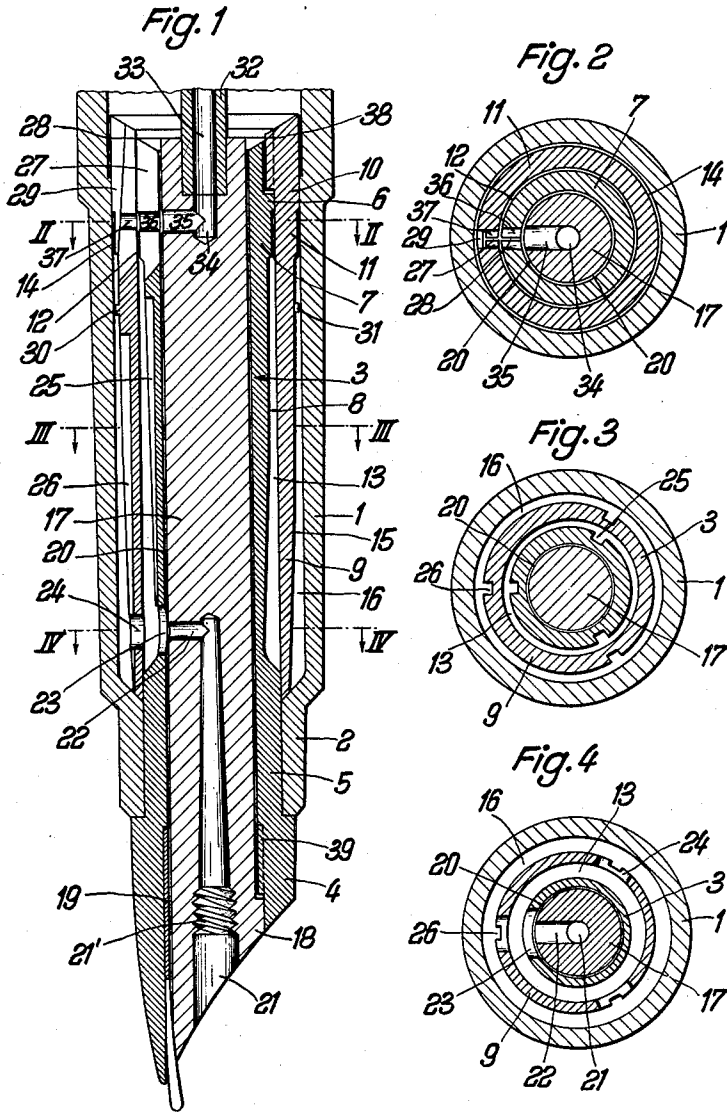


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FOUNTAIN PEN WITH OVERFLOW CHAMBER SITUATED
IN THE FRONT PART OF THE FOUNTAIN PEN BODY
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**FOUNTAIN PEN WITH OVERFLOW CHAMBER
SITUATED IN THE FRONT PART OF THE
FOUNTAIN PEN BODY**

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4 Claims. (Cl. 120—50)

This invention relates to fountain pens having an overflow chamber situated in the front part of the fountain pen body which consists of at least one longitudinally extending capillary space of annular cross section narrowing towards the ink reservoir and communicating at the front with the atmosphere and at the rear through an air passage with the ink reservoir.

It is an object of the invention to improve the functioning of the overflow chamber formed by the capillary space or spaces by specially designing said space or spaces. It is a special object of the invention to control the processes of filling and emptying of the overflow chamber more accurately than has hitherto been possible.

It is another object of the invention to facilitate the assembling of the fountain pen.

Other objects of the invention concern details which will facilitate the disassembling and reassembling for cleaning purposes of the parts essential for the proper functioning of the fountain pen.

The front part of a fountain pen according to the invention is shown at an enlarged scale, and by way of example only, in the accompanying drawing in which:

Fig. 1 is a longitudinal section of the front part of the fountain pen in the plane of symmetry, and

Figs. 2, 3 and 4 are cross sectional views taken along the corresponding lines II—II, III—III, and IV—IV of Fig. 1.

In the drawings, 1 designates the front part of the hollow fountain pen body, in the rearwardly closed rear part of which (not shown) is located the ink reservoir. The bore of the fountain pen body is restricted at its front end 2. A tubular body 3 having a head 4 is inserted in the fountain pen body from the front so that only its head 4 projects outside said body. The shank portion 5 of the tubular body adjacent the head 4 is sealingly and fixedly retained in the mouth of the fountain pen body. The outside diameter of the rear end portion 6 of the tubular body is by a few ten thousandths of an inch smaller than that of the shank portion 5, so that the rear end portion 6 may readily be inserted through the mouth of the fountain pen body. The tubular body has an intermediate portion of reduced diameter extending between the shank portion 5 and the end portion 6. A short section 7 of the tubular body adjacent the end portion 6 has a diameter about .008 in. (0.2 mm.) smaller than that of the end portion 6. The intermediate portion of the tubular body extending between the section 7 and the shank portion 5 is of a more reduced diameter and tapers from the section 7 towards the shank portion 5 following the shape of a hyperbola or of a hyperbola-shaped curve. In the bore of the fountain pen body is inserted from the rear a sleeve 9 which with its rear end 10 is fixedly retained in the bore of the fountain pen body. The sleeve 9 with its front end embraces the shank portion 5 and is thereby centered at the front. Between its rear end portion 10 and its front end, the sleeve is of reduced outside diameter. A short section 11 of the sleeve adjacent the rear end portion 10 has

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an outside diameter about .008 in. (0.2 mm.) smaller than that of the end portion 10. The part of the sleeve extending from section 11 to the front end thereof is of more reduced diameter. The sleeve tapers in longitudinal cross section towards the front following the form of a hyperbola or of a hyperbola-like curve. The section 7 of the tubular body 3 forms within the bore of sleeve 9 a space 12 of annular cross section which is so narrow that, during writing, it retains the quantity of ink previously received therein. The capillary space formed within the bore of sleeve 9 by the hyperboloid surface 8 of the tubular body 3 narrows in longitudinal cross section towards the ink reservoir, following the form of a hyperbola or of a hyperbola-like curve, and is so dimensioned as to be capable of receiving excess ink and giving it off again. The section 11 of sleeve 9 forms within the bore of the fountain pen body a space 14 corresponding to the narrow space 12, while the hyperboloid surface 15 of sleeve 9 forms an outer space 16 corresponding to the inner capillary space 13. Both spaces 13 and 16 constitute the overflow chamber.

The tubular body 3 is provided with a through bore the inner diameter of which is approximately .02 in. (0.5 mm.) greater within the head 4 than behind said head. Inserted from the front into the bore of the tubular body is a pin 17 having a thickened front portion 18 which fits into the front part of the bore of the tubular body and is provided with a recess adapted to receive the pen 19. The reduced rear portion of the pin has an outside diameter which is by about .004 in. (0.1 mm.) smaller than the diameter of the surrounding bore, whereby a narrow space 20 of annular cross section adapted to conduct ink therethrough is formed around the reduced rear portion of the pin.

The head 4 of the tubular body 3 covers the pen almost up to its point. An axial vent passage 21 narrowing towards the rear and extending upwardly into the region of the front portion of the capillary spaces 13, 16 is provided in the front part of pin 17. In its wider front part the vent passage 21 is provided with threads, while at its rear end, it communicates with space 13 through a narrow transverse bore 22 of pin 17 and through a further transverse bore 23 formed in the tubular body 3. The sleeve 9 surrounding the tubular body is provided with three transverse bores 24 equally spaced around its circumference, one of said bores being aligned coaxially with the aligned transverse bores 22 and 23. The tubular body 3 and the sleeve 9 are each provided with sets of three longitudinal grooves 25 and 26 respectively, equally spaced around their circumference. One of the longitudinal grooves 25 terminates at the front in the wide transverse bore 23, while the longitudinal grooves 26 terminate in the wide transverse bores 24 of sleeve 9. The longitudinal grooves are of such width that they have a lower capillary potential than the capillary spaces 13, 16, whereby the surfaces 8 and 15 of the respective bodies 3, 9 forming the capillary spaces 13, 16 are divided into longitudinal lands.

On the pen side of the fountain pen, the rear end portion 6 of the tubular body 3 and the rear end portion of sleeve 9 are provided with respective narrow longitudinal slots 27, 28 which when wet will not allow the passage of air. An air passage 29 about .02 in. (0.5 mm.) wide and increasing in depth towards the ink reservoir, is provided in the rear end portion of the sleeve in the central plane of slot 28. An integral flange 30 presenting a recess 31 on the side opposite the pen, is arranged on the sleeve 9 about .08 in. (2 mm.) ahead of the section 11 thereof. At the rear the longitudinal slots 25 of the tubular body terminate short of the section 7, while the longitudinal slots 26 terminate short of collar 30.

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The space 16 communicating with the ink reservoir through air passage 29 narrows in cross section towards the pen side of the fountain pen, whilst the space 13 is of constant circumferential width. The space 16 has a higher capillary potential than the space 13, at least in its rear part.

Fixed in the rear end of the ink conductor pin 17 is an air evacuating tube 32 the bore 33 of which communicates with the space 16 via a short axial bore 34 of the pin, aligned, radial bores 35, 36, 37, and air passage 29, and with the atmosphere via bores 24, 23, 22 and 21.

The relative position of the ink conductor pin 17 inserted from the front into the tubular body 3, and of the sleeve 9 inserted from the rear into the bore of the fountain pen body, is assured by the connection of both parts with the tubular body. The position of pin 17 is determined by a key 39 of the tubular body, while the position of the sleeve is determined by a key 38 engaging in a groove of the tubular body.

The fountain pen according to the invention functions as follows: The fountain pen is filled by drawing in ink in the usual manner. During writing, the ink flows from the ink reservoir through the ink conduit 20 to the pen 19, while the replacement air normally passes through the vent passage 21, the overflow chamber, and the air passage 29, into the ink reservoir. Any excess ink that may be present flows from the ink reservoir via the longitudinal slots 27, 28, and the air passage 29, into the overflow chamber, in which it advances from the rear towards the front. During writing, ink is drawn from the ink reservoir via the ink conduit 20, whereby a negative pressure is created in the reservoir which prevents the excess ink in the overflow chamber from flowing back into the reservoir. After the elimination of all excess ink, replacement air will normally enter the reservoir.

The longitudinal grooves 25, 26 assure complete filling of the spaces 13, 16 forming the overflow chamber, due to the fact that they have a lower capillary potential than the said spaces and divide the spaces into longitudinal lands from which, during the advance of the excess ink, the air may readily escape through the longitudinal grooves not covered with ink.

The longitudinally extending capillary spaces 13, 16 taper in longitudinal cross section towards the ink reservoir following the form of a hyperbola or of a hyperbola-like curve. With a constant taper of the spaces towards the ink reservoir, the capillary potential in said spaces is irregular, being lower in the region corresponding approximately to the medium height of said spaces, than in the regions above and below thereof. This disadvantage is eliminated by the novel design of said spaces according to the invention, and the functioning of the overflow chamber is substantially improved.

The outer space 16 communicating with the ink reservoir through air passage 29 possesses a higher capillary potential than the inner space 13, at least in its rear portion, so that the spaces will fill and empty in the desired sequence. The complete filling and emptying of

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the spaces is further assisted by the fact that the outer space communicating with the reservoir through the air passage, narrows in transverse cross section towards the pen side of the fountain pen, whilst the inner space is of constant circumferential width.

The air passage 29 connecting the overflow chamber with the ink reservoir increases in depth towards the latter. Consequently, the replacement air will encounter the necessary resistance only in the narrower front part of the passage, and will periodically block the upper part of the passage only for shortest periods of time, whereby the air passage may also act as an ink passage to the overflow chamber.

The vent passage 21 in the front portion of the ink conductor pin 17 narrows towards the rear in order to permit the ink contained in said vent passage from the filling operation may be used up without an increase in flow intensity. Threads 21' provided in the wider front of the passage retain the ink and conduct it by increased capillary effect into the narrower rear part of the bore.

I claim:

1. A fountain pen, comprising a barrel formed with an ink reservoir in the rear portion thereof, at least one sleeve arranged within the front portion of said barrel, the surfaces of said sleeve and of said barrel defining therebetween at least one longitudinally extending capillary annular overflow ink storage space, said space tapering from the front to the rear, said sleeve being formed with a plurality of continuous uninterrupted longitudinal grooves cut into the outer surface thereof and extending over a length intermediate and non-contiguous the end portions of said sleeve, said grooves having a lower capillary potential than said overflow ink storage space and said sleeve being otherwise uncompartmented in a transverse direction.

2. A fountain pen as set forth in claim 1, said sleeve being formed with transverse bores in the front part of said sleeve, said grooves terminating at their front ends at said bores.

3. A fountain pen as set forth in claim 2, including a flange integral with said sleeve near the rear end thereof, said grooves terminating at their rear ends at said flange.

4. A fountain pen as set forth in claim 2, wherein said capillary annular space tapers substantially along a hyperbolic curve from the front toward the rear of said pen.

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