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

(11) Publication number : **0 482 950 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **91309893.5**

(51) Int. Cl.^{5} : **B43K 8/20**

(22) Date of filing : **25.10.91**

(30) Priority : **26.10.90 JP 289670/90**

(43) Date of publication of application :
29.04.92 Bulletin 92/18

(84) Designated Contracting States :
DE FR GB IT

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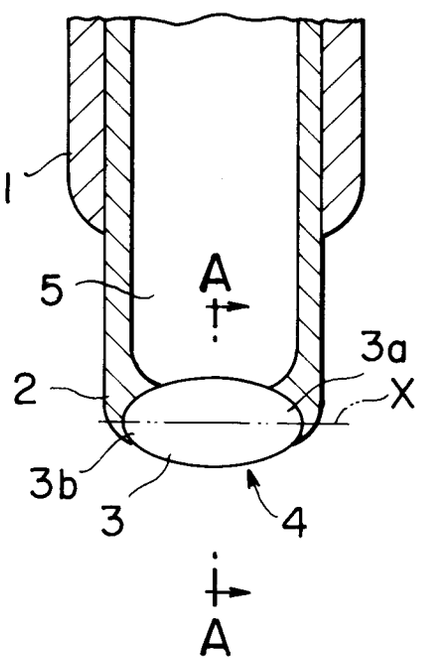
(54) Roll-point pen.

(57) A roll-point pen has a roll-tip (4) which has an ellipsoidal portion (3) and which is mounted for rotation about the longer axis of the ellipsoidal portion (3) in the end of a tubular holder (2) providing an ink reservoir (5). The surface of the ellipsoidal portion (3) may be formed with ridges (7) extending obliquely to the longer axis of the roll-tip so that a rotational force is applied to the roll-tip due to friction between it and the surface of a paper sheet when the roll-tip is moved in the direction of the longer axis thereof.

FIG. 1



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This invention concerns roll-point pens.

In known roll-point pens, a roll-tip in the form of a ball of a completely spheroidal shape is held rotatably in the end of a tubular holder. Since the ball is completely spherical such a pen has the merit of enabling it to write, whatever the direction of movement of the pen, but on the other hand the use of a spherical ball tip involves several drawbacks.

For instance, since the thickness of a line drawn by a pen with a spherical tip changes little even when pressure applied to the pen is adjusted, it can not satisfactorily draw a line of varying thickness. Accordingly, the ball-point pen is not suitable for so-called calligraphic or other writing with lines of varying thickness, such as Japanese letters .

A traditional writing brush or a pen with split nib or tip can draw such letters as described above, but a cap is indispensable to the writing utensil of this kind for protecting a writing portion or preventing the ink from coagulation or deposition, which is troublesome in use.

In addition, since a completely spheroidal tip rotates freely in all directions, its running direction may be unstable, and the writing stroke may therefore not adapt quickly to a new direction of movement of the pen.

It is, accordingly, a principal object of the present invention to provide a writing utensil capable of writing a line or stroke of varying thickness, stabilizing the writing stroke and not requiring a cap for the writing element.

According to the invention there is provided a roll-point pen comprising a roll-tip which has a writing portion of ellipsoidal form and which is held rotatably for rotation about the longer axis of said portion in the end of a tubular holder providing an ink reservoir.

A plurality of ridges may be formed on the circumferential surface of the ellipsoidal portion of the roll-tip each of which ridges is oblique to the longer axis of the ellipsoidal portion.

According to a preferred feature of the invention, part-spherical portions are formed at both axial ends of the ellipsoidal portion. The part-spherical portions may themselves provide the pivots of the roll-tip in the holder, or additional cylindrical or conical pivot portions for the roll-tip may be provided at its ends.

Thus in a roll-point pen according to the present invention, the writing portion comprises an ellipsoidal roll-tip and, accordingly, an ellipsoidally convex surface of the roll-tip abuts against the surface of a paper sheet. Therefore, when the pen is moved in a direction, in particular, perpendicular to the longer axis x of the ellipsoid as shown in Figure 10 of the attached drawings, lines of various thickness such as a_1 or a_2 can be drawn depending on the pressure applied to the roll-tip.

Further, as shown in Figure 11, the width of the spheroidal surface abutting the surface of the paper sheet becomes a maximum in the direction A perpendicular to the longer axis and becomes minimum in the direction B parallel to the longer axis. Further, the width abutting the surface of the paper sheet corresponds to the width of the longer axis projected at an angle of inclination when it is drawn in the oblique direction C. Accordingly, lines of varying thickness as a, b, c, c_2 can be drawn depending on the writing direction, that is, the longitudinal, lateral or oblique direction relative to the longer axis of the ellipsoidal portion even when the same pressure is applied to the pen tip.

Further, since the roll-tip rotates only about the axis of the ellipsoidal portion, the direction upon writing a stroke is stabilized.

The invention will now be described in more detail with reference by way of example to the accompanying drawings in which:

Figure 1 is a vertical cross sectional view of part of a roll-point pen according to the present invention;

Figure 2 is a sectional view on the line A-A shown in Figure 1;

Figure 3 is a vertical cross sectional view of a modification of the embodiment shown in Figure 1;

Figure 4 is an enlarged view of part of the writing tip illustrated in Figure 3;

Figure 5 is a sectional view of another modification of the embodiment shown in Figure 1;

Figure 6 is an enlarged view of part of the writing tip illustrated in Figure 5;

Figure 7 is a sectional view of a further embodiment of a roll-point pen according to the present invention;

Figure 8 is a sectional view on the line B-B shown in Figure 7;

Figure 9 is a sectional view illustrating a modification of the embodiment shown in Figure 7; and

Figures 10 and 11 are explanatory views illustrating the operation of a roll-point pen according to the present invention.

Referring now to Figure 1, the roll-point pen shown comprises a barrel 1, a tubular holder 2 secured in the barrel and a roll-tip 4 which has an ellipsoidal portion 3 and which is attached as the writing element at the end of the holder 2. The roll-tip 4 is supported such that it is rotatable around the longer axis X of the ellipsoidal portion 3 and fits in a liquid sealing fashion at the bottom of an ink reservoir 5 formed inside the holder 2.

In the first embodiment shown in Figure 1, spheroidal portions 3a, 3b each of smaller radius than the portion 3 are formed on the respective ends of the ellipsoidal portion 3 and are rotatably held in the tip of the holder 2 to provide the pivots of the roll-tip 4.

Integral cylindrical pivots 6a may be formed at the ends of the ellipsoidal portion 3 as shown in Figures

3 and 4, the pivots 6a being mounted pivotally in the holder 2, or alternatively as shown in Figures 5 and 6 the roll-tip may have integral conical pivots 6b. In the embodiments shown in Figures 3 and 5, it is also preferred to have part-spherical surfaces, corresponding to the spheroidal surfaces 3a and 3b, at the ends of the ellipsoidal portion 3. When the part spheroidal surfaces 3a and 3b are engaged with the holder 2, good liquid sealing performance and stable rotational operation of the roll-tip 4 are obtained.

Since the roll-tip 4 rotates about the longer axis of the ellipsoidal portion 3, the roll-point pen shown in Figure 1 can be used as a writing implement for drawing lines mainly in directions perpendicular and oblique to the longer axis.

In a further embodiment shown in Figure 7, a plurality of ridges 7, each oblique to the longer axis X of the ellipsoidal portion 3, are formed on the circumferential surface of the ellipsoidal portion 3, to enable rotation of the roll-tip 4 to be actuated also in a case of drawing a line in the direction of the longer axis of the ellipsoidal portion 3. The oblique ridges 7 constitute a means for applying a torsional force to the roll-tip 4 due to the frictional resistance relative to the surface of the paper sheet (not illustrated), thereby causing the roll 4 to rotate. That is to say that when a line is drawn in the direction of the axis X of the ellipsoidal portion 3 by abutting the portion against the surface of the paper sheet, the oblique ridges formed at the surface of the ellipsoidal portion 3 produce a frictional resistance. Since the ridges 7 are formed obliquely to the direction of the longer axis of the ellipsoidal portion 3 as described above, a rotational force is applied to the roll 4 due to this frictional resistance, and as a result, portions of the ellipsoidal surface carrying fresh ink are successively brought into contact with the surface of the paper sheet to draw a continuous line.

In this case, since the ellipsoidal portion 3 is brought into contact with the surface of the paper sheet at an ellipsoidal form extended in the direction of the writing stroke, an elongate ink retaining surface in contact with the paper is obtained and a solid or substantially solid written line can be obtained.

The oblique ridges 7 may be of rectilinear form, all slanted in one direction as shown in Figure 7, or they may be in a plurality of segments each in a V-shape as shown in Figure 8.

Since the roll-point pen according to the present invention uses a roll having an ellipsoidal portion as a writing portion, lines of varying thickness can be drawn depending on the pressure applied to the roll.

Further, since the roll-tip is brought into contact at an elliptic shape with the surface of the paper sheet, the thickness of a line varies according to the direction of movement of the pen relative to the longer axis, that is, longitudinally, laterally or obliquely, even when an identical pressure is applied to the roll-tip. Accordingly, it is possible to draw a letter having different thickness of lines such as in square or cursive styles and, in addition, alphabetical letters, musical notes, designed letters, etc. can be drawn with various characteristic expressions.

Further, since the roll-tip of the pen rotates only about the fixed axis of the roll-tip, the direction of the writing stroke can be stabilized to draw well-regulated letters or graphs.

Furthermore, in the embodiment having oblique ridges formed in the ellipsoidal portion of the roll-tip, since the rotational force is provided to the roll-tip also in a case of drawing a line in the direction of the longer axis of the ellipsoidal portion, it is possible to draw the fine letters or graphs with no scratching.

Claims

1. A roll-point pen comprising a roll-tip which has a writing portion of ellipsoidal form and which is held rotatably for rotation about the longer axis of said portion in the end of a tubular holder providing an ink reservoir.

2. A roll-point pen as claimed in claim 1, wherein a plurality of ridges are formed on the circumferential surface of the ellipsoidal portion of the roll-tip such that each of the ridges is oblique to said longer axis of the ellipsoidal portion.

3. A roll-point pen as claimed in claim 1 or claim 2, wherein the roll-tip has part-spherical portions at opposite ends of the ellipsoidal portion.

4. A roll-point pen as claimed in any one of claims 1 to 3, wherein cylindrical pivots are provided at opposite ends of the roll-tip about which pivots the roll-tip rotates relative to the holder.

5. A roll-point pen as claimed in any one of claims 1 to 3, wherein conical pivots are provided at opposite ends of the roll-tip, about which pivots the roll-tip rotates relative to the holder.

FIG. 1

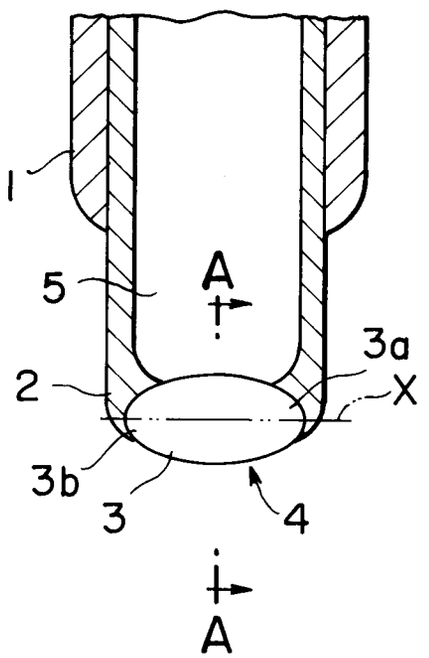


FIG. 2

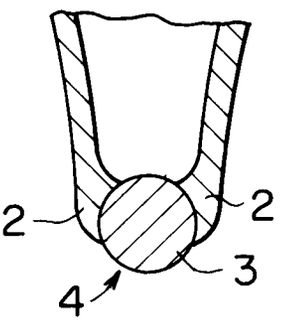


FIG. 3

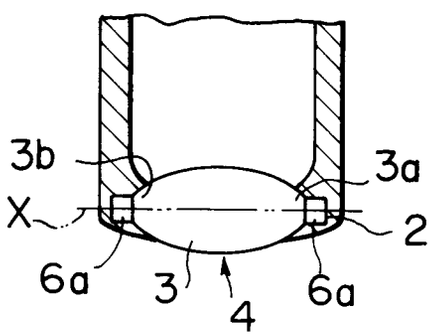


FIG. 4

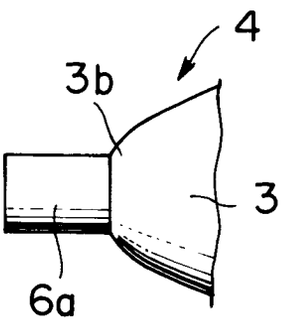


FIG. 5

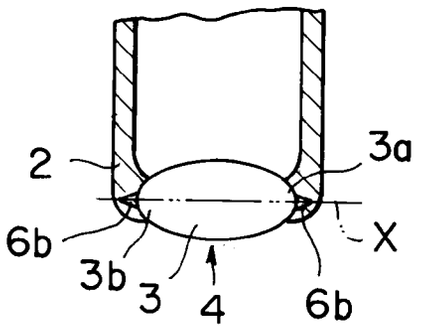


FIG. 6

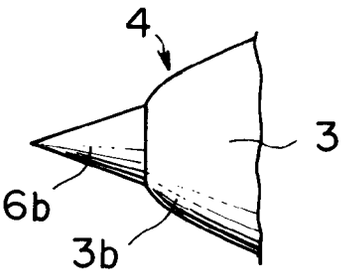


FIG. 7

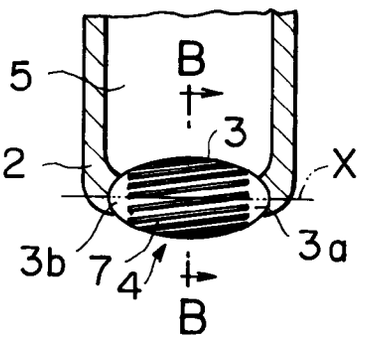


FIG. 8

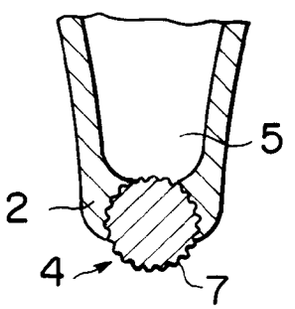


FIG. 9

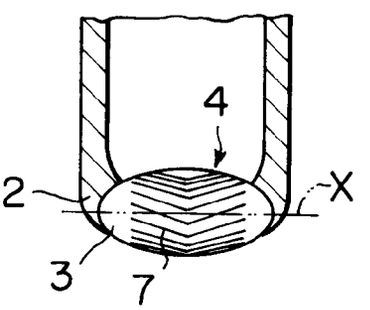


FIG. 10

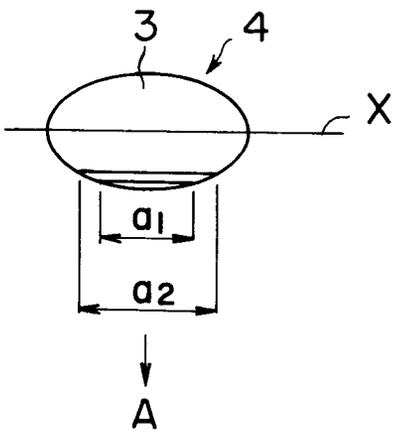
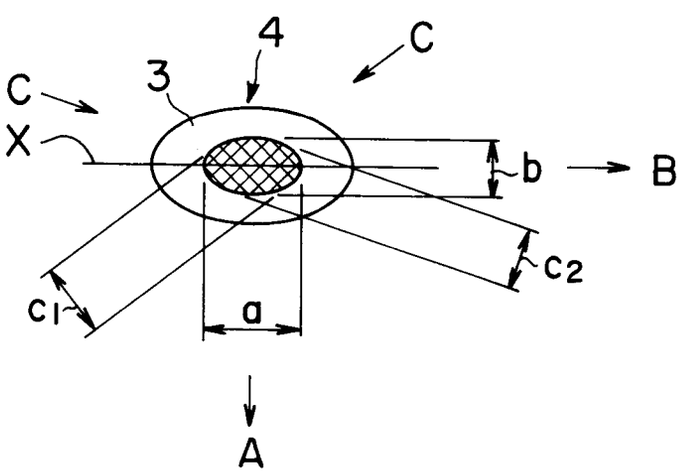


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number

EP 91 30 9893

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)
X	LU-A-49 136 (BLOCK) * page 1, paragraph 1 - page 2, last paragraph; figure *	1,5	B43K8/20
Y		2,3	
Y	US-A-2 029 056 (CARLSON) * page 1, right column, line 46 - line 51; figure 6 *	2	
Y	FR-A-962 771 (FRACHEBOUD) * page 2, line 47 - line 52; figure 7 *	3	
X	FR-A-1 003 948 (ARNAUD) * the whole document *	1,4	
X	DE-A-3 121 948 (IDEEE DESIGN) * claims 1,2,4; figures 1,5,7 *	1	
A		2	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B43K
A45D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 FEBRUARY 1992	PERNEY Y.

CATEGORY OF CITED DOCUMENTS

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