PATENT SPECIFICATION

1,017,991

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Inventor: DERRICK JOHN SILVER.

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Int. Cl.:—B 43 c.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in Self-Filling Fountain Pens

ERRATA

SPECIFICATION NO. 1,017,991

AMENDMENT NO. 1

Page 2, line 7, *for* "with" *read* "without"

Page 3, line 93, *for* "the" *read* "this"

THE PATENT OFFICE,
18th March, 1966

D 63796/5

a supply of ink when the nib of the pen is dipped into a body of ink, will then retain such supply and will subsequently feed it to the nib during the action of writing, the filling being coupled to the nib by an ink-conducting element such as a wick.

Such fountain pens, in which the reservoir space is vented to the atmosphere at or towards the end remote from the nib, are insensitive to variations in pressure and temperature and are generally satisfactory. However, it has been found necessary in the past to limit the axial dimension of the filling of material in the reservoir space so as to ensure that the quantity of ink initially taken up by the material during a filling operation will be stably retained while the pen is vertically disposed. This is due to the fact that the axial dimension or length of the filling may be made somewhat greater than what is termed herein the "stable-column length", defined as the greatest length of the filling which can stably retain, while the pen is vertically disposed, all the ink taken up during a filling operation, and yet take up a full charge of ink although the excess quantity of ink (repre-

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ing body of ink in the filling material tends to move to the end of the filling remote from the nib as soon as the pen is placed nib-uppermost (which is the normal disposition of the pen while being carried on the person) with a consequent draining of ink from the portion of the filling adjacent to the nib. When the pen is again used for writing purposes there is sometimes considerable difficulty in starting the flow of ink to the point of the nib and this fault becomes progressively more pronounced as the quantity of ink held in the filling is reduced.

On the other hand, if the filling of material in the reservoir space of the pen is restricted to the stable-column length, it is necessary to employ an accurately manufactured nib having a slit of very small width. Not only is the nib difficult and costly to make but its writing characteristics are somewhat undesirable in that a free flow of ink to the writing point is unobtainable and the nib is relatively inflexible with a "hard" feel in use. In addition, a person who writes with a heavy pressure can soon put the nib out of set by spreading the points of the nib, with permanent deforma-

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in Self-Filling Fountain Pens

We, MENTMORE MANUFACTURING CO. LIMITED, a Company registered under the laws of Great Britain, of Platignum House, Six Hills Way, Stevenage, Hertfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to self-filling fountain pens of the kind (hereinafter referred to as "the kind specified") in which the reservoir space contains a filling of a material offering a multiplicity of capillary passages or interstices which will take up a supply of ink when the nib of the pen is dipped into a body of ink, will then retain such supply and will subsequently feed it to the nib during the action of writing, the filling being coupled to the nib by an ink-conducting element such as a wick.

Such fountain pens, in which the reservoir space is vented to the atmosphere at or towards the end remote from the nib, are insensitive to variations in pressure and temperature and are generally satisfactory. However, it has been found necessary in the past to limit the axial dimension of the filling of material in the reservoir space so as to ensure that the quantity of ink initially taken up by the material during a filling operation will be stably retained while the pen is vertically disposed. This is due to the fact that the axial dimension or length of the filling may be made somewhat greater than what is termed herein the "stable-column length", defined as the greatest length of the filling which can stably retain, while the pen is vertically disposed, all the ink taken up during a filling operation, and yet take up a full charge of ink although the excess quantity of ink (representing that portion of the charge which is absorbed into the part of the filling extending beyond the end of the stable-column length) tends to be discharged very easily from the filling material, under the action of gravity, when the pen is held in a vertical position. This discharge, which may occur while the pen is in a pocket of the user's clothing, increases the risk of leakage of ink through the air vent of the pen with disadvantageous consequences. Another drawback of pens having a filling of greater than stable-column length is the fact that after a small quantity of the ink has been expended in writing operations, the remaining body of ink in the filling material tends to move to the end of the filling remote from the nib as soon as the pen is placed nib-uppermost (which is the normal disposition of the pen while being carried on the person) with a consequent draining of ink from the portion of the filling adjacent to the nib. When the pen is again used for writing purposes there is sometimes considerable difficulty in starting the flow of ink to the point of the nib and this fault becomes progressively more pronounced as the quantity of ink held in the filling is reduced.

On the other hand, if the filling of material in the reservoir space of the pen is restricted to the stable-column length, it is necessary to employ an accurately manufactured nib having a slit of very small width. Not only is the nib difficult and costly to make but its writing characteristics are somewhat undesirable in that a free flow of ink to the writing point is unobtainable and the nib is relatively inflexible with a "hard" feel in use. In addition, a person who writes with a heavy pressure can soon put the nib out of set by spreading the points of the nib, with permanent deforma-

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tion of the metal, until the pen ceases to function.

The present invention is concerned with improvements in pens of the kind specified which shall make it possible to store a larger supply of ink than usual in the filling material, with risk of leakage of ink during normal use, so that the nib need not be made to such close tolerances and will write without inconvenient delay after the pen has been kept in the nib-uppermost position for some time.

According to the invention a pen of the kind specified has the filling of material in the reservoir space of the pen provided as two separate bodies, one of which is located adjacent to the nib of the pen in permanent ink-feeding relationship to the nib and the other of which is mounted so that it may move longitudinally under the action of the force due to gravity towards and away from a position in which it is in ink-feeding relationship to the first body, the axial length of each body being less than the stable-column length as herein defined but the sum of the axial lengths of the bodies being greater than this stable-column length.

One construction of a fountain pen embodying the invention is described in greater detail below with reference to the accompanying drawings, wherein:—

Fig. 1 is a part sectional elevation of the pen in the nib-uppermost position,

Fig. 2 is a longitudinal section of the pen in the nib-downwards position,

Fig. 3 is an end view of the pen taken from the nib-end,

Fig. 4 is a plan view of the feed element of the pen and

Fig. 5 is an under-plan view of this element.

This pen comprises a barrel 1 and a nib-section 2 secured together at a screw-threaded joint 3 (Fig. 2), the end 1*a* of the barrel remote from the joint being closed and the free end of the nib-section remote from the joint being fitted with a nib 4 and a feed element 5. The free end of the nib-section is closed except for an axially extending passage 6 (Figs. 2 and 3) into which is tightly fitted the feed element 5 having the nib 4 placed in contact with its upper face and interlocked therewith by inter-engaging projections and recesses (the projections on the feed element being shown at 5*a* in Fig. 4 and one of the recesses or notches in the edges of the nib being shown at 4*a* in Fig. 2). The upper face of the feed element has a shallow recess 5*b* (Fig. 4) formed therein to contain a piece 7 of the capillary mesh fabric which is to be employed to constitute the filling of the reservoir space of the pen (as hereinafter described), this recess extending from near the inner end of the element to near the outer or free end thereof beneath part of the length of the slit 4*b* (Figs. 2 and 3) in the nib. The underside of the element 5 is formed with a longitudinally extending groove 5*c* (Figs. 2, 3 and 5) through which ink can gain access to the space within the nib-section 2, when this is dipped into a body of the ink, and also has abutments 5*d* adapted to engage a shoulder 6*a* (Figs. 2 and 3) formed in the passage 6 in the end of the nib-section in order to limit the extent to which the nib and feed element assembly may be pressed into the passage. At the appropriate location the wall of this passage 6 is formed with spaced longitudinally extending ribs 6*b* (Figs. 2 and 3) adapted to bear on the back of the nib 4 and leave between them a channel in which is disposed the end of a wick 8 that extends (see Fig. 2) from the free end of the nib-section 2 in close contact with the back of the nib (over a part of the slit 4*b* therein) to be folded across the inner end of the nib and then folded again to extend along the inner surface of the nib section to the other end thereof.

The space within the nib-section is filled with a spirally rolled length 9 of a capillary mesh fabric, which roll extends from the inner end of the nib 4 to a short distance beyond the open end of the nib-section. A suitable fabric is one knitted from nylon yarn and generally known as a "tricot". The axial length of the fabric roll 9 is somewhat shorter than the stable-column length referred to above.

Within the barrel 1 of the pen is a longitudinally extending space 10 of circular cross-section that is substantially cylindrical throughout its length and is vented to the exterior of the barrel by way of a small aperture 11 in the wall thereof at about its centre of length. Freely slidable within the space 10 in the barrel is a sleeve 12, of a suitable synthetic plastics composition, for example, in which is contained a second spirally rolled length 13 of the capillary mesh fabric, this roll projecting from the sleeve at each end. The sleeve, which substantially fills the cross-section of the space, is weighted, for example, by slipping a tightly-fitting metal sleeve 14 over a reduced diameter end thereof. The length of the second fabric roll 13 is again somewhat less than the stable-column length and may be about equal to half the length of the space within the barrel. So that the sleeve 12 containing this roll may slide freely within the barrel despite the presence of ink in the latter, either the surfaces of the interior of the barrel and the exterior of the sleeve are treated with a water-repellent composition or the sleeve is formed (as shown in Figs. 1 and 2) with small pro-

tuberances 12*a* which will space the exterior of the sleeve from the interior of the barrel by a short distance.

The combined lengths of the two fabric rolls 9 and 13 give an overall length which is substantially greater than the stable-column length, for example, equal to the stable-column length plus 30% to 50%. The mesh size of the fabric employed has, of course, to be taken into account in arriving at the appropriate stable-column length.

A cap is provided in the usual way (it is not illustrated) to protect the nib-end of the pen when the latter is out of use.

A pen as described functions in the following manner.

When the pen is placed vertically with the nib 4 downwards as shown in Fig. 2, the sleeve carrying the second fabric roll 13 slides down inside the barrel until the lower end of the roll comes to bear upon the upper end of the fabric roll 9 in the nib-section of the pen. The two fabric rolls then constitute a continuous reservoir of a capillary nature into which ink can be inducted or absorbed when the nib end of the pen is immersed to a suitable depth in a body of ink. The ink rises, by capillary action, to the full height of the composite column composed of the two fabric rolls 9 and 13.

On removing the pen from the body of ink and allowing it to drain for a short time, any ink not held in capillary interstices is relinquished but there remains a column of ink of a length exceeding the stable-column length by some 30% to 50% (dependent upon the lengths selected for the rolls 9 and 13). This ink is not held so stably as it would be in a column of the stable-column length and thus will provide an adequate flow to the nib 4 without its being necessary to construct the latter to the high degree of accuracy normally required in a capillary pen.

On inverting the pen to the position shown in Fig. 1, as when placing it (provided with a cap on the nib-end) in a pocket of the user's clothing, the sleeve 12 carrying the second fabric roll 13 slides to the closed end of the barrel. In this condition, the reservoir consists of two sections 9 and 13 each of less than the stable-column length which are separated by an intervening gap. Consequently, the volume of ink held in each section is stably retained and there is no risk of undesired discharge of ink from either section.

Should there happen to be some excess ink in the nib-section 2 of the pen, *i.e.* ink not held in capillary interstices of the filling 9, this excess will flow into the second fabric roll 13 during the inversion of the pen and be carried by this roll to the bottom of the barrel. When the pen is again returned to the nib-downwards position, ink carried in the second fabric roll 13 can again be transferred from the latter to the fabric roll 9 in the nib-section by reason of the contact between the two fabric rolls.

If some ink should be dislodged from the fabric rolls 9 and 13 into the barrel of the pen, due to the subjection of the pen to shocks, as by its being dropped this ink is quickly absorbed by the second fabric roll 13 as it reaches the bottom of the barrel.

WHAT WE CLAIM IS:—

1. A pen of the kind specified having the filling of material in the reservoir space of the pen provided as two separate bodies, one of which is located adjacent to the nib of the pen in permanent ink-feeding relationship to the nib and the other of which is mounted so that it may move longitudinally under the action of the force due to gravity towards and away from a position in which it is in ink-feeding relationship to the first body, the axial length of each body being less than the stable-column length as herein defined but the sum of the axial lengths of the bodies being greater than the stable-column length.

2. A pen according to claim 1, wherein each body of reservoir-filling capillary material is a spirally rolled length of fabric.

3. A pen according to claim 1 or 2, wherein the movable body of capillary material is held in but projects at each end beyond a sleeve slidable within the barrel of the pen.

4. A pen according to claim 1 substantially as herein described with reference to the accompanying drawings.

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1 SHEET

COMPLETE SPECIFICATION

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

Fig. 1.

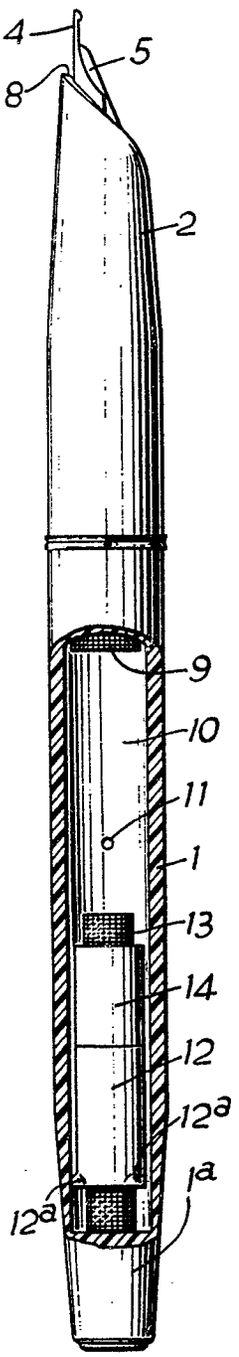

Fig. 3.

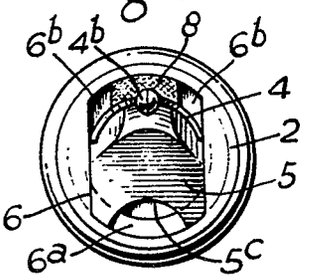

Fig. 4.

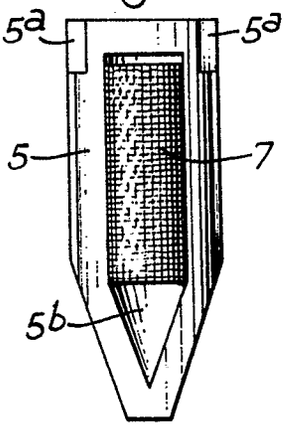

Fig. 5.

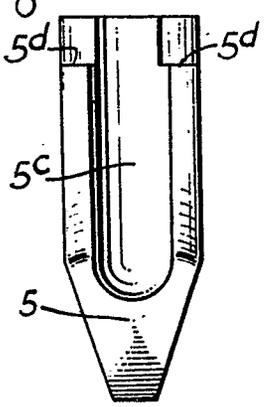

Fig. 2.