Nov. 29, 1949 V. H. SEVERY 2,489,983

FOUNTAIN PEN

Filed Feb. 14, 1944 4 Sheets-Sheet 1

Fig. 1.

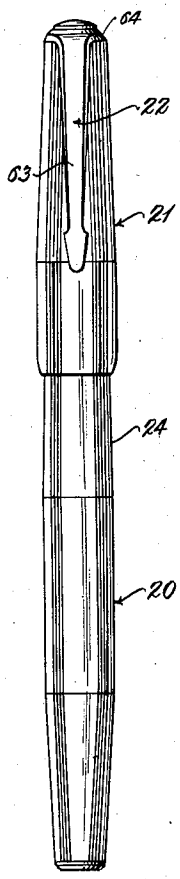


Fig. 2.

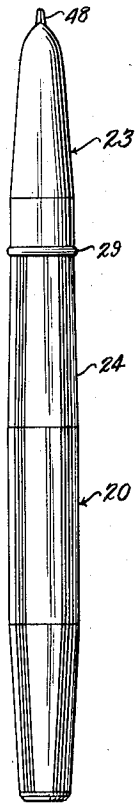


Fig. 3.

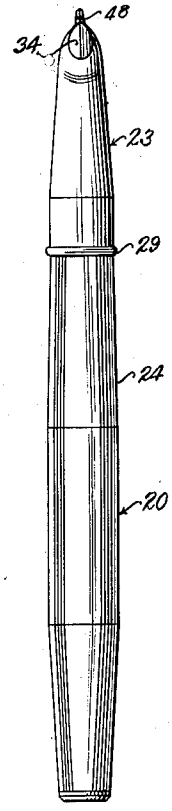
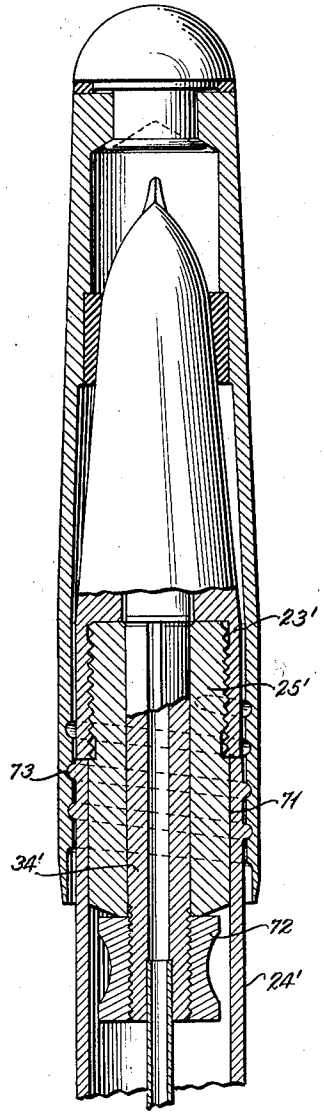


Fig. 13.



Inventor

Victor H. Severy

By Jewett and Jurad

Attorneys

Nov. 29, 1949 V. H. SEVERY 2,489,983

FOUNTAIN PEN

Filed Feb. 14, 1944 4 Sheets-Sheet 2

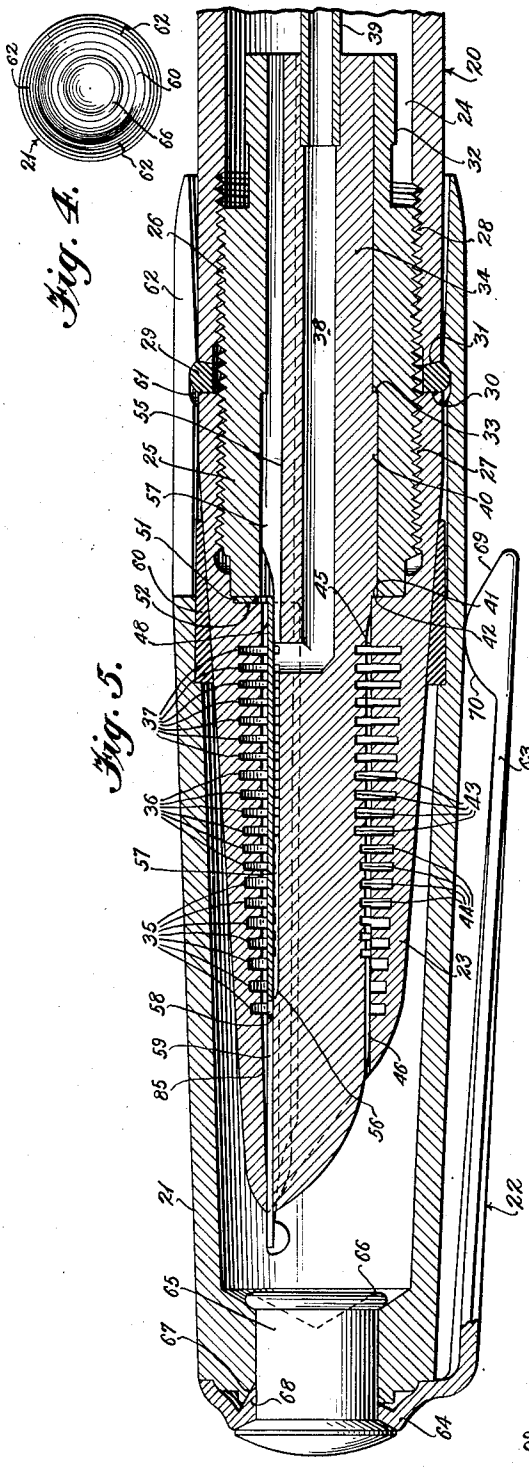


Fig. 4.

Fig. 5.

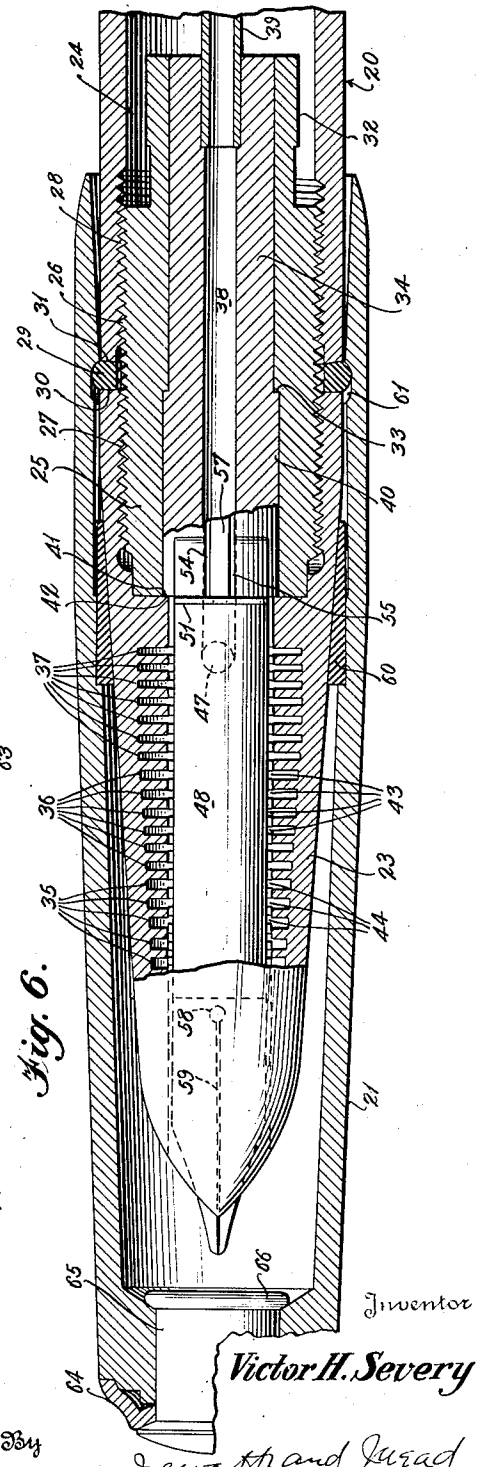


Fig. 6.

Inventor
Victor H. Severy
By Jewett and Israel
Attorneys

Nov. 29, 1949 V. H. SEVERY 2,489,983

FOUNTAIN PEN

Filed Feb. 14, 1944 4 Sheets-Sheet 3

Fig. 7.

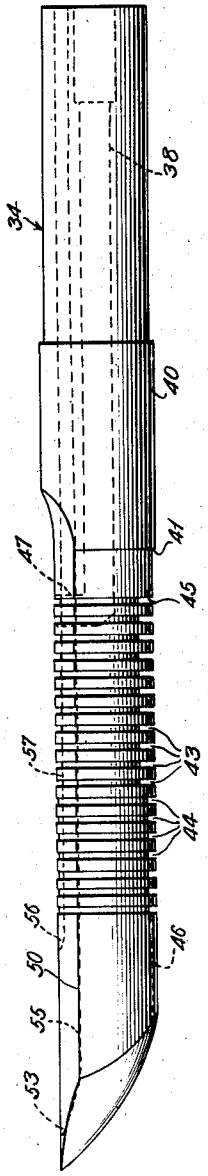


Fig. 8.

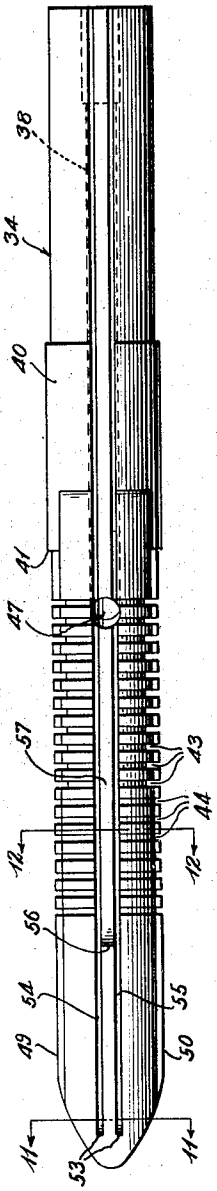


Fig. 9.

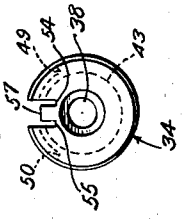


Fig. 12.

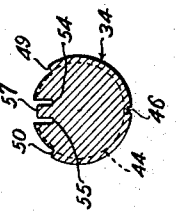


Fig. 11.

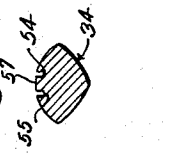
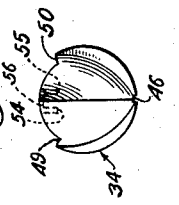


Fig. 10.



Inventor

Victor H. Severy

By Jewett and Surad

Attorneys

Nov. 29, 1949 V. H. SEVERY 2,489,983

FOUNTAIN PEN

Filed Feb. 14, 1944 4 Sheets-Sheet 4

Fig. 14.

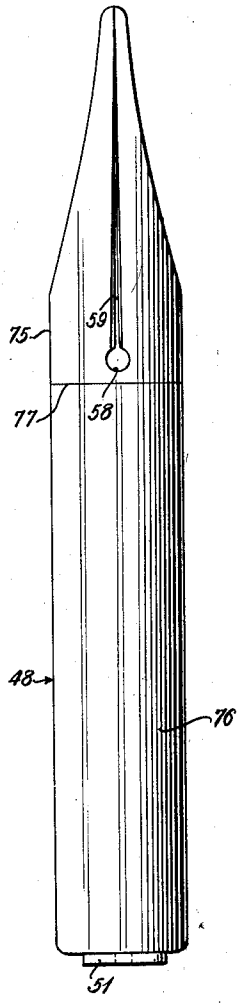


Fig. 16.

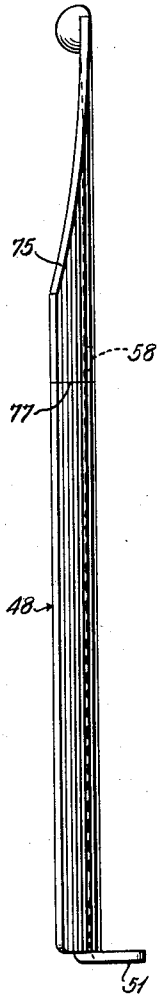
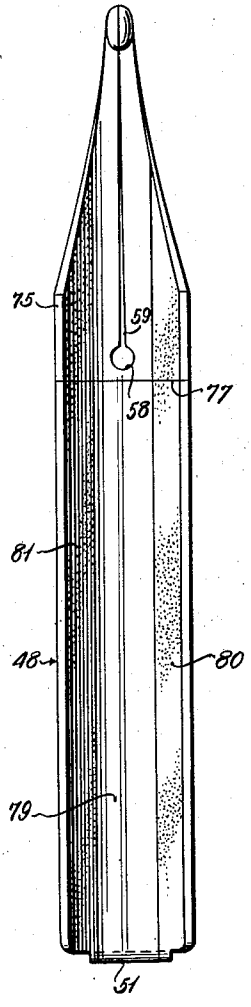


Fig. 15.



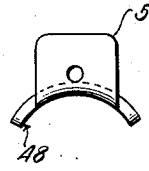


Fig. 17.

Inventor

Victor H. Severy

By Jewett and Jurad

Attorneys

Patented Nov. 29, 1949

2,489,983

UNITED STATES PATENT OFFICE

2,489,983

FOUNTAIN PEN

Victor H. Severy, Atlanta, Ga., assignor to Scripto, Inc., a corporation of Georgia

Application February 14, 1944, Serial No. 522,351

13 Claims. (Cl. 120—52)

1

The invention relates to fountain pens and has as an object the improvement of devices of this character in several important particulars.

Among the objects of the invention are: To provide improved means to feed ink to the point of the nib so as to secure certainty of marking; to prevent flooding; to improve filling; to improve assembly of parts; to improve coaction between cap and pen; to avoid use of screw threads between cap and pen; to improve the clasp; to improve the nib.

More specifically, objects of the invention are: To provide auxiliary reservoir means in the hood which surrounds the feed bar and cooperating reservoir means in the feed bar itself to conserve excess ink and to give it out as needed; to provide the auxiliary reservoir means referred to and to connect them by means of a vent open to the atmosphere and connecting with air vent means extending into the main ink reservoir; to provide a structure designed for production on high speed special machines and involving a minimum of assembly labor; to provide a cap having effectual sealing means to coact with the barrel or hood of the pen and means to retain the cap without the use of screw threads.

Further objects will appear from the following description when read in connection with the accompanying drawing showing illustrative embodiments of the invention and wherein:

Fig. 1 is a side elevation of the pen with the cap in place drawn to a slightly enlarged scale.

Figs. 2 and 3 are side elevations with the cap removed viewing the pen from opposite sides.

Fig. 4 is an end view of the interior of the cap, the clasp being omitted.

Fig. 5 is a detail longitudinal section to a much enlarged scale showing the writing end of the pen with the cap in place.

Fig. 6 is a section similar to Fig. 5 taken at right angles thereto.

Fig. 7 is a side elevation of the feed bar.

Fig. 8 is a plan view thereof.

Fig. 9 is an end view taken from the right of Fig. 7.

Fig. 10 is an end view taken from the left of Fig. 7.

Figs. 11 and 12 are transverse sections on the corresponding section lines of Fig. 8.

Fig. 13 is a view similar to Fig. 6 showing an alternative form.

Figs. 14 and 15 are top and bottom plan views respectively of the nib drawn to a still further enlarged scale.

Fig. 16 is a side elevation of the nib, and

Fig. 17 is an end view seen from the lower end of Fig. 14.

2

As shown, the device comprises a barrel 20 and a cap 21 carrying a clasp 22 affixed thereto in a manner to be described. As shown in Figs. 2 and 3, the barrel comprises a hood portion 23 extending downwardly over the nib so that only a very small portion thereof is exposed to the atmosphere and providing a writing instrument which may be grasped as near to the point as may be desired. The parts are so shaped as to permit of holding the pen in as flat a writing angle as could be desired.

As clearly shown in Figs. 5 and 6, the barrel 20 comprises the hood portion 23 and a reservoir portion 24. To connect the said portions and to retain interior parts in place there is shown a connector or union 25 exteriorly screw threaded at 26 to engage interior screw threads at 27 in the hood and at 28 in the reservoir portion 24.

To provide means for retaining the cap 21 in this form of the invention, there is shown a ring or washer 29 which slips freely over the screw threads 26 and provides a sealing fit with the end of the hood as at 30. The opposite side of the washer 29 is shown as formed upon a slight angle as indicated at 31 and the end of the reservoir member 24 is formed upon a complemental angle with the result that the screwing home of the reservoir member against the ring will assist in centering the ring. The connector 25 is provided with a reduced end portion 32 which may receive an ink sack if such form of ink container is utilized. Also the connector is shown as formed with an internal shoulder 33 to coact with a shoulder upon the feed bar 34 as will be explained.

The hood 23 is also shown as formed with a plurality of cuts or cells 35, 36, and 37. Although the number and size of these cells is not critical provided only that they are not too large for capillarity with the ink used, it is found that with writing fluid of an average viscosity which viscosity depends on the pH value and which is found to be present when the pH value is between 7 and 10, the number and width of the cells operate satisfactorily if there are provided seven of the cells 35 each substantially .010" wide; substantially six of the cells 36 of a width substantially .0085" and substantially seven of the cells 37 each of a width of substantially .007" and if the distance of the front cell nearest the writing point from the point of the feed bar is substantially .400".

The feed bar shown in detail in Figs. 7 to 12 inclusive is made of a substance which will not be affected by the ink and which is easily acted upon by machine tools. One substance which has been found satisfactory is an acrylic plastic resin and

specifically methyl methacrylate has been found eminently satisfactory as it will not swell even after long use which swelling would distort or change the size of the ink passages and fissures. As shown, the feed bar 34 is formed with a circular bore 38 which as shown is counterbored for reception of a vent tube 39 to extend into the ink reservoir and adjacent the upper end thereof when the pen is in use or is being filled. The feed bar is also formed with an enlarged portion 40 providing the shoulder 33 already referred to and a shoulder 41 for engagement with the shoulder 42 in the hood.

Surrounding the feed bar there is shown a plurality of circular cuts 43, 44 shown as comprising a total of 18 cuts. The number and size of these cuts are not critical but it is found that eleven of the cuts 43 each .022" deep and seven of the cuts 44 each .011" deep, the cuts being .010" wide and spaced apart a distance of .020" will give good results with ink of an average grade of viscosity and when combined with the remaining capillary and vent passages as will be described.

Crossing the cuts 43 and 44 and extending longitudinally of the feed bar from an opening to the atmosphere as indicated in Fig. 10 and extending into communication with the last cut 43 as indicated at 45, Fig. 7, there is a longitudinal channel 46 which is slightly greater in width but less in depth than the cuts 43, 44. The depth of the channel is desirably .008" and its width .030". The fact that the channel 46 is greater in width but less in depth than the cuts 43, 44 causes the film strength of the writing fluid in the circular cuts to be weakened and as ink is drawn from the reservoirs 35, 36, 37 it may be replenished from ink in the cross cuts 43, 44. The bore 38 is shown as terminating in a passage way 47 extending to the surface of the feed bar under the nib 48.

The nib is formed upon the arc of a circle having an outer radius the same as that of the feed bar and fitting into a recess milled in the upper part of the feed bar in which it closely fits with its edges lying against shoulders 49, 50. The nib is shown as formed with an upwardly extending lug 51 which fits in a recess 52 formed interiorly of the hood 23 as clearly indicated in Fig. 5 and is pressed thereagainst by the end of the connector 25 when the parts are screwed together. The nib is therefore prevented from any motion of revolution with respect to the hood and because of the fit of the nib upon the shoulders 49, 50 the feed bar is prevented from any motion of revolution. The nib is also formed with an opening 58 from which opening a slit 59 extends to the writing point.

Extending longitudinally of the feed bar from a point 53 substantially .050" from the end thereof and continuously to the reservoir end there are shown a pair of capillary cuts 54, 55 between which, from a point 56 adjacent the most forward of the cuts 44, there is a wider and shallower cut 57. The cut 57 as shown extends continuously under the nib to the point 56 but milling of the space for the nib reduces its depth thereunder and this space as well as cuts 54, 55, are in communication with the hole 47. The cuts 43, 44 are also milled away in the shaping of the nib recess and the cuts 44 under the nib are substantially only .001" in depth. The recess for the nib is allowed to die out in its portion beyond the nib as clearly indicated in Fig. 5 to preserve strength in the remaining portion of the feed bar. The cuts 43, 44 are in substantial registry with the cuts 36, 37 in the hood and communicate with the cuts 35 with the exception of the last 4 or 5 thereof.

To coact in sealing relation with the outer surface of the hood there is shown a ring 60 in the cap, the angle between the cap and hood being substantially an included 5° or well within the angle at which a seal once formed will not slip, which angle with the material under consideration is critical at substantially an included 6°. To hold the cap upon the body of the pen without the use of screw threads, the washer 29 is shown as formed with an outer rounded surface and a recess 61 is milled upon the interior of the cap to coact therewith. The opening of the cap is slightly in excess of the outer diameter of the ring 29 and the interior diameter of the cap at the ring is somewhat less than the outer diameter of the ring. To permit the skirt of the cap to expand to slip over the ring, kerfs 62, shown as three in number, may be formed with a very thin saw. The recess 61 is of excess axial length to allow for wear in ring 60.

The clasp 63 is shown as terminating in a ring 64 set upon the end of the cap and held in place by means of a rivet 65 expanded as at 66. To prevent revolution of the clasp upon the cap a recess is formed at 67 in the cap and a lug or enlargement 68 is formed on the ring 64 to enter the recess 67. The clasp is formed at 69 with a cam surface 70 to provide slightly greater resistance to removal.

In the form shown in Figure 13, the connector 25' has screw threaded coaction with the skirt of the hood 23' and the reservoir portion 24' of the pen has a slip fit at 71 with the connector 25'. The feed bar 34' is extended to a screw threaded projection engageable by a nut 72 to hold the parts in assembly. In this form of the invention there are illustrated screw threads 73 upon the portion 24' engaging with internal screw threads upon the cap.

The nib 48, as shown in Figs. 14–17 is formed for long life and to conserve valuable metal. To this end, a gold point 75, preferably 14 karat gold, is welded to a non-corroding base metal body 76 as at line 77. Appearance alone could be secured by gold plating the point portion 75 but in such practice it is difficult to plate the edges of the slit 59, which if not solid metal or plated would eventually corrode and destroy good operation.

The tip 78 is provided with a hard tip, as Ruthorium alloy, in the usual manner. The central portion 79 of the under surface of the nib is highly polished and the side portions 80, 81 are shown as sanded in accordance with known practice, to improve feed of ink to the slit 59 and to the writing point.

Operation

The operation of the modern fountain pen depends on the creation of a hydrostatic balance of fluid in the capillary passages and fissures of the pen which balance is upset by the act of writing, releasing fluid to flow outward from the writing point of the nib to the writing surface. Flooding occurs when the hydrostatic balance fails, or does not properly control flow from the point of the nib.

In the pen of the present invention the only passages or fissures which open to the atmosphere are the slit of the nib leading to the point, and the air vent at the bottom of the feed bar. These are both of capillary size.

Considering carefully the above description and explanation, the flow of writing fluid to the writ-

ing point, in my invention, takes place as follows: the main reservoir in the barrel or sac supplies the ink to the opening ducts in the feed. The capillary channel and the air vent admits and by-passes some fluid to the main feed channel. Although the quantity depends upon the height of fluid in the main reservoir, inverting to writing position allows some ink in the vent pipe to flow toward the feed channel, until a balance is effected between the air entering the vent hole in the feed, to the vent tube, when the remaining fluid in the vent pipe flows in the opposite way, admitting air to the reservoir. The fluid passing down the main channel and capillaries on each side of the channel flows outwardly from the transverse channels in the feed bar under the writing nib to the cells nearest the reservoir end. The filling of the cells in the front or nearer the writing point takes place next but slower because the fluid attraction is not as great at this point due to greater width of the lower cells and the lack of conducting channels under the lower end of the feed bar and the nib. The filling of these cells takes place more slowly as well as the middle cells. The conducting channel on the lower side of feed bar opposite the nib furnishes a channel conducting the writing fluid to and away from these front cells.

Furthermore, in my invention the design allows the nib or writing unit to lie in a deformation on the top of the feed bar, completing a true compact circular bar fitting tightly into the shell bore. Although the nib member has a radius equal to the feed bar radius, both on the inside as well as outside of the nib member, the writing fluid by capillary action along this space between the two surfaces flows outward to the wider cells at the writing end, and empties first when the demand is made during writing.

The writing fluid finds its path along the nib slit to the extremity—the point of the nib—and contacts with the writing surface. As the flow of fluid takes place air is admitted through the vent hole 47 located in the upper part of the feed bar adjacent to the nib; this air flowing from the fissures and cells to the upper reservoir first and later from the lower by-pass channel in the feed bar, connected with the atmosphere to and up through the air vent pipe to the top of the reservoir, thus balances the atmospheric pressure, due to the outward flow of writing fluid.

My invention provides a check valve to prevent flooding. This action of flooding, caused by several well known actions, can occur when the auxiliary cells are partially or wholly emptied by the action of writing. In this case the cells would fill in part or completely until the balance is reached. However, if these cells are full, such as might occur by holding the pen in writing position without writing, then the fluid tends to fill the lower cells completely, and meeting the well known edge effect of the cell chambers, writing nib, and air intake channel, automatically raises the pressure factor or fluid tension, against which the expansion has to contend, and further, and at the same instant shutting off all air venting, preventing a return of air to the main reservoir.

It is readily seen that the fluid friction is raised considerably and has in my invention met the normal flooding problem. When this pressure in the reservoir subsides the writing fluid is drawn up out of the air channel in the feed bar with considerable ink in the front cells, these cells releasing their ink supply more easily and before

the rear cells due to the lower fluid film strength of the larger front cells.

It will be seen that the film strength is greater in the small cells near the upper end of the bar than in the larger cells near the lower end of the pen point or end of feed bar. The fluid will be conducted back toward the reservoir because the fluid film above will not break until the lower cells nearest the writing point have emptied.

In the act of filling the pen the auxiliary cells fill first then the reservoir. It has been found beneficial to instant writing to eject a drop or two of writing fluid as the pen is withdrawn from the writing fluid container and to wipe the sides of the shell, or lower writing end with paper or cloth.

My invention employs the fluid valve lock principle in filling the reservoir of the pen. The ink channel and capillaries provide more frictional resistance for the ink than the air port or vent tube. In filling and on the expelling stroke of any usual pumping device utilized for filling the reservoir there will be a more rapid expulsion of the air in the reservoir than displacement of ink—after several pumping actions the ink rapidly gains in volume within the reservoir which quickly fills.

At 85, Figure 5, there is shown a passage of capillary size cutting across the annular slots 35, 36 and 37 above the nib and dying out near the point of the hood. This passage is in registry with the slit of the nib and passes above and in communication with the opening 58 of the nib.

The use of this passage is optional and will be advantageous particularly with pens designed to write heavy lines. It acts with channel 46 as an additional air vent to conduct air seeping in above the nib as ink is drawn in writing from below the nib. It may also, under some conditions, serve as an additional supply of ink to the slit of the nib from the auxiliary reservoirs provided by slots 35, while vent air is entering through channel 45.

Minor changes may be made in the physical embodiments of the invention within the scope of the appended claims without departing from the spirit of the invention.

I claim as my invention:

1. A fountain pen comprising, in combination: a shell member formed with annular capillary slots in its inner surface; a feed bar member closely fitting the interior of said shell; one of said members formed with a longitudinal capillary passage placing said slots in communication; one of said members formed with a nib receiving recess; a nib seated in said recess with a surface thereof exposed to the interior of said slots; and means in said shell to supply ink to said slots, capillary passage and nib.

2. A fountain pen comprising, in combination: a shell member formed with annular capillary slots in its inner surface; a feed bar member closely fitting the interior of the shell and formed with annular capillary slots in its periphery, certain of which register with the slots of the shell; one of said members formed with a longitudinal capillary passage placing said slots in communication; one of said members formed with a nib receiving recess; a nib seated in said recess with a surface thereof exposed to the interior of said slots; and means in said shell to supply ink to said slots, capillary passage and nib.

3. The structure of claim 2 in which at least one of the slots in the shell nearest the writing end thereof is out of register with any feed bar slot.

4. The structure of claim 1 in which the slots nearest the writing end of the pen are of greater axial extent than certain of the slots more remote therefrom.

5. The structure of claim 1 in which the capillary passage is in the portion of its member opposite the location of the nib and opens to the atmosphere.

6. A fountain pen comprising, in combination: a shell member formed with annular capillary slots in its inner surface; a feed member closely fitting the interior of said shell; one of said members formed with a longitudinally extending recess; a longitudinal capillary passage in one of said members at one of the opposed surfaces thereof, opening to the atmosphere, and placing said slots in communication; a nib formed with an opening and a slit extending from said opening to the point thereof; one of said slots registering with said opening; and means in said shell to supply ink to said slots and nib.

7. The structure of claim 2 with a longitudinal capillary passage in said feed bar extending under the nib from a point closely adjacent said nib opening and across the annular slots in the feed bar; and with a venting capillary passage opening to the atmosphere and cutting across said slots.

8. A fountain pen comprising, in combination: a shell comprising a hood portion and a reservoir portion; said hood portion formed with a feed bar and nib receiving bore portion and a larger internally screw threaded portion joining at an internal shoulder; a feed bar housed in said shell and closely fitting the first named portion of said bore, and formed intermediately of its length with an enlarged portion presenting oppositely facing shoulders; a connector formed with a bore presenting an internal shoulder and with external screw threads to coact with said first named screw threads; said connector acting against one feed bar shoulder to press the remaining feed bar shoulder against the internal shoulder of said hood portion; means providing intimate non-slipping engagement between said reservoir portion and an extension of said connector; a nib confined between said feed bar and the interior of the hood; and means to feed ink from the reservoir portion to the point of the nib.

9. The structure of claim 8 with a laterally extending lug carried by said nib and confined against the interior shoulder of the hood portion by said connector.

10. The structure of claim 8 with a washer confined between the opposed ends of said shell portions and formed with an annular rounded surface projecting from the surface of the shell.

11. A fountain pen comprising, in combination: a shell member formed with annular capillary slots in its inner surface; a feed bar closely fitting in said shell, formed with annular capillary slots in its periphery and with a larger-than-capillary bore in its portion remote from the nib end thereof and in communication with certain of feed bar slots remote from the nib end of the bar and opening to an ink reservoir; a plurality of the feed bar slots nearest said bore exceeding in depth the remaining thereof; said bar formed with a nib receiving recess cutting across said bar slots; a nib seated in said recess and formed with an opening registering with at least one of the shell slots nearest the point of the nib, and with a slit extending to the point of the nib; said bar also formed with a longitudinal capillary passage from a position closely adjacent the nib end to the reservoir end thereof passing through said nib recess and communicating with the vent bore at its slot communication.

12. A feed bar comprising: a substantially cylindrical body formed with an enlarged central portion providing oppositely facing shoulders; said body formed with a longitudinal recess in its surface for receiving a nib and tapering to a point located at the center of the recessed surface; said body having a central vent bore extending from the end thereof opposite said point to a position midway of its length and a transverse passage at said mid length end to the surface of the body; said body formed with spaced capillary grooves from a point closely adjacent its point to the opposite end, interrupted by said transverse passage, and with a shallow groove communicating laterally with said spaced grooves and cut to a less depth; said shallower groove terminating intermediate the length of said nib recess; said body formed with a series of annular peripheral slots, at least one thereof cutting into said transverse passage, certain of said slots cutting through the bottom of said nib recess; and said body formed with a longitudinal capillary slot extending from said point end to communication with the annular slot which is in communication with said transverse passage.

13. A fountain pen comprising, in combination: a shell member; a feed bar member closely fitting the interior of said shell member; a nib rigidly confined between surfaces of said members with only its point projecting from the shell; the longitudinal central portion of said nib having a polished surface, and side regions of said nib bordering said polished surface roughened as by sand blasting; said roughened surface contacting its confining surface only at the eminences thereof whereby to provide capillary passages among said eminences leading from the edges of the nib to said polished portion thereof; capillary fissures in at least one of said members at the edges of said nib and in communication with the capillary passages of said roughened surface; and means to supply ink to said fissures.

VICTOR H. SEVERY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 9,890	Cross	Oct. 11, 1881
109,257	Schifferle	Nov. 15, 1870
631,824	Robinson	Aug. 29, 1899
734,116	Blair	July 21, 1903
832,981	Kennedy	Oct. 9, 1906
836,905	Whitehouse	Nov. 27, 1906
1,313,056	Blackwood et al.	Aug. 12, 1919
1,613,812	Wahl	Jan. 11, 1927
1,825,090	Reis	Sept. 29, 1931
1,950,364	Moore	Mar. 6, 1934
2,016,106	Dahlberg	Oct. 1, 1935
2,107,150	Heising	Feb. 1, 1938
2,375,770	Dahlberg	May 15, 1945
2,282,840	Wing	May 12, 1942