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C. R. SHEAFFER
WRITING IMPLEMENTS

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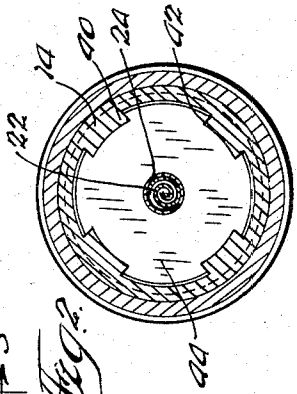
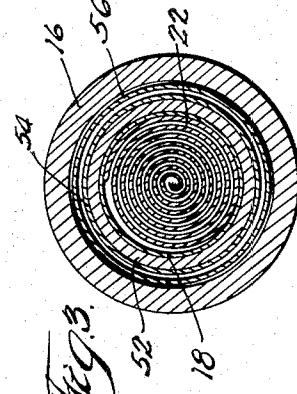
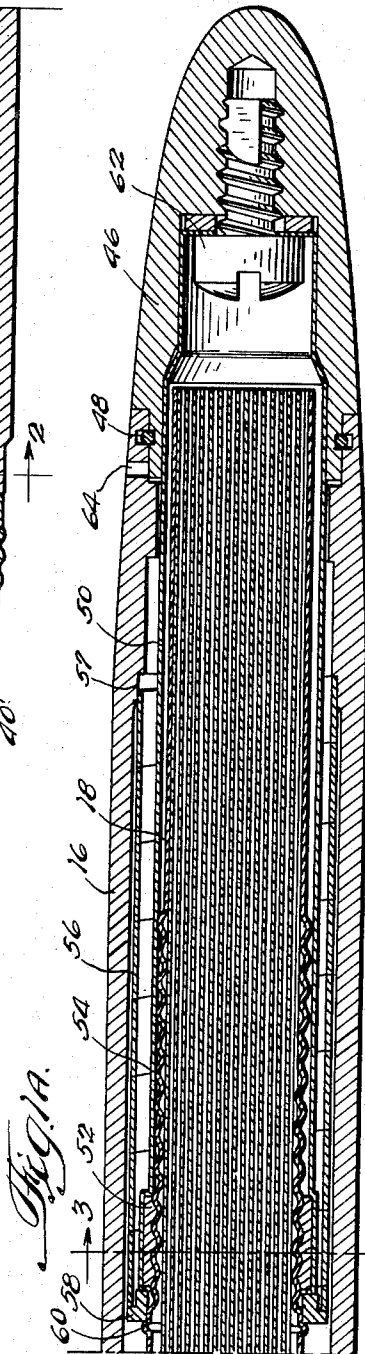
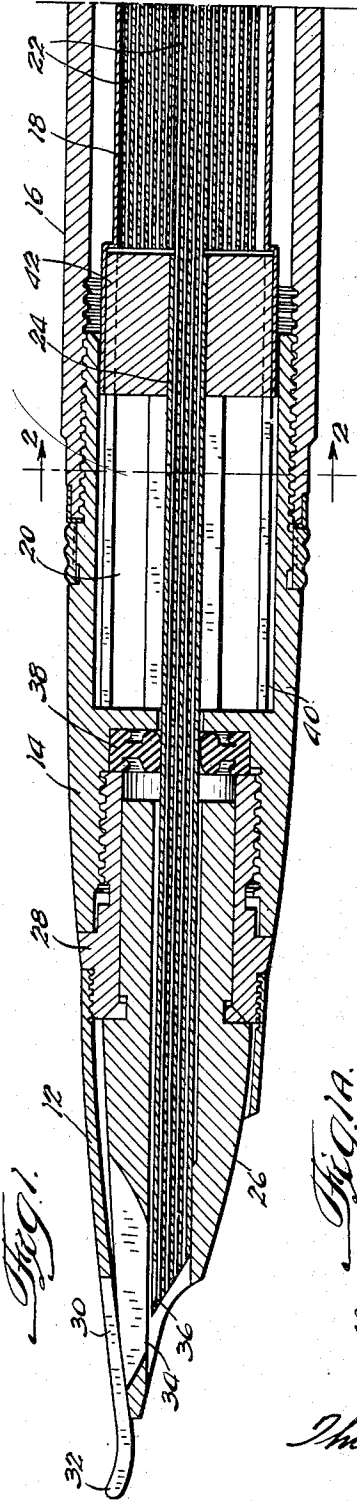


Fig. 1A.
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2,784,699

WRITING IMPLEMENTS

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3 Claims. (Cl. 120-46)

This invention relates to writing implements and more particularly to improved means for filling a writing implement with a writing fluid and subsequently feeding the fluid to a writing element associated with the implement. An important object of this invention is to provide an improved writing implement having improved filling and fluid feeding means.

The method of filling fountain pens heretofore generally utilized involves the step of dipping the writing point or element into a body of fluid. Such devices involve several disadvantages, an important one of which is that when the writing point is immersed in a body of fluid an excess amount of such fluid accumulates on and around the writing point, thus necessitating wiping of excess fluid from the writing element prior to use in writing. It has been found that a more aesthetic and functionally improved device may be provided by eliminating the need for dipping the writing element in the fluid incident to the filling operation. Also various systems have been proposed for improving the filling process for fountain pens, such as those involving the use of replaceable ink cartridges or those wherein the pen is filled from a rear portion. None of these has proved entirely satisfactory since such systems have proved cumbersome and generally messy during the filling process.

Therefore, it is a further object of this invention to provide a fountain pen which may be filled with a writing fluid without necessitating the insertion of the writing element in a body of such fluid.

It is another object of this invention to provide a fountain pen which can be filled without requiring pumping or squeezing, or the performance of any other operation, but requires only dipping a portion of the fountain pen in a body of writing fluid.

It is an additional object of this invention to provide a system for fountain pen filling which is readily adapted to use in most forms of fountain pens presently in use.

It is a further object of this invention to provide a fountain pen utilizing an improved filling system which requires a minimum number of parts, is simple in construction, and is substantially infallible in use.

It is another object of this invention to provide an improved fountain pen which does not require a fluid expansion chamber adjacent the writing element or an external filling device whereby is formed a simpler and more aesthetic instrument.

It is another object of this invention to provide a reservoir cartridge unit in accordance with this invention.

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

In accordance with one embodiment of this invention, a writing implement is provided comprising a fluid reservoir which is essentially capillary in nature and may be formed from a spirally wound laminar structure having spaces between successive convolutions of the spiral which

are of capillary dimensions. A filling tube extends forwardly from said reservoir and also is essentially capillary in nature and may be formed from spirally wound material having capillary spaces between successive convolutions. The reservoir and filling tube preferably form an integral structure or cartridge which is axially reciprocable with respect to the writing element or point, and it may be so mounted that relative rotation of two portions of the pen barrel will cause axial movement of the reservoir and filling tube within said barrel. Mounted on the forward end of the fountain pen barrel is the customary feed bar providing fluid communication between the fluid reservoir and a writing element. No comb-like expansion chamber is necessary in said feed bar since the capillary reservoir is normally vented at both ends and no differential pressure will exist to force the fluid from the reservoir toward the writing point. The feed bar has an axial bore through which the filling tube normally passes, said filling tube being reciprocable between filling and writing positions. The forward end of the side wall of the filling tube is provided with a capillary ink feeding slit, and in the writing position the forward end of the filling tube will be positioned so that this slit is in communication with a capillary slit in the feed bar. The capillary slit in the feed bar is, in turn, in communication with a capillary slit in a writing element which is secured to the feed bar. When the cartridge comprising the reservoir and filling tube is moved to the filling position the forward end of the filling tube is remote from the writing element, and the forward end of the filling tube may be readily immersed in a body of writing fluid to effect filling of the fountain pen thereby avoiding immersion of the feed bar or writing point in the fluid.

An important feature of this invention is a structure in which a single tube is used both for filling the reservoir and for feeding the writing fluid to the point or nib during writing. No pump or lever is required to fill the fluid reservoir. By providing a plurality of communicating capillary passageways within the space defined by the reservoir and the filling tube the mere dipping of the forward end of the filling tube into a body of fluid permits a quantity of the fluid to rise in the filling tube and reservoir by capillary action whereby the implement is filled for writing. The capillary reservoir section is vented at both ends and, therefore, the problems of fluid and gas expansion within the closed type reservoir are eliminated. Thus it is not necessary to provide comb-like expansion chambers in the feed bar.

It will be clear that a number of means for reciprocation may be utilized in order to condition the forward end of the filling tube for insertion in a body of fluid. One such means is herein specifically disclosed involving relative rotation of two barrel portions to produce axial reciprocation of the filling tube to a position forwardly of the writing tip. Additional means of tube reciprocation will become manifest, such as the provision of a simple lever secured to the filling tube or reservoir extending through a side wall of the barrel whereby the forward end of the tube may be reciprocated between a forward and rearward position with respect to the writing element.

While one particular type of capillary structure is specifically disclosed herein, it will be clear to one skilled in the art that other capillary systems may be substituted therefor without departing from the spirit and scope of this invention. The spirally wound sheet material, which is herein disclosed, may be replaced by a plurality of balls or spheres having capillary dimensions therebetween which would draw a writing fluid up into the sphere-filled filling tube and reservoir by capillary action. Other capillary systems which might be used include a plurality

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of individual tubes of capillary dimensions placed in the reservoir and filling tube side by side, a plurality of spaced concentric tubes substantially filling the reservoir and filling tube, or convolutely wound corrugated material to provide capillary passageways between successive convolutions thereof to provide a reservoir and filling tube filled with spaces of capillary dimensions.

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

Figure 1 is a longitudinal sectional view of the forward portion of one embodiment of this invention;

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

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1; and

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1A.

Referring now to the drawings, a fountain pen is shown which comprises a writing element or nib 12 threadedly engaged with a connecting member 28 mounted on a gripping section 14 which is in turn threadedly secured to a barrel 16. A reservoir 18 is secured within the barrel 16 and is reciprocable between a writing position, as shown, and a filling position (not shown) in which the reservoir 18 is axially moved into a space 20 in the rearward end of the gripping section 14. The reservoir 18 is filled with a spirally wound material 22 in which each of the convolutions of the material is spaced from the adjacent convolutions to provide a capillary space or spaces whereby surface tension effects will cause the writing fluid to fill the reservoir when the capillary spaces are in communication with a body of writing fluid. Integrally with and extending forwardly from the reservoir 18 is a filling tube 24 also filled with a spirally wound material having convolutions spaced to form capillary passageways or cells therebetween which are in capillary communication with the capillary spaces within the reservoir 18. The filling tube 24 extends forwardly of the reservoir through an axial bore in a feed bar 26 to a point adjacent to and in fluid communication with the writing element 12, the feed bar 26 being in slip-fit engagement with a central bore in the connecting member 28. The writing element or nib 12 is of a well-known tubular variety and threadedly engages the connecting member 28. The nib 12 is provided at its forward portion with the usual capillary slit 30 which terminates in a writing point 32. A capillary slit 34 is formed in the forward end of the feed bar 26 and is in communication with the capillary slit 30 in the writing element 12. The filling tube 24 is open at its forward end to receive fluid when filling and is also provided with a capillary opening 36 which is in communication with the capillary slit 34 of the feed bar 26 for feeding fluid from the reservoir and filling tube to the writing point.

The connecting member 28 is threadedly engaged in gripping section 14 and retains a gasket 38 within the gripping section 14, and this gasket normally engages the filling tube 24 to prevent writing fluid which may adhere to the forward end of tube 24 from passing rearwardly into the interior portions of the fountain pen. The gripping section 14 is provided with a rearward axial bore of sufficient diameter to receive the reservoir 18 when the latter is reciprocated to its forward position (not shown). As shown best in Fig. 2, the internal surface of the gripping section 14 has a plurality of longitudinally extending splines 40 formed thereon. The splines 40 in the gripping section 14 engage corresponding grooves 42 in the side walls of a bushing 44 which forms the forward closure for the reservoir 18. These splines and grooves prevent relative axial rotation of the reservoir 18 with respect to the barrel and the gripping section, but allow reciprocation of the reservoir within the barrel.

The manner in which reciprocation of the barrel and

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filling tube is effected will now be explained. A barrel knob 46 is provided at the rearward end of the barrel 16 and is held against relative longitudinal movement by a snap ring 48 which engages corresponding registering channels in the barrel and barrel knob. Secured to the barrel knob 46 is a tube 50 which extends forwardly through the barrel and over the reservoir 18 to a point near the forward end of the barrel. The tube 50 may be secured to the barrel knob 46 by any convenient means, and is here shown retained by the screw 62. A thrust nut 52 is secured to the forward end of the tube 50, said thrust nut being threaded internally to engage a threaded portion 54 of the reservoir 18. Thus the barrel knob and thrust nut are rotatable with respect to the barrel, while the reservoir, with which the thrust nut is threadedly engaged, is locked against rotation by the splines 40 engaging the corresponding grooves 42 in the gripping section 14. Relative rotation of the barrel 16 and barrel knob 46 therefore causes axial movement of the reservoir 18 with respect to the thrust nut 52. This motion causes the filling tube 24 to move forwardly of the writing element 12 to the filling position. The movement of the reservoir 18 to its forward position is assisted by a helical spring 56 which is compressed between a shoulder 57 in the barrel 16 and a collar 58 movable within the barrel but urged against a ridge 60 on the reservoir 18. The helical spring 56 may be eliminated if desired. A vent hole 64 is provided in the rearward portion of barrel 16 to continuously vent the rearward end of the reservoir 18. The purpose of such a vent is to equalize the pressures within the reservoir and barrel and to facilitate capillary feeding of the fluid to the writing point.

Thus when the reservoir is to be filled, the filling tube and reservoir are moved forwardly to extend the forward end of the tube to a position (not shown) forwardly of the writing tip 32. The end of the tube is dipped into a body of writing fluid and capillary attraction causes the fluid to fill the capillary spaces within the tube and within the reservoir, it not being necessary to immerse the pen nib in the fluid. Thereafter the instrument is conditioned for writing by retracting the filling tube and communication is established between the reservoir and the writing element through the filling tube and the capillary passageways 36, 34, and 30, as will be understood. Also, in the event that the pen was dry prior to filling, the passageways in the feed bar and pen nib are automatically primed by any excess fluid adhering to the forward surfaces of the tube when retracted, this fluid passing to these passageways by capillary attraction.

Thus it can be seen that an improved writing implement is here provided which can be filled without immersing the writing element and feed bar in a body of fluid, thus avoiding the necessity of wiping the pen point after filling or the accumulation of excess writing fluid on the bar and writing element. Upon dipping the forward end of the filling tube into a body of fluid, it is not necessary to operate a lever or pump since the writing fluid is drawn up into the filling tube and communicating reservoir by the forces of surface tension acting within the communicating cells which are of capillary dimensions. Thus the filling operation is greatly simplified.

While one particular embodiment of this invention is herein shown, it will be clear that various modifications may be made in the structures herein taught without departing from the spirit and scope of this invention.

Without further elaboration, the foregoing will so fully explain the character of my 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 me by the following claims.

I claim:

1. A fountain pen comprising a writing element and a

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reservoir longitudinally shiftable relative to said writing element having capillary space-defining material substantially filling said reservoir, said reservoir having a substantially rigid forward portion with an open forward end extensible to a position forwardly of said element and retractable to a position rearwardly of said element, said reservoir having adjacent its open forward end a capillary fluid feeding passageway in communication with said writing element.

2. In a fountain pen having a writing element, a reservoir having capillary space-defining material substantially filling said reservoir and being substantially rigid and open at both ends, said reservoir being reciprocally mounted in said pen to extend the open forward end of said reservoir to a position forwardly of said writing element and to retract said open forward end to a position rearwardly of said writing element, said reservoir having an opening of capillary dimensions in a side wall thereof providing a fluid feeding passageway between said reservoir and said writing element.

3. A fountain pen comprising an elongated casing having a rear portion and a forward portion axially secured together in relatively rotatable relationship, a writing fluid reservoir within said casing having capillary space-defining material therein and having an open rearward end, a bushing having an axial bore mounted for rotation with said rear portion of said casing, a gripping section having an axial bore coaxial with and forwardly of said bushing and mounted for rotation with said forward portion of said casing, a feed bar having a capillary feeding passageway supported within the bore of said gripping section and

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having an axial bore extending therethrough, a writing point positioned forwardly of said bar and in fluid communication with said capillary feeding passageway, a substantially rigid longitudinally reciprocable filling tube having an open forward end and including capillary space-defining material therein, said tube extending through the axial bores of said feed bar and gripping section and communicating with the forward end of said reservoir, means on the forward portion of said casing for holding said reservoir and filling tube against rotation when the rear portion of said casing is being rotated relative thereto, and threaded means on a portion of said reservoir and on said bushing to reciprocate said filling tube and reservoir with respect to said casing whereby the open forward end of said filling tube is reciprocated between a filling position forwardly of said writing point and a non-filling position rearwardly of said point when said forward and said rear portions are relatively rotated.

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