PATENT SPECIFICATION

795,902

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COMPLETE SPECIFICATION

Improvements in Fountain Pens

I, THEODOR KOVACS, of 19 Nottelmann Ufer, Hanover-Buchholz, Germany, German 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 a fountain pen having an overflow chamber, provided in the front portion of the barrel, consisting of at least one longitudinally extending capillary intermediate space of annular cross section, contracting towards the reservoir and connected in front to the atmosphere and behind, by an air channel, to the reservoir.

The object of the invention is to improve the action on filling and emptying of the overflow chamber and to feed more uniformly the ink on writing.

An essential feature of the invention consists in the surfaces of the bodies forming the capillary intermediate space or spaces or longitudinal grooves, being divided into longitudinal lands, the longitudinal grooves having a lower capillary potential than the intermediate spaces. By this measure the overflow chamber is subdivided into longitudinally extending spaces distributed around the circumference, which fill uniformly on excess of ink occurring, for instance, by heating on writing, so that the receptivity of the overflow chamber is well utilised.

If the longitudinal grooves, in accordance with a further feature of the invention, open in front into transverse bores serving to admit air into the capillary intermediate space, the supply of air to the reservoir is facilitated.

It is already known to form an overflow chamber, consisting of two capillary intermediate spaces, by inserting from the front into the barrel, a hollow stem surrounded, with a clearance, by a sleeve. According to a further feature of the present invention, the sleeve abuts with its front end against the hollow stem and has behind the abutment surface, transverse bores which serve to admit air into the capillary intermediate spaces formed by the sleeve. By this measure to a certain extent two intermediate spaces subdivided by longitudinal grooves are connected in parallel.

In order to ensure under all circumstances a filling of the capillary intermediate spaces with excess ink, beginning from behind, the capillary intermediate spaces, according to a further feature of the invention, contract towards the reservoir longitudinally following a hyperbolic or hyperbola-like curve.

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

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

Figs. 2, 3 and 4 are transverse sections on the lines II—II, III—III and IV—IV of Fig. 1.

In the drawings, 1 designates the front part of the hollow fountain pen barrel, in the rearwardly closed rear part of which (not shown) is located the ink reservoir. The bore of the fountain pen barrel is constricted at its front end 2. A hollow stem 3 is inserted into the barrel from the front as far as its head portion 4. The neck portion 5 of the hollow stem adjoining the head portion 4 is held fluid-tight and firmly in the mouth of the barrel. The outside diameter of the rear end portion 6 of the hollow stem is by a few hundredths of a mm. smaller than that of the neck portion 5, so that the rear end portion 6 can be easily inserted through the mouth of the barrel. The hollow stem is reduced between the neck portion 5 and the end portion 6. A short section 7 of the hollow stem adjoining the end portion 6 has a diameter of about 0.2 mm. smaller than that of the end portion 6. The intermediate portion of the hollow stem extending between

the section 7 and the neck portion 5 is of a more reduced diameter and tapers from the section 7 to the neck portion 5 longitudinally following a hyperbola or a hyperbola-like curve. In the bore of the barrel is inserted from the rear a sleeve 9 which with its rear end portion 10 is held firmly in the bore of the barrel. The sleeve 9 with its front end embraces the neck portion 5 and is thereby centered at the front. Between its rear end portion 10 and its front end, the sleeve is externally reduced. A short section 11 of the sleeve adjoining the rear end portion 10 has an outside diameter about 0.2 mm. smaller than that of the end portion 10. From the section 11 to the front end, the sleeve is more greatly reduced. The sleeve tapers to the front end longitudinally following a hyperbola or a hyperbola-like curve. The section 7 of the hollow stem 3 forms within the bore of the sleeve 9 an intermediate space 12 of annular cross section, which is so narrow that, during writing, it retains any quantity of ink once accepted. The capillary intermediate space 13 formed within the bore of the sleeve 9 by the longitudinally hyperboloid surface 8 of the hollow stem 3 narrows towards the ink reservoir, longitudinally following a hyperbola or hyperbola-like curve, and is so dimensioned as to be capable of receiving excess ink and giving it up again. The section 11 of the sleeve 9 forms within the bore of the barrel a space 14 corresponding to the narrow space 12, whilst the longitudinally hyperboloid surface 15 of the sleeve 9 forms an outer intermediate space 16 corresponding to the inner capillary intermediate space 13. Both intermediate spaces 13 and 16 constitute the overflow chamber.

The hollow stem 3 is provided with a through bore the internal diameter of which is approximately 0.5 mm. greater within the head portion 4 than behind it. Inserted from the front into the bore of the hollow stem is a feed bar 17. This has a thickened front portion 18 which fits into the front part of the bore of the hollow stem and is provided with a recess adapted to receive the nib 19. The reduced rear portion of the feed bar is in diameter about 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 feed bar.

The head portion 4 of the hollow stem 3 covers the nib almost up to its point. An axial air-admission 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 the feed bar 17. The air-admission passage 21 is provided in its wider front part with screw threads. At its rear end, it communicates with the intermediate space 13 by a narrow transverse bore 22 of the feed bar 17 and by a wide transverse bore 23 formed in the hollow stem 3. The sleeve 9 surrounding the hollow stem is provided with three transverse bores 24 equally angularly separated around its circumference, one of said bores being arranged coaxially with the transverse bore 22 and with the transverse bore 23. The hollow stem 3 and the sleeve 9 are each provided with three longitudinal grooves 25 and 26 equally angularly separated around the 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 the sleeve 9. The longitudinal grooves are of such width that they have a lower capillary potential than the capillary intermediate spaces 13, 16, whereby the surfaces 8 and 15 of the bodies 3, 9 forming the capillary intermediate spaces 13, 16 are divided into longitudinal lands.

The rear end portion 6 of the hollow stem 3 and the rear end portion of the sleeve 9 are provided, on the nib side of the barrel, with narrow longitudinal slots 27, 28 which when wet will not allow the passage of air. In the rear end portion of the sleeve in the middle plane of the slot 28, an air passage 29, about 0.5 mm. wide and increasing in depth towards the ink reservoir, is provided. In front of the section 11, about 2 mm. ahead thereof, a collar 30 presenting a recess 31 on the side remote from the nib, is provided on the sleeve 9. The longitudinal grooves 25 of the hollow stem terminate rearwardly short of the section 7, whilst the longitudinal groove 26 terminates rearwardly short of the collar 30.

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

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

The relative position of the ink-feeding bar 17 inserted from the front into the hollow stem 3, and of the sleeve 9 inserted from the rear into the bore of the barrel, is assured by the connection of both parts to the hollow stem. The position of the feed bar 17 is determined by a key 39 of the hollow stem, while the position of the sleeve is determined by a key 38 engaging in a groove of the hol-

flow stem.

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 nib 19, while replacement air normally passes through the air-admission passage 21, the overflow chamber, and the air passage 29, into the ink reservoir. Any excess ink that for any reason 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 reduced pressure is created in the reservoir, which causes excess ink in the overflow chamber to flow back into the reservoir. After complete emptying of all excess ink, replacement air will in the normal manner enter the reservoir.

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

The longitudinally extending capillary intermediate spaces 13, 16 contract towards the ink reservoir following a hyperbola or a hyperbola-like curve. With a constant contraction of the intermediate spaces towards the ink reservoir, the capillary potential in the intermediate spaces would be un-uniform, being somewhat lower in the region of the mean height of said spaces, than in the regions thereabove and therebelow. This disadvantage is eliminated by the profiling of the said spaces, and the functioning of the overflow chamber is substantially improved.

The outer intermediate space 16 communicating with the ink reservoir through the air passage 29 possesses, at least in its rear portion, a higher capillary potential than the inner intermediate space 13, so that these intermediate spaces will fill and empty in the desired sequence. The complete filling and emptying of the intermediate spaces is further assisted by the fact that the outer intermediate space communicating with the reservoir through the air passage, narrows slightly in transverse cross section towards the nib side of the barrel, whilst the inner intermediate 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 a short duration, whereby the air passage can also act as an ink passage to the overflow chamber.

The air-admission passage 21 in the front portion of the ink-feeding bar 17 narrows towards the rear, in order to permit the ink, contained in said air-admission passage from the filling operation, to be used up without an increase in flow intensity. Screw threads 21′ provided in the wider, front portion of the passage retain the ink and conduct it by increased capillary action into the narrower, rear part of the bore.

What I claim is:—

1. A fountain pen having an overflow chamber situated in the front part of the barrel consisting of at least one longitudinally extending capillary intermediate space of annular cross section contracting towards the ink reservoir and communicating at the front with the atmosphere and at the rear through an air passage with the ink reservoir, in which the surfaces of the bodies forming the capillary intermediate space or intermediate spaces are divided into longitudinal lands by longitudinal grooves formed in said bodies, said longitudinal grooves having a lower capillary potential than said intermediate spaces.

2. A fountain pen as claimed in Claim 1, in which the longitudinal grooves terminate at the front in transverse bores for admitting air to the capillary intermediate spaces.

3. A fountain pen as claimed in Claim 1 or 2, and having an overflow chamber consisting of two capillary intermediate spaces, in which by a hollow stem inserted from the front into the barrel, and a sleeve partially surrounding with clearance said hollow stem and with its front end abutting against said hollow stem and having transverse bores situated behind the abutting surface, serving to admit air to the intermediate spaces separated by said sleeve.

4. A fountain pen as claimed in any of the preceding claims, in which a collar is provided in one of the capillary spaces in front of said air passage, and the longitudinal grooves of such intermediate space extend up to said collar.

5. A fountain pen as claimed in any of the preceding claims, in which the capillary intermediate spaces contract towards the ink reservoir longitudinally following a hyperbola or a hyperbola-like surve.

6. A fountain pen as claimed in any of the preceding claims, and having two capillary intermediate spaces, in which the outer intermediate space communicating with the ink reservoir through the air passage has at least in its rear portion a higher capillary potential than the inner intermediate space.

7. A fountain pen as claimed in any of

Claims 4 to 6, in which the capillary intermediate space communicating with the ink reservoir through the air passage in the manner known contracts slightly in transverse cross section towards the nib side of the barrel, whilst the other intermediate space is of constant circumferential width.

8. A fountain pen as claimed in any of the preceding claims, in which the air passage connecting the overflow chamber with the ink reservoir increases in depth towards said ink reservoir.

9. A fountain pen as claimed in any of the preceding claims, and comprising a hollow stem carrying an ink-feeding bar, inserted into the barrel from the front, and the nib, and a sleeve surrounding said hollow stem, in which the relative position of said ink-feeding bar and of said sleeve is determined by the connection of both said parts to said hollow stem.

10. A fountain pen as claimed in any of the preceding claims, and having a centrally arranged ink-feeding bar having an axial air-admission passage in the front portion thereof, in which said air-admission passage contracts towards the rear and is provided with screw threads in its wider front portion.

11. A fountain pen, substantially as described with reference to the accompanying drawing.

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Agents for the Applicant.

Reference has been directed in pursuance of Section 9, Subsection (1) of the Patents Act, 1949, to Patent No. 732,982.

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1 SHEET

COMPLETE SPECIFICATION

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

Fig.1

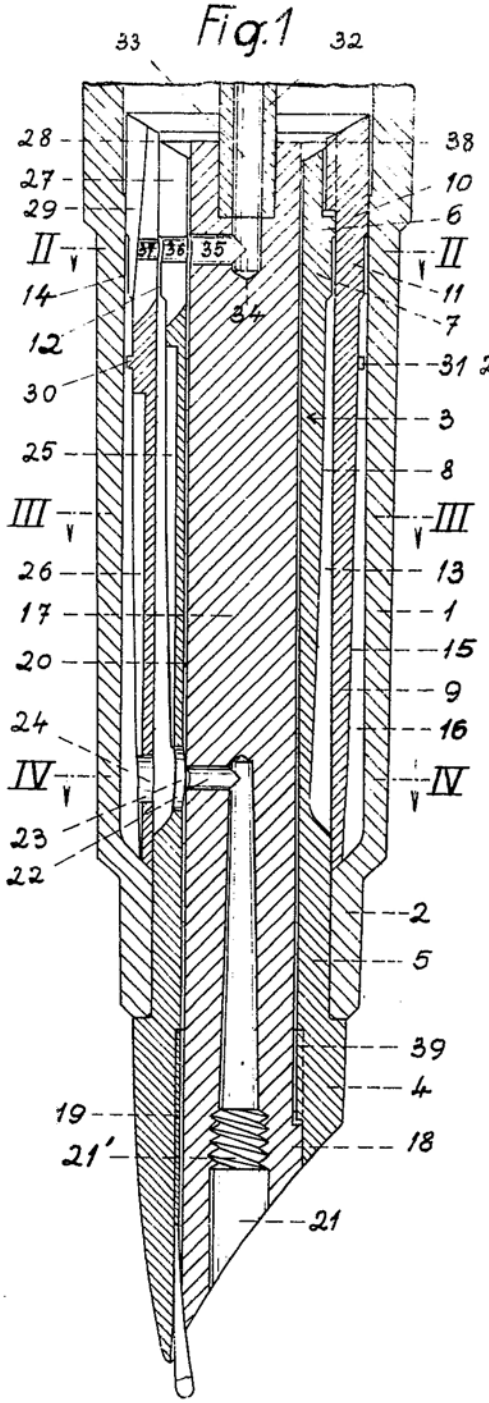

Fig.2

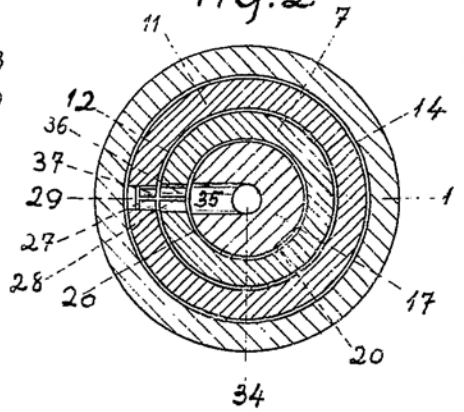

Fig.3

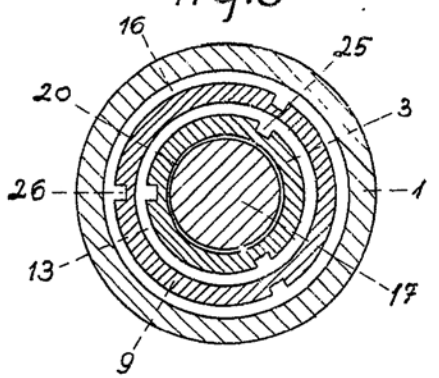

Fig.4