

Aug. 23, 1960

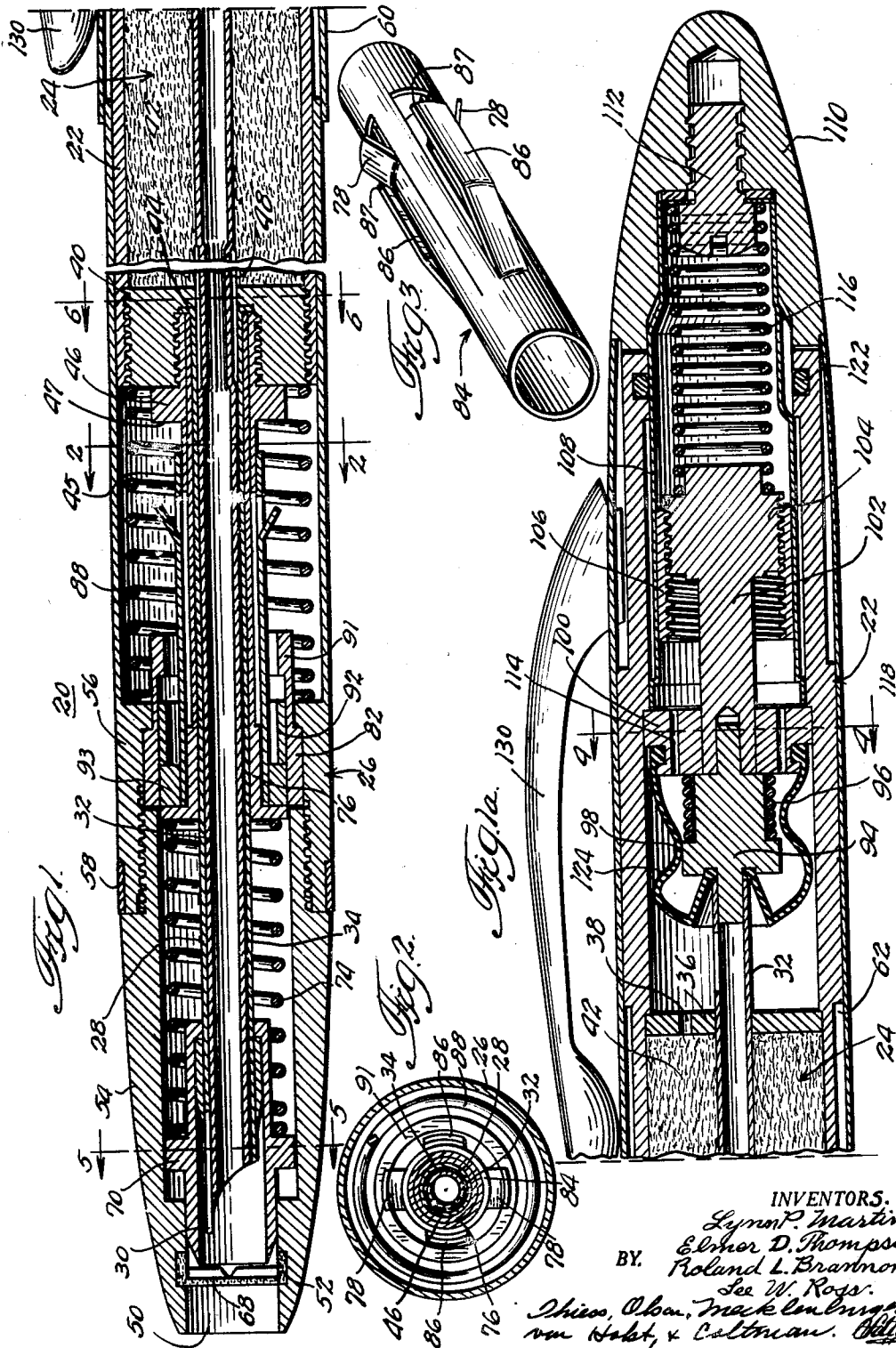
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2,949,887

WRITING IMPLEMENT

Filed Sept. 11, 1956

4 Sheets-Sheet 1



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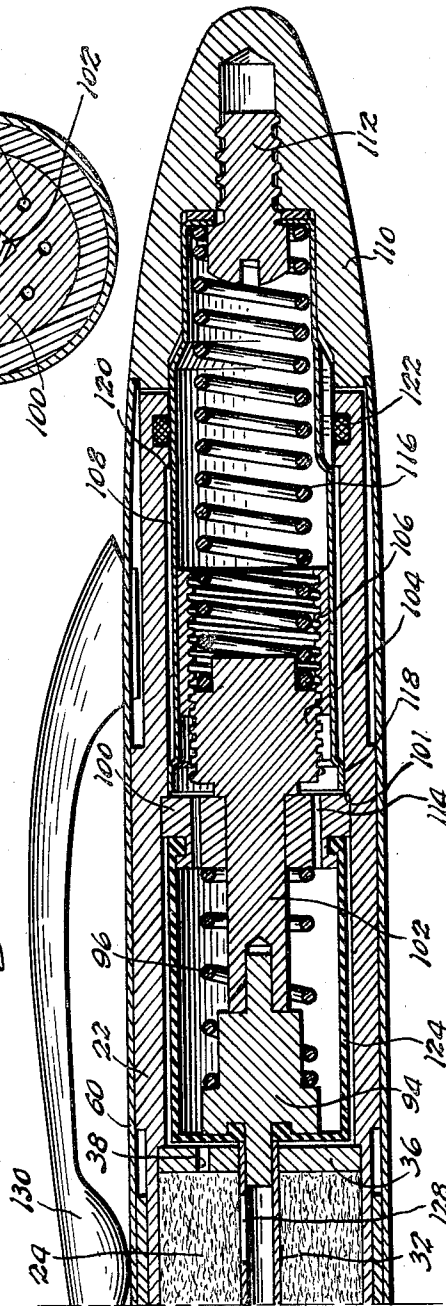
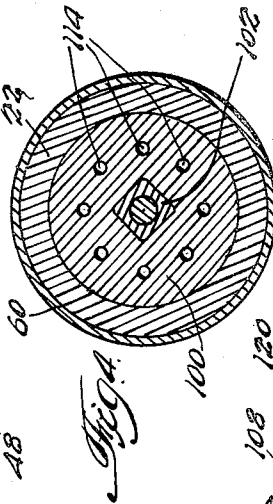
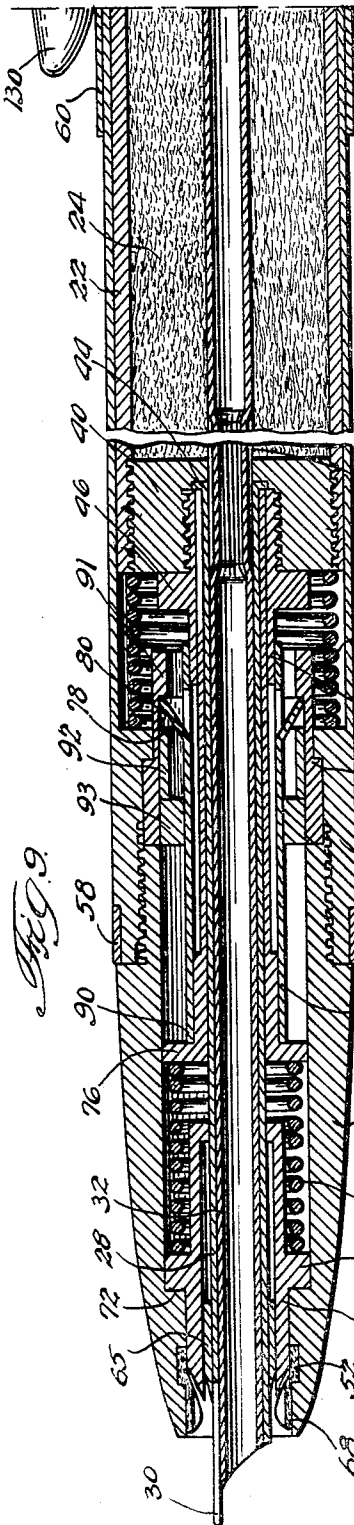
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2,949,887

WRITING IMPLEMENT

Filed Sept. 11, 1956

4 Sheets-Sheet 2



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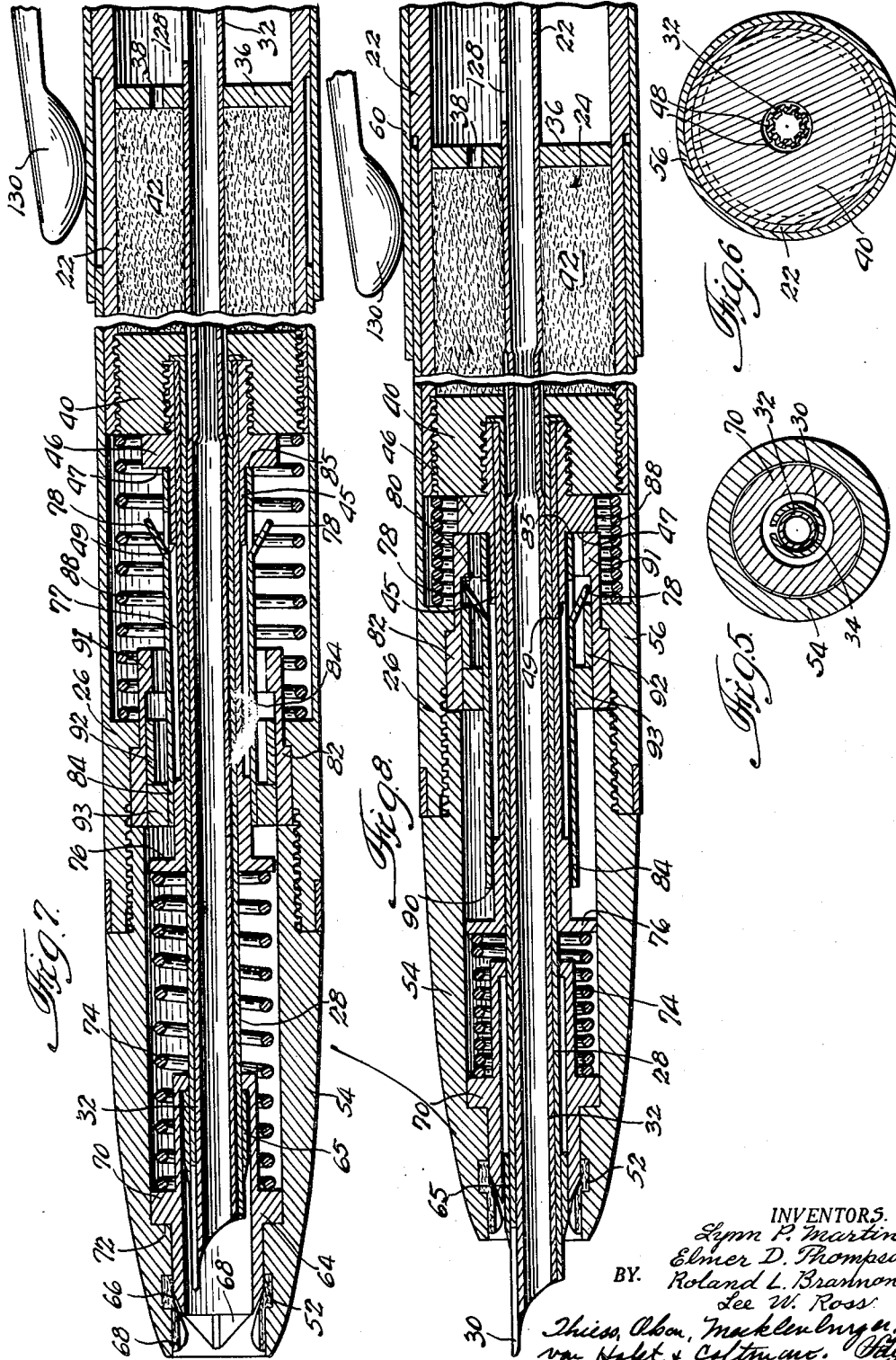
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2,949,887

WRITING IMPLEMENT

Filed Sept. 11, 1956

4 Sheets-Sheet 3



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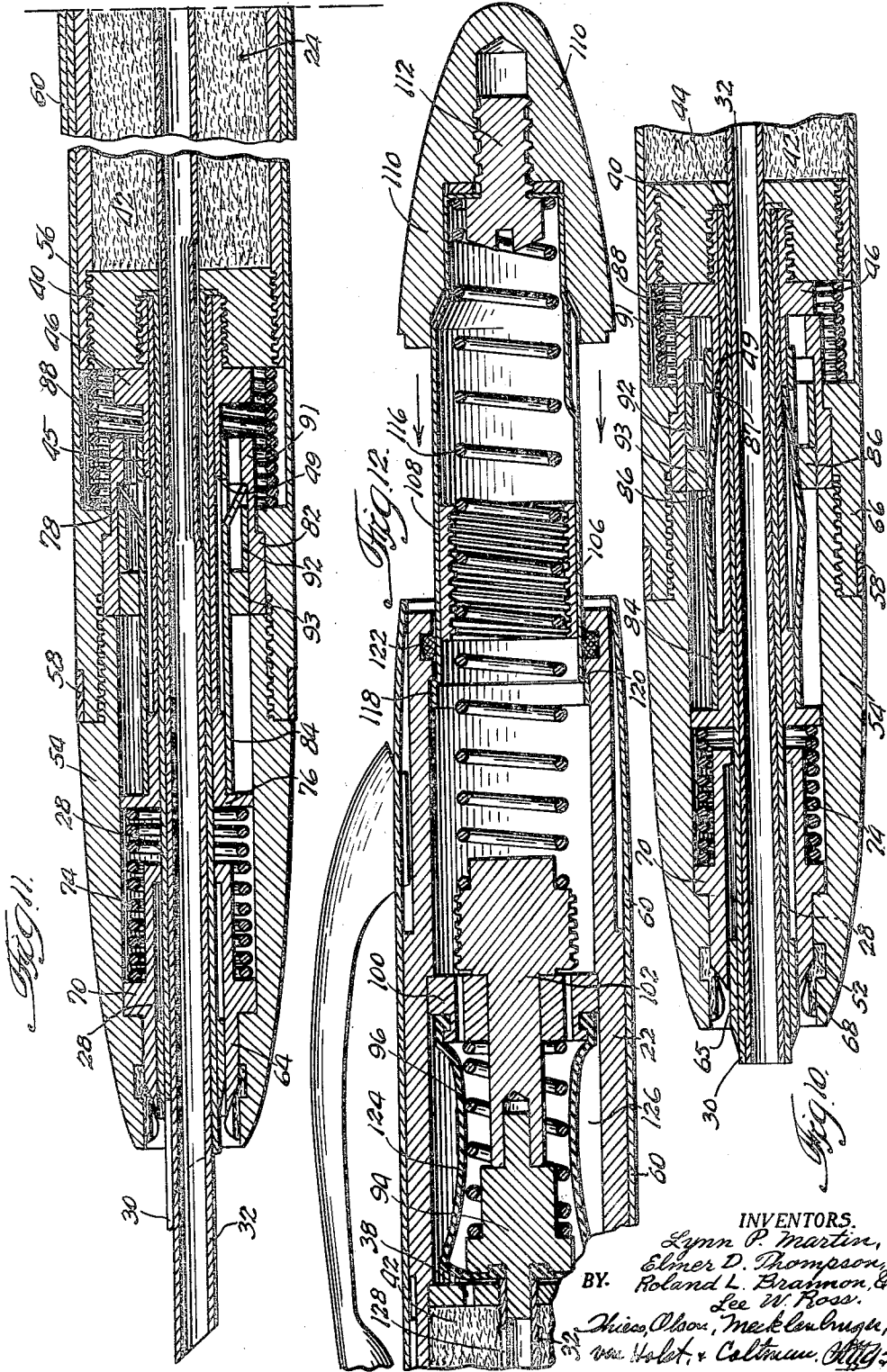
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2,949,887

WRITING IMPLEMENT

Filed Sept. 11, 1956

4 Sheets-Sheet 4



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2,949,887

WRITING IMPLEMENT

Lynn P. Martin, Elmer D. Thompson, Roland L. Brannon, and Lee W. Ross, all of Fort Madison, Iowa, assignors to W. A. Sheaffer Pen Company, Fort Madison, Iowa, a corporation of Delaware

Filed Sept. 11, 1956, Ser. No. 609,281

5 Claims. (Cl. 120—42.03)

This invention relates to writing implements and more particularly to writing implements of the fountain pen type.

In the construction of the usual type fountain pen employing a liquid writing fluid it has usually been necessary to provide such implements with a cap if the implements are to be carried in the pocket or handbag of the user. The caps have been considered necessary in order to prevent accidental spilling of the writing fluid with attendant soiling of the clothes of the person carrying the implement. Furthermore, fountain pens are generally constructed so that the caps are provided with pocket clips so that when the implement is carried it will be in the "point up" position. Under certain circumstances this has not been wholly satisfactory since after long periods in the "point up" position, the writing fluid may dry or drain away from the writing tip so that the implement will not immediately write when applied to the writing surface. Furthermore, the caps that have been used in the past offer the further disadvantage that they may become separated from the implement and lost, whereafter it is practically impossible for the implement to be carried by the user without soiling the clothes.

It has been proposed in connection with the so-called ball point pen writing implements to provide a device in which the point of the implement can be retracted into the main body portion thereof whereby the implement may readily be carried by the user without concern over the soiling of clothes. However, such structures have not been feasible in connection with fountain pens employing liquid writing fluid since the liquid fluid in most types of constructions tends to leak from the point upon changes in temperature or barometric conditions.

Accordingly, it is an object of this invention to provide a fountain pen in which it is not necessary to employ the usual type of cap for concealing the writing point when the implement is not in use.

A further object of this invention is the provision of a fountain pen which may be carried by the user in a "point down" position in order that the writing point will always be ready for immediate transfer of fluid upon use.

A still further object of this invention is the provision of a capless fountain pen which may be readily carried in the pocket or in a handbag without danger of prematurely discharging writing fluid from the implement.

A still further object of this invention is the provision of a novel construction which may be readily adaptable to many types of implements that have been previously sold commercially.

A still further object of this invention is the provision of an improved capless fountain pen construction which may be charged with writing fluid without the deposit of fluid on the gripping section and without danger of soiling fingers or garments.

An additional object of this invention is the provision of an improved capless fountain pen having means for

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selectively moving a writing tip between an extended writing position and a concealed position.

Further and additional objects will appear from the following description, the accompanying drawings and the appended claims.

In one form of this invention an improved fountain pen is provided having a capillary reservoir disposed within a barrel assembly with a writing element and a filling tube disposed forwardly of the reservoir and extendible through an open forward end of the barrel assembly. More particularly, a capless fountain pen is provided in which a writing element is shiftable relative to and through the open forward end of a barrel assembly wherein the open end is normally sealed by a yieldable element and a filling tube is coaxially mounted with the writing element and shiftable between positions forwardly and rearwardly of the writing element. The writing element and filling tube are spaced apart to define a capillary space therebetween extending longitudinally from the capillary reservoir to the writing tip. Means is also provided for forcefully filling the capillary reservoir with writing fluid by the successive actuation of a telescoping pneumatic assembly.

As indicated above, this invention is readily applicable to a number of different types of constructions that have been suggested in the prior art. For example, this invention is readily adaptable to a device having an extendible filling tube such as is disclosed in Lynn P. Martin application Serial No. 256,897, filed November 17, 1951, now Patent No. 2,769,427, and more particularly to an implement having a pneumatically collapsible sac of the character disclosed in Martin, United States Patent No. 2,610,612, dated September 16, 1952. However, the invention has particular applicability in those writing implements that are provided with a so-called capillary mass type reservoir and such an implement is disclosed in the copending application of Craig R. Sheaffer, Serial No. 319,031, filed November 6, 1952, now Patent No. 2,784,699. As is known, capillary reservoirs are freely vented to the atmosphere at their rearward ends and it is not necessary to provide expansion chambers because of the fact that writing fluid is not expelled therefrom due to barometric or temperature changes. Thus the capillary type reservoirs are essentially free from leakage under ordinary conditions of use and are therefore particularly suitable for use in connection with the provision of a capless type fountain pen of the character contemplated by this invention.

For a more complete understanding of this invention reference will now be made to the accompanying drawings wherein:

Fig. 1 is an enlarged longitudinal sectional view of the forward end of a fountain pen incorporating the novel features of the invention with the various parts illustrated in their closed or normal positions;

Fig. 1A is an enlarged longitudinal sectional view of the rearward portion of the embodiment of Fig. 1;

Fig. 2 is a transverse sectional view of the embodiment of Fig. 1 taken on the line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the latching element forming a part of the embodiment of Fig. 1;

Fig. 4 is a transverse sectional view of the embodiment of Figs. 1 and 1A taken on the line 4—4 of Fig. 1A;

Fig. 5 is a transverse sectional view of the embodiment of Fig. 1 taken on the line 5—5 thereof;

Fig. 6 is a transverse sectional view of the embodiment of Fig. 1 taken on the line 6—6 thereof;

Fig. 7 illustrates in enlarged longitudinal section the forward portion of the embodiment of Fig. 1 with the writing element partially shifted to the writing position;

Fig. 8 illustrates the embodiment of Fig. 1 in enlarged

longitudinal section with the writing element in an over-extended position;

Fig. 9 is an enlarged partial longitudinal sectional view of the embodiment of Fig. 1 with the writing element in the writing position;

Fig. 10 is an enlarged partial longitudinal sectional view of the embodiment of Fig. 1 illustrating the operating mechanism for extending and retracting the writing tip;

Fig. 11 is an enlarged longitudinal sectional view of the forward portion of the embodiment of Fig. 1 with the fitting tube extended;

Fig. 11A is an enlarged longitudinal sectional view of the rearward portion of the embodiment of Fig. 1 with the writing tube in the extended position; and

Fig. 12 is an enlarged longitudinal sectional view of the rearward portion of the embodiment of Fig. 1 with the force filling mechanism actuated.

Referring now to the drawings and more particularly to Figs. 1 and 1A, a fountain pen 20 is illustrated having a main barrel portion 22 with a capillary reservoir unit 24 disposed therein. A sleeve 26 is slidably mounted on the main barrel portion 22 to selectively expose or conceal a writing element 28 which extends forwardly from and is integral with the reservoir unit 24. At the forward end of writing element 28 a writing tip 30 having the conventional longitudinal slit therein is employed. A filling tube 32 is coaxially mounted within the writing element 28 and adapted for longitudinal movement for purposes and in a manner to be explained in greater detail hereinafter. The outer diameter of filling tube 32 and the inner diameter of writing element 28 are so selected that a space 34 exists between the two elements which is of capillary dimensions and continuous over the entire length of the filling tube and writing element. Thus, a capillary writing fluid path is provided between the rearward end of the writing element 28 and the writing tip 30.

The fluid reservoir is defined by the barrel portion 22, a rearwardly disposed annular plug 36 having apertures 38 therein and a forwardly disposed plug 40 which is threaded into the forward end of the body 22. The space thus defined is filled with a capillary mass 42. Any one of many well known capillary masses may be employed. For example, the space may be filled with woven gauze, a helically wound film having spaces between adjacent layers, or a plurality of small spheres having capillary dimensions therebetween, as is described in the Craig R. Sheaffer application set out above.

The writing element 28 has a rearwardly disposed flange 44 which is secured in the plug 40 by a collar 46 in threaded engagement therewith. As is clearly illustrated in Fig. 6, the plug 40 slidably supports the inner filling tube 32, and at the point where the filling tube passes through the plug 40 the filling tube is formed with a plurality of recesses or splines 48 which will insure the passage of writing fluid from the reservoir 24 to the writing tip 30.

The sleeve 26 encloses the writing tip 30 when the fountain pen is not in use, as illustrated in Fig. 1. The forward open end 50 of the sleeve 26 is normally closed by a flexible seal 52. The seal 52 has a plurality of radial slits extending outwardly from the center thereof whereby the seal may be deformed to pass the writing element 28 and filling tube 32 therethrough. The sleeve 26 is formed of two parts, a gripping section 54 which is threaded into a barrel section 56. The juncture of the gripping section 54 and barrel section 56 is ornamented by a metallic ring 58. The barrel section 56 is slidably mounted on the main barrel portion 22, and a shell 60 is mounted on the main barrel portion 22, said shell being formed of metal or other suitable material. The main barrel portion 22 has a reduced outer diameter at its forward end whereby an annular recess 62 is defined which receives the rearward portion of the barrel section 56 of sleeve 26. Thus, the sleeve 26 may be axially

shifted on the main barrel portion 22 to expose the writing tip 30 in a manner which will be described hereinafter.

Referring now to Fig. 7, the first step in the actuation of the mechanism is illustrated. When the writer wishes to expose the writing tip 30 for use he presses the main barrel portion 22 and sleeve 26 together in a familiar manner, compressing coil spring 88. In axially shifting the sleeve 26, a cylindrical element 64 having a tapered forward end 66 engages the inner surface of resilient seal 52 spreading the furcated portion 68 thereof to permit passage of the writing element therethrough. The cylindrical element 64 is normally urged forwardly slidably on writing element 28 by a coil spring 74 which is compressed between a collar 70 formed on cylindrical element 64 and a stop 76. The forward position of cylindrical element 64 relative to writing element 28 is established by the tapered ring 65 fixed on the forward end of writing element 28. The collar 70 formed on cylinder 64 will abut against a shoulder 72 formed in the gripping section 54 to limit forward movement of the cylindrical element with writing element 28 relative to sleeve 26. Spring stop 76 is secured in collar 46 which is in turn carried by plug 40 forming a part of the main body portion 22.

The second step in the actuation of the writing element to a writing position is illustrated in Fig. 8. Further relative axial movement of the main body portion 22 and the sleeve 26 further compresses spring 88 and causes the writing element 30 to protrude beyond the open forward end of gripping section 54 through seal 52 which has been spread as described above. Coil spring 74 is compressed by this further motion and the sleeve 26 is moved to a point where resilient detents 78 formed in latching sleeve 84 pass into an annular recess 80 formed in an annular insert 82 which forms a part of and moves with sleeve 26. The latching element 84 is formed of spring steel or similar material and is clearly shown in perspective in Fig. 3. As can be seen in Fig. 3, the cylindrical latching element 84 has a plurality of longitudinal slits formed therein to define detents 78 and additional portions are formed outwardly to provide resilient faces 86 which will maintain the latching element 84 in desired positions within the sleeve 26 by selective engagement with the insert 82 or the forward edge 49 of collar 46.

In axially shifting the sleeve 26 rearward during the first step described above, motion of the latching element 84 is initially frictionally prevented by the interference of ring 93 and resilient faces 86 of latching element 84 until the rear edge 85 of the cylindrical latching element 84 abuts the forward edge 47 of the large portion of the collar 46, imparting a forward motion to the latching element 84.

Further forward motion of sleeve 26 and the cylindrical latching element 84 causes the resilient faces 86 of the latching element 84 to be depressed inwardly by the ring 93, exerting pressure upon the small diameter section 45 of the collar 46.

As shown in Fig. 8, rearward movement of sleeve 26 effects engagement of detents 78 in recess 80. Upon manual release of sleeve 26, coil spring 88 urges sleeve 26 forwardly, causing detents 78 to engage the rearward edge of recess 80. Thus, further forward movement of sleeve 26 carries latching element 84 forward to a point where the forward edge 90 thereof abuts stop 76, which, as already described, is fixed in plug 40, and the rearward edges 87 of the resilient faces 86 of latching element 84 move to a position forward of the small diameter 45 of the collar 46 and also move inwardly contacting the small diameter cylindrical portion 77 of the stop 76. Thus, the sleeve is restrained against further forward movement under the influence of the spring 88, and the writing tip 30 remains exposed for use. The writing element is illustrated in the writing position in Fig. 9

with the detents 78 in engagement with the rearward edge of recess 80 and the forward edge 90 of latching element 84 abutting the stop 76. The springs 74 and 88 are thus maintained under compression while the writing element 28 is in the writing position. As shown in Fig. 10, when conditioned for writing, or when in the overextended position, the rearward edges 87 of the resilient faces 86 of the latching element 84 contact the forward edge 49 of the small diameter portion 45 of the collar 46.

When it is desired to retract the writing tip to the sealed position, the sleeve is once again manually actuated to produce the overextension of the writing element illustrated in Fig. 8 and the overextension of the latching element 84 illustrated in Fig. 10. A slidable sleeve 92 is disposed within insert 82 mounted on sleeve 26 and movable between predetermined limits. The limits are determined by the rearward flange 91 of insert 82 and a ring 93 which is forced within the forward end of insert 82. Overextension of writing element 28 forces detents 78 inwardly as they slide forwardly onto sleeve 92 and thus sleeve 92 rides rearwardly with the detents 78 of latching element 84 to a point where the sleeve 92 abuts rearward flange 91. As the forward edge 90 of sleeve 84 remains in abutment with stop 76, further forward movement of sleeve 26 produces relative rearward movement of the latching sleeve 84 whereby detents 78 slide onto flange 91. Thus, release of the sleeve 26 will return the parts to the positions illustrated in Fig. 1. Subsequent manual actuation of the sleeve and barrel portion will again position the writing element for use in the manner already described.

To facilitate filling the capillary reservoir 24, the filling tube 32 is extensible relative to the writing element 28. The extension of filling tube 32 is accomplished by the mechanism disposed in the main barrel portion 22 rearwardly of the reservoir 24. A shaped plug 94 is inserted in the rearward end of filling tube 32 and a coil spring 96 normally urges the plug 94 and consequently the filling tube 32 forwardly relative to the main body portion 22, reservoir 24, and writing element 28 fixed thereto. The coil spring 96 is compressed between a collar 98 formed on plug 94 and an apertured annular ring 100 secured against a shoulder 101 formed in the main body portion 22. An operating pin 102 is slidably mounted in a central aperture in ring 100 and is secured to plug 94. Pin 102 has an enlarged threaded portion 104 which is in engagement with a correspondingly threaded insert 106 secured in a telescoping tube 108. Tube 108 has a decorative cap 110 secured to the rearward end thereof by machine screw 112 whereby the tube 108 and cap 110 may be manually rotated and actuated together.

As illustrated best in Fig. 4, the plug 100 is provided with a plurality of vent holes 114. The central aperture in plug 100 is generally square and the pin 102 has a corresponding cross section. The plug 100 is fixed in the main barrel portion 22 and thus the pin 102, plug 94, and filling tube 32 are restrained against rotation relative to the main body. Rotation of cap 110 thus produces relative axial movement of the cap and the pin 102 because of the threaded engagement of the parts, and this axial movement produces a forward extension of the filling tube 32 under the influence of spring 96.

Figs. 11 and 11A illustrate the preferred embodiment of this invention with the filling tube 32 in the extended position. In the fully extended position, as can be seen in Fig. 11A, the enlarged threaded portion 104 of pin 102 engages plug 100, limiting forward motion of the filling tube 32 under the influence of spring 96. Further rotary motion of cap 110 will provide rearward movement of the cap and tube 108 whereby the tube is freed from threaded engagement with pin 102. When so freed, the cap and tube are immediately urged rearwardly by compressed coil spring 116 to a position where further rearward movement is prevented by engagement of a

flanged portion 118 of tube 108 against a shoulder 120 formed in the main barrel portion 22.

A circular sealing ring 122 is disposed in a recess in the main barrel portion 22 and engages tube 108 to provide a pneumatic seal. Thus, as the tube 108 moves rearwardly to the position shown in Fig. 12 the expansion of the chamber defined thereby causes partial collapse of a resilient flexible sac 124 which surrounds spring 96 and plug 94. Sac 124 is of a generally cylindrical shape sealed at its rearward end in plug 100 and at its forward end in plug 94. Thus, as the tube 108 moves rearwardly and the sack 124 is partially collapsed, air is drawn into the space 126 created thereby and this air is drawn upwardly through the filling tube 32 through a transverse aperture 128 formed in the filling tube and through a plurality of vent apertures 38 formed in the rearward plug 36. Thus, fluid is drawn upwardly through tube 32 and into the capillary mass 42 where it remains in capillary suspension. The fluid will move forwardly in the capillary mass 42 upon successive depressions of cap 110 whereby the capillary mass may be completely charged with fluid by a plurality of actuations of the cap.

The pen is then reconditioned for writing by reversing the steps described above. The cap 110 is forced inwardly toward the main body portion 22 and threaded into engagement with pin 102. Rotation of cap 110 draws filling tube 32 rearwardly to the position illustrated in Fig. 9 and the pen is in condition for writing. Then, as already described, the writing element may be shifted between the concealed and the writing position by selective operation of the barrel and sleeve mechanism.

A pocket clip 130 of a conventional type is provided and is secured in the metal shell 60 in a conventional manner.

Various changes and modifications of the basic structure described herein will immediately appear to one skilled in this art.

While the capless concept employing a deformable sealing member may be employed with other fountain pens which may not use an extensible filling tube or a capillary type of reservoir, the advantages of the combination of these elements is believed manifest and clearly set out in the introductory portions of this specification. Also the concept of two concentric cylinders, one of which comprises a writing element to provide improved fluid feedings, and the other a filling tube, may be employed with other forms of reservoir types and filling mechanisms.

The various means described above are clearly exemplary and only one particular embodiment of the invention. Other nib means, reservoir means, mechanical means for extending and retracting the writing point, mechanical means for extending and retracting the filling tube, pressure means for filling the reservoir, and the like may be provided without departing from the spirit and scope of this invention. For example, while the general discussion above refers to a rearwardly vented reservoir, it will be apparent that this language is properly construed to include any longitudinal reservoir means vented at a point opposite the writing tip whereby writing fluid may be discharged to the tip, irrespective of the possible tortuous shape of the reservoir or any connecting tubes or passages.

Without further elaboration, the foregoing will so fully explain the character of our invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, while retaining certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured to us by the following claims.

We claim:

1. A fountain pen comprising a barrel section, a fluid reservoir within said barrel section, a writing nib in communication with said reservoir positioned forwardly relative to said barrel section, an integral cylindrical sleeve

having an open forward end mounted on said barrel section and movable to a rearward position wherein said nib extends through said open forward end in writing position and to a forward nib concealing position, a resilient deformable sealing member adjacent the open forward end of and completely within said sleeve normally substantially sealing said nib against access to the atmosphere through said open forward end when said sleeve is in said forward position, operating means movable within said sleeve to a forward position to deform said sealing means to define a central aperture in said open forward end, said operating means being axially movable relative to said writing nib and resiliently urged forwardly of said writing nib but restrained rearwardly of said sealing member whenever said cylindrical sleeve is in the nib concealing position, and stop means to limit forward movement of said operating means to said forward position deforming said sealing means, whereby said writing nib may be moved forwardly of said operating means and said sealing member to said writing position.

2. A fountain pen comprising a barrel section, a fluid reservoir within said barrel section, a writing nib in communication with said reservoir positioned forwardly relative to said barrel section, an integral cylindrical sleeve having an open forward end mounted on said barrel section and movable to a rearward position wherein said nib extends through said open forward end in writing position and to a forward nib concealing position, a resilient deformable sealing member adjacent the open forward end of and completely within said sleeve normally substantially sealing said nib against access to the atmosphere through said open forward end when said sleeve is in said forward position, operating means movable within said sleeve to a forward position to deform said sealing means to define a central aperture in said open forward end, said operating means being axially movable relative to said writing nib and comprising a collar surrounding said writing nib within said sleeve, resilient means urging said collar forwardly, stop means carried by said writing nib and limiting movement of said collar to a forward writing nib concealing position, and stop means in said sleeve to limit forward movement of said collar to a forward position within said sleeve deforming said sealing means, whereby said writing nib may be moved forwardly of said operating means and said sealing member to said writing position.

3. A fountain pen comprising a hollow body portion having an open forward end, a flexible resilient sealing member closing said open forward end having a slitted central portion deformable to define a central aperture and mounted within said body portion adjacent said open forward end, a writing point mounted in said body portion for movement relative to and through said open forward end and said slitted central portion, said movement being between point exposed and point concealed positions, substantially cylindrical means surrounding said writing point and carried thereby, said cylindrical means being responsive to said movement to the point exposed position to engage and open said slitted central portion

whereby said point may freely move to said exposed position, said cylindrical means being axially movable relative to said writing point and resiliently urged to a position forwardly of said writing point, and stop means supported within said body portion to limit forward movement of said cylindrical means to a forward position within said body portion deforming said sealing means when said writing point is moved through said open forward end, whereby said writing point may be moved forwardly of said cylindrical means and said sealing member to said point exposed position.

4. The fountain pen of claim 3 wherein said resilient deformable sealing member comprises a flexible diaphragm having a radially slit central area and deformable to define a central aperture whereby said cylindrical means spreads said diaphragm radially to freely pass said writing element therethrough.

5. A fountain pen comprising a barrel section, a fluid reservoir, a writing nib in communication with said reservoir positioned forwardly of said barrel section, a cylindrical sleeve having an open forward end adapted to receive said nib mounted on said barrel section and movable with respect to said barrel section to a rearward nib exposing position and to a forward nib concealing position, a resilient sealing member mounted completely within said sleeve closing said open end and having a slitted central portion deformable to define a central aperture for receiving said nib upon movement of said sleeve toward said nib exposing position, said central portion being spaced forwardly of said nib when said sleeve is in said nib concealing position, substantially cylindrical means surrounding said nib and carried thereby for opening said slitted central portion in response to movement of said sleeve to the nib exposing position whereby said nib may freely assume said exposed position, said cylindrical means being axially movable relative to said writing nib and resiliently urged to a position forwardly of said writing nib, and stop means supported within said sleeve to limit forward movement of said cylindrical means to a forward position within said sleeve deforming said sealing means when said writing nib is moved through said open forward end, whereby said writing nib may be moved forwardly of said cylindrical means and said sealing member to said writing position.

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