

## PATENT SPECIFICATION

732,463



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## COMPLETE SPECIFICATION

## Fountain Pen

I, GUY FRÉDÉRIC RIGONDAUD, of 2, rue Gustave Rouanet, Paris (18<sup>e</sup>), Seine, France, a French citizen, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to reservoir pens, commonly known as fountain pens.

The fountain pen according to the invention has no moving parts, is of simple and economic construction, and can be filled without actuation of a movable member. Ink contained therein cannot leak out even under the action of variations of temperature and/or pressure, and whatever the position of the fountain pen with respect to the vertical, even when subjected to jolts and impacts.

Fountain pens are known in which the ink is retained in the reservoir by a hydrophile (i.e. absorbent) material having a cellulosic base. Fountain pens of this kind have been so unreliable in operation that so far as is known they have not come into practical use.

The fountain pen according to the invention, the reservoir of which contains a hydrophile medium, is characterised in that the said medium consists of a sheet material having a mesh structure and disposed in the form of a stack, the meshes thus superimposed forming capillary spaces for the induction and retention of ink.

The sheet material of mesh structure can consist of a cellulosic substance, primarily cellulose, which can be derived for example in the known manner from cotton fibres.

Water repellent (hydrophobous) materials having a water-absorbent (hydrophilous) surface layer thereon may also be used according to the invention.

The diameter of the fibres and the dimensions of the mesh or inter fibre spacing therein are selected with regard to the amount of the capillary forces which it is desired to develop. Either or both factors may be varied, moreover, with the position of the storage element within the reservoir.

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The above considerations hold true not only for the material placed within the reservoir itself, but likewise for the material which extends the stack up to the opening which is immersed in ink.

In the usual case where the reservoir is cylindrical, the invention provides the stacking of a plurality of disc-like elements within the cylindrical cavity of a fountain-pen of conventional shape. These disc-like elements are made preferably entirely of a hydrophilous or water-absorbent material and in accordance with the statements previously made herein, the fibre diameters and mesh size defined by the fibre structure may be varied with the distance from the writing tip. Good results have however been obtained with the use of only a single type and size of disc-like elements over the length of the stack.

The ensuing disclosure, in which reference is made to the accompanying drawings, relates to one exemplary embodiment of the invention given for purposes of illustration but not of limitation. In the drawings:

Fig. 1 is a general view in axial cross section of a writing instrument embodying the invention;

Fig. 2 is a section on line 2—2 of fig. 1 on an enlarged scale;

Fig. 3 is a side elevation of a writing tip or nib.

Fig. 4 is a section on line 4—4 of fig. 3;

Fig. 5 is a plan view corresponding to fig. 3;

Fig. 6 is a front view of one element of the ink storage means;

Fig. 7 is a developed view of a flexible liner for use in one embodiment of the invention; and

Fig. 8 is a view of the rear body section in a modification.

As shown, an improved writing instrument or fountain pen comprises a cylindrical or near-cylindrical body *A* having a conventional tapered shape and made from any of the materials usual for this purpose. The body comprises two sections, a rear body section 10 and a forward body section 11, interconnected

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by a threaded joint 12. Clamped between the forward edge 13 of the rear body section and a shoulder 14 of the forward body section 11 is a retainer ring 15 serving to retain the cap or hood of the instrument, not shown.

The forward body section 11 which carries the nib is formed with a rear cylindrical chamber 16 merging through a tapered section 17 with a duct 18. Housed within the duct 18 is a tubular nib *B* comprising a cylindrical body portion 19 formed with front cutouts 20 and 21, so as to define two legs 22 and 23 tapering off at 24, 25 into a narrow nib or pen-tip 26. The nib body 19 is further formed with longitudinally extending slot 27 opening into the rear end of the tubular body at 28 and terminating at its forward end at 29, and having longitudinal side edges 30 and 31.

Received in the tubular duct 32 defined by the nib is a rod 33 which at its rear end terminates in a straight cross section 34 and at its front end a taper section 35, so as to conform with the taper of the nib.

The rod 33 is formed with a longitudinal slot 36 for imparting resiliency to it for the purpose stated below. In the illustrative embodiment, this slot is limited by vertical walls (see fig. 2) 37 and 38 interconnected by a cross wall 39.

Interposed between nib *B* and cylindrical duct 18 is a flexible liner element 40 made of an absorbent material such as cotton, wool or other suitable cellulose base substance. The slotted rod 33 presses resiliently against the internal wall of the nib, and the respective diameters of the tubular parts described are so selected that the tubular body 19 of the nib is applied under a predetermined degree of tension against the liner 40 which thus is caused to engage narrowly the walls of cylindrical duct 18.

The liner 40 may be impregnated or coated at the forward edge 40<sup>1</sup> thereof (see fig. 7) with a suitable flexible hydrophobous substance, such as a suitable synthetic resin, thereby preventing evaporation of the ink and ingress of air.

A pin 70 embedded in the forward section 11 of the body *A* is provided to cooperate with the slot 27 in positively maintaining the nib *B* against angular and axial displacement, while permitting a pivotal motion of the nib about the pin 70. The pin 70 is flush with the lateral face of the rod 33.

The pin 70 may, in a slightly modified form of construction, likewise contribute to the retention of the rod 33 by penetrating into a blind hole formed in said rod, in which case the rod may or may not be formed with the previously described slot.

The liner 40 extends at 41 into the cylindrical cavity 16. Stacked within this cavity are a plurality of disc-like elements 50 substantially equal in diameter to that of the cavity 16. The foremost disc 50<sup>1</sup> contacts the

rear edge of the liner 40. The stack consisting of the discs 50 extends into the cylindrical cavity 59 throughout which the stack consists of disc-like elements 60 generally similar in shape to the elements 50. In the construction shown, the cylindrical cavity 59 is slightly larger in diameter than the cavity 16, and accordingly, the elements 60 are larger in diameter than the elements 50.

Fitted within cavity 59 beyond the stack is a ring 61 made of a flexible, deformable material, such as cork or the like. The fit of the ring 61 in the cavity is a friction fit opposing displacement of the ring. The ring thus serves as an abutment for the stack of disc-like elements, and the stack is thus blocked between ring 61 at its rear end and the shoulder 17 at its forward end.

The instrument body section 10 defines, rearwardly of ring 61, a condensation chamber 62. This chamber communicates with the atmosphere as through the vent hole 63 formed at the rear end of the body *A*, or at any other suitable location.

In a modified form of the invention, shown in Fig. 8, a cylindrical baffle member 64 formed with a shoulder 65 is interposed between the end of stack 60 and the rear end of body 10, communication between the interior of the fountain pen and atmosphere being provided by through one or more holes such as 66 formed in the baffle member and 67 formed in the body. The provision of such a baffle will positively provide against the possibility of any outflow of ink even in the case of a violent impact against the instrument.

The disc-like elements 50 and 60 are preferably made of a cellulose base substance, a suitable substance for this purpose being cotton gauze. Excellent results have been obtained where the disc-like elements were made from cellulosic material having an average fibre thickness of 0.1 mm and average inter-fibre spacings of 0.5 mm when dry. It will be understood of course that the numerical data here given is by no means restrictive and that satisfactory results can be had even though this data is very considerably departed from.

The instrument operates as follows: To fill the instrument it is simply necessary to dip its writing extremity into writing liquid or ink. The depth to which the instrument should be immersed for the filling operation may, for example, be approximately that indicated by the line 2—2 on fig. 1. As a result of capillary forces, the ink rises up the stack of absorptive disc elements into the reservoir. An initial stage may be considered during which the fibres of the discs become drenched with ink; after the fibres have been saturated, a second stage may be thought of as setting in when the capillary mesh spaces defined by the fibres in turn become filled with the liquid. During the filling operation, air contained in the reservoir

is of course vented through the hole 63 after having passed through the condensation chamber 62.

5 The instrument is now in condition for writing. If the nib 26 is placed on and drawn across a suitable writing sheet, a line of ink will be deposited thereon in the usual way owing to the surface adhesion at the tip of the nib. As long as there is some ink remain-  
10 ing in the inter-fibre spaces or meshes of the discs, the nib will be smoothly fed.

15 Desirably, the average dimension of the inter-fibre spaces in any given cross sectional plane of the reservoir may be increased with the distance of said plane from the nib. This increase may be effected gradually or step-  
wise.

20 In practice, the pen will no longer write when all the meshes in the discs of the stack are empty. The strands or fibres of the discs remain moist however, and this condition facilitates the next filling operation, increasing the rate at which it can be effected.

25 It will be obvious that regardless of temperature and pressure variations, a pneumatic equilibrium will at all times obtain between the interior of the ink reservoir and the ambient atmosphere owing to the vent hole 63.

30 In writing, the nib *B* is applied radially against the flexible liner 40, and this increases the smoothness of the written stroke and prevents distortion of the nib.

35 The arrangement described for mounting the nib in the body is such as to provide for a perfect alignment therebetween, while at the same time assuring sufficient flexibility to prevent objectionable vibrations of the nib.

40 The provision of the rod 33 prevents evaporation of the ink from between the points of the nib.

What I claim is:—

45 1. A fountain pen the reservoir of which contains a hydrophile medium, characterised in that the said medium consists of a sheet material having a mesh structure and disposed in the form of a stack, the meshes thus superimposed forming continuous capillary conduits along the length of the reservoir for the

induction and retention of ink. 50

2. A fountain pen as claimed in claim 1, characterised in that the stack consists of superimposed discs.

3. A fountain pen as claimed in claim 2, characterised in that the discs are of cotton gauze. 55

4. A fountain pen as claimed in claim 1, characterised in that a ribbon of hydrophile substance is inserted between the mesh-structured sheet material and the nib. 60

5. A fountain pen as claimed in claim 4, characterised in that the nib has a tubular body by means of which it is mounted in a correspondingly shaped cylindrical duct of the fountain pen, with the interposition of a ribbon of hydrophile substance. 65

6. A fountain pen as claimed in claim 5, characterised in that within the tubular body of the nib is disposed a cylindrical rod which is slotted longitudinally for the purpose of imparting sufficient resilience to the rod to make it rigid with the said tubular body of the nib. 70

7. A fountain pen as claimed in claim 5, characterised in that the tubular body of the nib is formed with a longitudinal slot which cooperates with a radial pin rigid with the body of the fountain pen. 75

8. A fountain pen as claimed in claim 7, characterised in that the said radial pin is flush with the lateral face of the internal rod. 80

9. A fountain pen as claimed in claim 7, characterised in that the end of the said radial pin penetrates into a blind hole formed opposite the pin in the internal rod. 85

10. A fountain pen as claimed in claim 1, characterised in that it comprises a chamber containing the hydrophile material followed by a condensation chamber.

11. A fountain pen as claimed in claim 10, characterised in that the condensation chamber has a vent communicating with the outer atmosphere. 90

12. A fountain pen as claimed in claim 11, characterised in that the condensation chamber contains baffle means inserted between the chamber-reservoir and the said vent. 95

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Fig.1

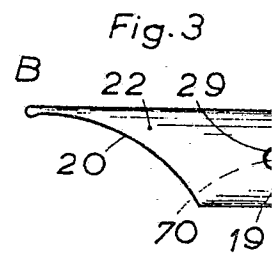
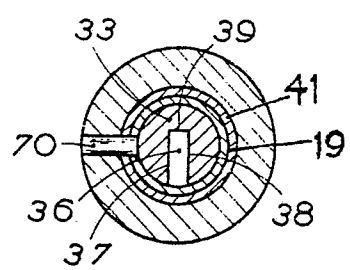
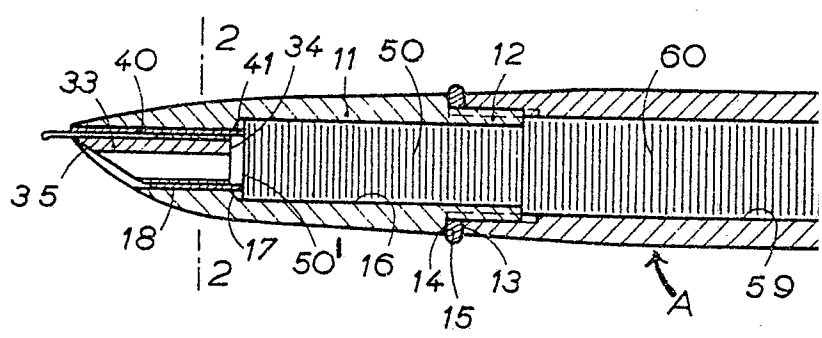


Fig.2

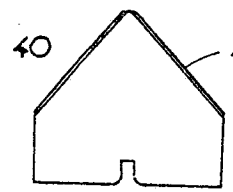
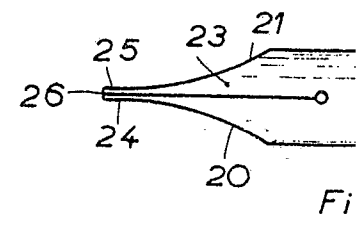


Fig.7



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1 SHEET This drawing is a reproduction of the Original on a reduced scale.

Fig. 1

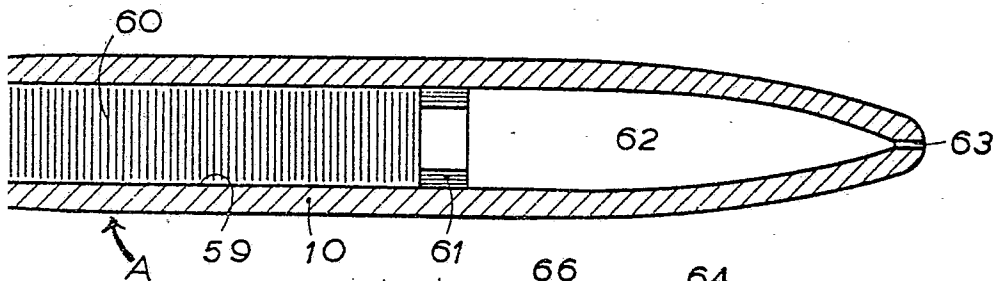


Fig. 8

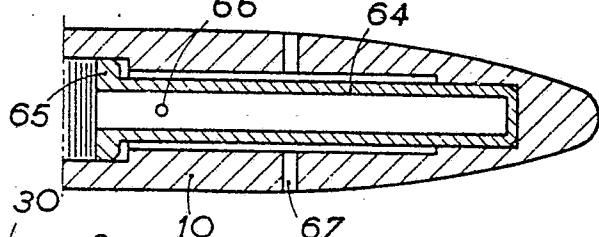


Fig. 3

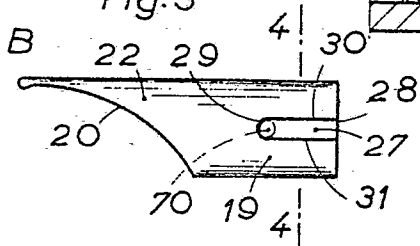


Fig. 4

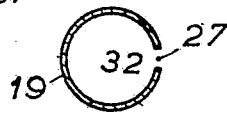


Fig. 5

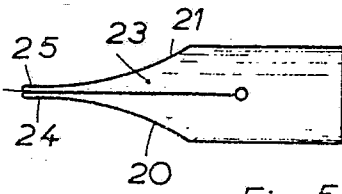


Fig. 6

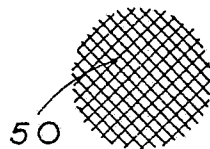


Fig.1

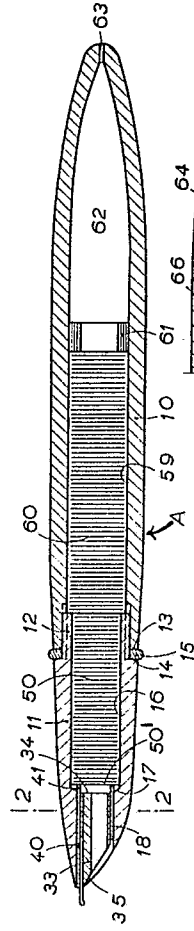


Fig.8

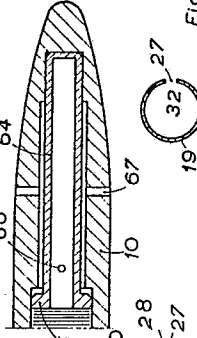


Fig.3

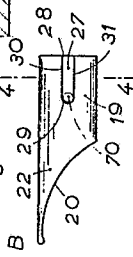


Fig.4



Fig.2

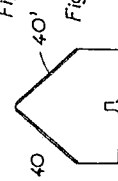


Fig.6

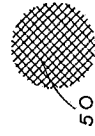


Fig.5

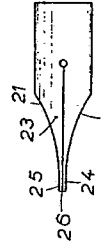


Fig.7

