absorbent and compressible means is means for conducting liquid from the barrel means at a flow rate in the range of from 0.3 to 1.6 g/100 m.

10. A paper leaf cutting instrument comprising:

a hollow holder of substantially cylindrical shape;

a paper leaf expanding/opening means comprising a blade which is secured by and extends axially from the holder in one direction;

liquid absorbent and compressible means which extends into the holder and also extends axially from the holder in the same direction and substantially to the same extent as the blade.

FIG. 1

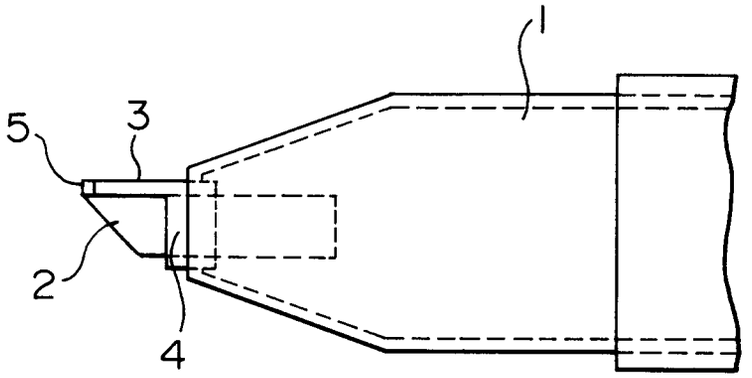


FIG. 2

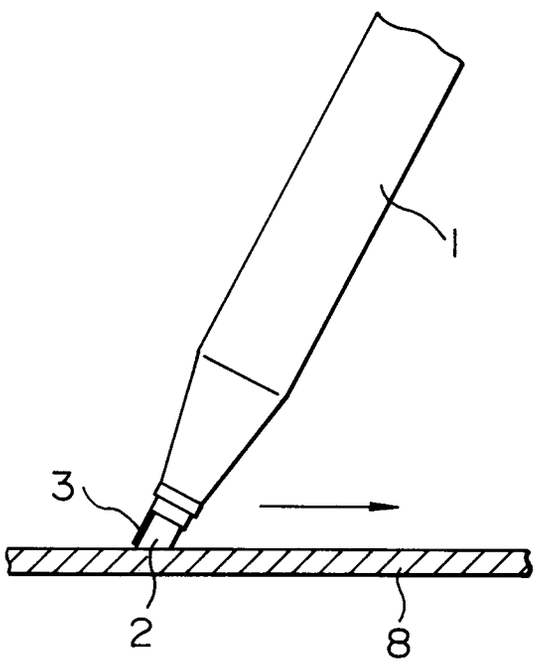


FIG. 3

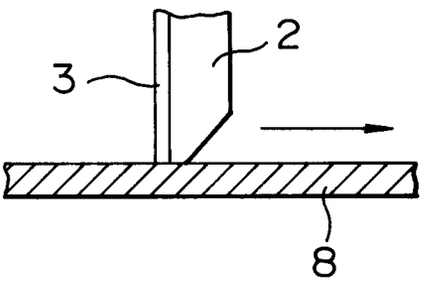


FIG. 4

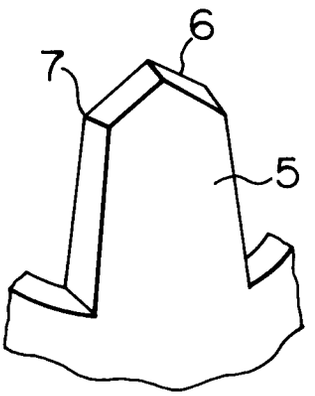


FIG. 5

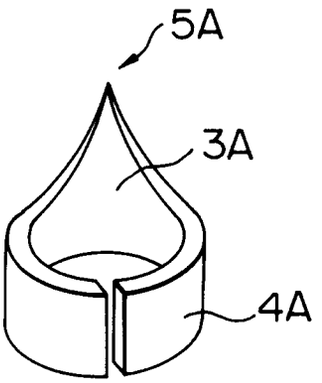


FIG. 6

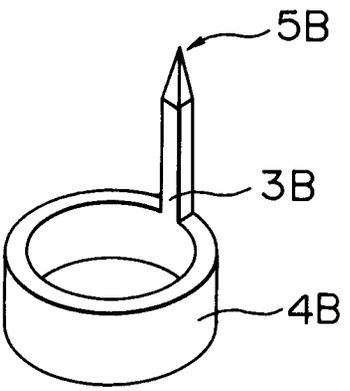
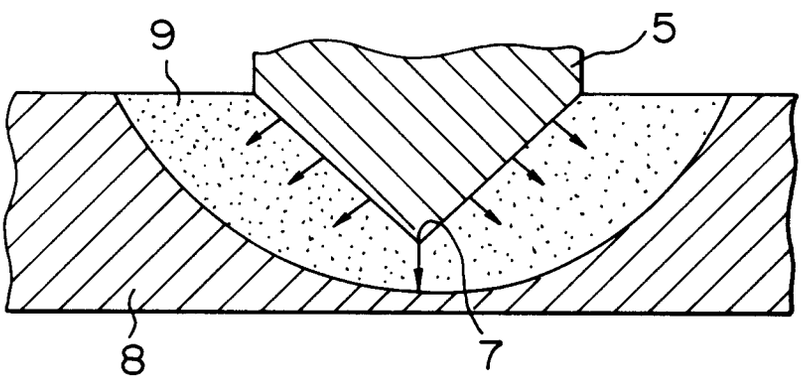


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number

EP 90 30 7535

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	JP-U- (-) * the whole document *	1	B 43 K 29/18 B 26 B 27/00
A	GB-A- (BYLICKI) * claim 1 *	1	
A	US-A-1 519 816 (WARD) * page 1, lines 39 - 59 *	5	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 43 K
B 26 B
B 43 M

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	07 February 91	LAMMINEUR P.C.G.

CATEGORY OF CITED DOCUMENTS

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