

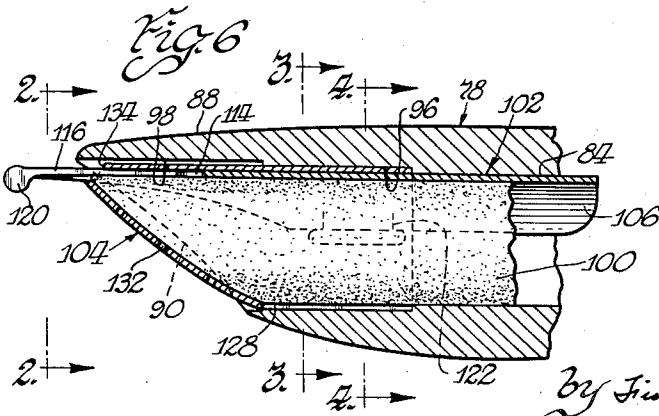
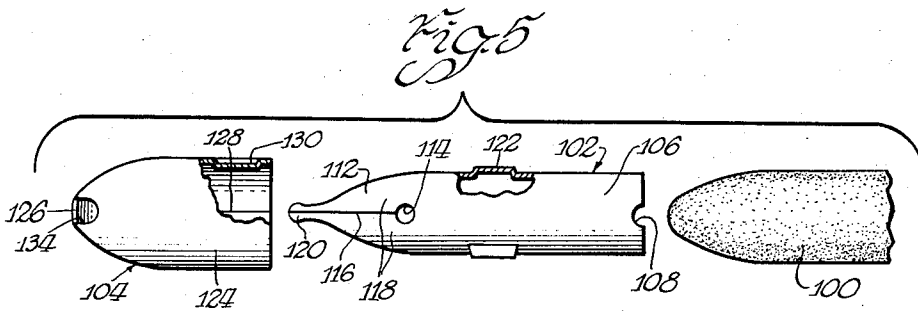
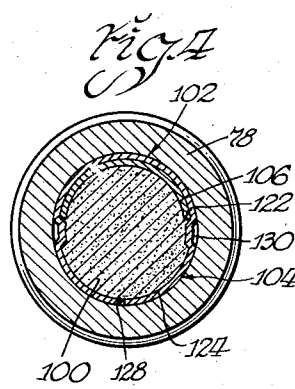
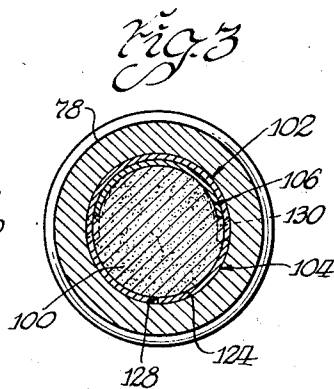
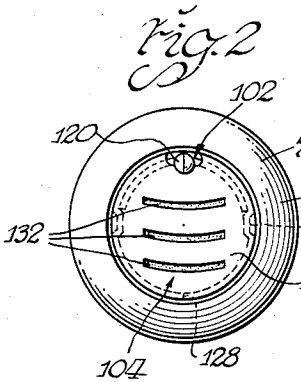
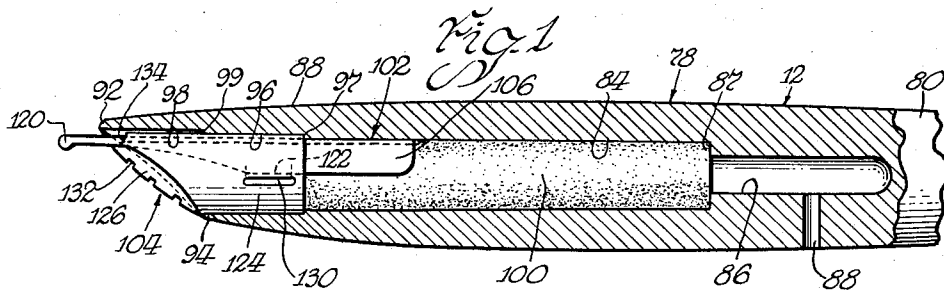
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FOUNTAIN PEN

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2,888,908

## FOUNTAIN PEN

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7 Claims. (Cl. 120—51)

This invention relates to a capillary pen and more particularly to a pen especially well adapted for use with a pen desk set base wherein the ink is presented to the pen by a capillary element which lifts ink above the level of the body of ink in the well of the base.

An object of the present invention is to provide a capillary pen which is extremely simple and inexpensive to manufacture, which effectively fills itself by capillary action and which is especially well adapted for use with a desk set base of the type having a capillary ink lifting element.

Another object is to provide a pen for use in connection with a base of the character referred to, having such novel construction that it is capable of storing a large quantity of ink whereby it may be used in writing for a relatively long period of time without the necessity for refilling the pen.

Another object is to provide a pen which can be made and assembled very inexpensively, is rugged and durable and is not likely to become inoperative over a long period of use.

Other objects and advantages will appear from the following description taken in connection with the appended drawings, wherein:

Fig. 1 is a fragmentary view partially in vertical cross-section of a novel pen constructed in accordance with my invention;

Figs. 2, 3 and 4 are enlarged transverse cross-sectional views taken respectively along lines 2—2, 3—3 and 4—4 of Fig. 6;

Fig. 5 is an enlarged exploded plan view of the nib, capillary element and guard forming portions of the pen of Fig. 1; and

Fig. 6 is an enlarged, fragmentary view in vertical cross-section of the front end of the pen of Fig. 1.

This application is a division of my copending application Serial No. 224,123 filed May 2, 1951.

While the pen of the present application is especially well adapted for use with a desk base of the type shown in my aforesaid copending application the invention is not thus limited and the pen may be used with other bases or may be filled by immersion of the writing end in a body of ink. It might be explained that in the desk base to which reference is made, there is a capillary ink lifting element formed of porous resilient material (preferably similar to the material forming the capillary element of the pen disclosed herein), and which serves to lift ink by capillary action from a body of ink in the base and to present it for transfer by capillary action to the pen.

The pen 12 is a capillary type pen effective for drawing or lifting ink from a capillary ink lifting element of the type such as shown in my copending application and possesses substantial capacity for enabling the pen to be used for a long period of time without the necessity for refilling. The pen 12 includes a barrel 78, which may be of any desired material such, for example, as

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plastic, having a rear portion 80 which may conveniently be of solid form and is of such size and shape as to fit the hand. The barrel is formed with a cavity or bore 84 in its forward end communicating at its rear with a reduced bore 86 forming a shoulder 87 therewith, the bore 86 having a vent 88 communicating with atmosphere for enabling lifting of the ink into the pen by capillary action. The barrel 78 at its forwardmost end tapers slightly at 88 to a shape such as to coax with the socket in the desk base (not shown) so that the pen, when its forward end is inserted in the socket, is supported at the desired height.

The cavity 84 opens out through the forward end of the barrel which is inclined at an angle forming an opening of the bore which lies in a slightly concave, inclined surface, as indicated at 90 (Fig. 6). The barrel thus has a forwardly extending tip or projection 92 on the upper side thereof and a longitudinally inwardly disposed terminal portion 94 on the under side. The bore 84 is provided with a slightly enlarged counterbore 96 adjacent its forward end which terminates forwardly adjacent the terminal portion 94, and a second counterbore 98 slightly larger than the counterbore 96 leading from the latter to the forward end of the barrel. The two counterbores form shoulders 97 and 99 respectively.

A capillary filler-and-reservoir element 100 is fitted in the bore 84 with its rear end engaging the shoulder 87 which forms a stop for positioning the filler-and-reservoir element. The filler-and-reservoir element 100 is formed of a porous material the pores of which are interconnected and provide capillary spaces, and preferably is yieldable and resilient. One material which I have found gives excellent results is regenerated cellulose sponge having capillary interstices for lifting the ink therinto and storing it therein. In this case the capillary filler-and-reservoir element is also preferably cylindrical in shape so as to completely fill the bore 84 and preferably has substantial frictional engagement with the wall of the bore for aiding in retaining it in the bore, particularly when filled with ink. The filler-and-reservoir element is primarily retained in place by a guard to be referred to later. The forward end of the filler-and-reservoir element is provided with an inclined, slightly convex surface for projecting a slight distance beyond the open forward end of the cavity 84 for a purpose to be explained later.

A pen nib 102 is retained in the bore 84 by means of a guard 104. The pen nib 102 includes an arcuate body portion 106 which, in the present instance, may be of slightly less than semi-cylindrical extent, with a notch 108 at its rear end. The pen nib also includes a forward portion 112 having the usual pierce 114 from which leads a slit 116 forming nib sections 118 which terminate forwardly in and together form a writing point 120 which is of the desired and customary hard-wear-resistant material. The body portion 106 is provided with outwardly extending projections or ribs 122 along its lateral marginal edges for engagement with appropriate conformations of the guard 104.

The guard 104 includes a tubular body portion 124 and a front plate 126, the body portion being split longitudinally on its under side as indicated at 128, whereby it can be slightly expanded for friction gripping the inner surface of the counterbore 96, as will be explained later. The body portion 124 also is provided with inwardly extending elements 130 forming projections on its inner surface at substantially diametrically opposite sides. The front plate 126 is preferably integral with the body portion 124 and is slightly convex outwardly so as to extend forwardly of the pen slightly beyond the barrel as determined by the surface 90, and to conform in shape with

and have full-surface contact with the forward end of the filler-and-reservoir element 100. The front plate 126 is provided with a plurality of transverse slits 132 forming capillary passages on the order of 0.006" in width, which enable capillary transfer of ink from the ink lifting element of the pen base or ink well (not shown) to the filler-and-reservoir element 100 when the front plate is in engagement with the ink lifting element. The convex shape of the front plate 126 and its position slightly beyond the surface 90, enable it to fully contact the ink lifting element without interference by the edges surrounding the opening of the barrel. It will be noted that although the front plate 126 is slightly convex and extends slightly outwardly beyond the surface 90, it is nevertheless inclined at an angle roughly corresponding with the angle of inclination of the surface 90. The front plate therefore is positioned so as not to contact the writing surface when the pen is held at a normal angle thereto in the writing operation. The guard 104 has an opening or aperture 134 at its upper forward point for projection of the writing point 120 of the nib therethrough.

In assembling the elements making up the pen, the pen nib is inserted into the guard from a position indicated in Fig. 5 to a position wherein the writing point 120 extends through the aperture 134 and the projections 122 on the nib engage the upper edge surfaces of the projections 130 in the guard. The upper edge surfaces of the projections 130 are of such conformation that the projections 122 have relatively tight frictional engagement therewith to maintain the pen nib and guard against undesired relative displacement. Thereafter the filler-and-reservoir element may be inserted into the guard 104 and the whole assembly inserted into the cavity 84. However, it is also possible to first insert the filler-and-reservoir element in the cavity and thereafter fit the guard and nib assembly into the cavity in surrounding relation to the filler-and-reservoir element. The pen nib 102 firmly engages the surface of the filler-and-reservoir element whereby the pierce 114 and the rear portion of the slit 116 are directly exposed to the surface of the filler-and-reservoir element, and as a consequence ink progresses by capillary action through the slit 116 to the writing point 120.

The front plate 126 acts as an effective closure for the forward end of the pen and as a cover for the filler-and-reservoir element for preventing undesired contact between the filler-and-reservoir element and external objects including the fingers of the user. The filler-and-reservoir element is heavily laden with ink when full and contact thereby with other elements is undesirable, but the front plate 126 will substantially prevent any undesired transfer of ink from the filler-and-reservoir element to outside objects. However, the slits 132 form such capillary passages as to readily permit transfer of ink therethrough from the ink lifting element to the filler-and-reservoir element of the pen.

The body portion 124 of the guard is so shaped relative to the counterbore 96 as to have a tight frictional engagement therewith, whereby the guard and nib are retained against undesired rotational displacement. The shoulder 97 at the rear end of the counterbore 96 also forms a stop for locating the guard at the intended innermost position.

The inclination of the front plate 126 is such relative to the inclination of the socket of the base (not shown) that, when the pen is supported in the socket, the front plate is disposed in a position at about 12° with respect to the horizontal as is also the upper end surface of the capillary ink lifting element (not shown) as mentioned above. For this reason there is assured greater surface contact between the front plate and the ink lifting element for establishing maximum transfer of ink into the pen, being in contrast to that condition wherein the respective contacting surfaces are disposed at a substantial angle relative to the horizontal. The ink, on being lifted

by capillary action from the ink well by the ink lifting element, progresses by capillary action through the capillary passages 132 in the front plate 104 and thence into the capillary filler-and-reservoir element where it is stored until the pen is used in writing.

I claim:

1. A pen comprising a barrel having a vented bore in a forward end portion opening through its forward end, the bore having a rear portion of major length substantially uniform in cross section throughout its length, all portions of the bore being of at least as great transverse dimension as any portion rearwardly thereof, a resilient capillary filler-and-reservoir element in the bore essentially of uniform transverse dimension throughout its length and of such transverse dimension as to substantially fill the bore and to frictionally engage at least said rear portion of the bore, the filler-and-reservoir element constituting essentially the sole means for containing ink in the pen, an arcuate nib in the bore and frictionally engaging the surface of the bore and of the filler-and-reservoir element, and having an ink feed slit in capillary ink feed relation with the filler-and-reservoir element and having a writing tip extending forwardly beyond the pen barrel, and a shell-like guard in surrounding relation to and frictionally gripping and confining the nib and the filler-and-reservoir element at the forward portion and frictionally engaging the surface of the bore, the nib and guard being substantially shorter than the filler-and-reservoir element and the latter having friction engagement with the bore rearwardly of the nib and guard, the filler-and-reservoir element substantially filling the guard and terminating adjacent the forward end of the latter, the filler-and-reservoir element, nib and guard together constituting a writing unit retained in the bore solely by friction and insertable into and removable from the bore as an assembled unit and only through the forward end of the bore.

2. The combination of claim 1 in which the filler-and-reservoir element is made of resilient sponge material whereby the nib can be impressed into the mass or body thereof in frictionally positioning it between that element and the surface of the bore without materially affecting the capillary structure in the body thereof.

3. The combination of claim 1 in which the nib is less than a complete circle in arcuate direction and the nib and guard have cooperating elements frictionally interengaging for positively restraining the members against relative rotational displacement and frictionally restraining them against relative longitudinal displacement.

4. The combination of claim 1 in which the guard has a front covering plate with capillary-dimension openings therein and the filler-and-reservoir element engages the plate in ink feeding relation to the openings.

5. The combination of claim 1 in which the barrel has a counterbore for receiving the guard, the guard is split for effecting frictional retention in the counterbore, and the counterbore forms a shoulder engaged by the guard for limiting rearward movement thereof.

6. The combination of claim 5 in which the barrel has a second counterbore the surface of which partially overlies the nib tip and forms therewith a space of capillary dimension operative for retaining a film of ink therein in feeding relation with the nib slit.

7. A pen comprising a barrel having a vented bore in a forward end portion opening through its forward end, the bore having a rear portion of major length substantially uniform in cross section throughout its length, all portions of the bore being of at least as great transverse dimension as any portion rearwardly thereof, a capillary filler-and-reservoir element in the bore in the form of a resilient mass having pores normally distributed substantially uniformly throughout its mass and readily conformable to different shapes without affecting its capillary properties and capable of being compacted without more than affecting the degree of its capillarity, the filler-and-

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reservoir element being essentially of uniform transverse dimension throughout its length and of such transverse dimension as to substantially fill the bore and to frictionally engage at least said rear portion of the bore, the filler-and-reservoir element constituting essentially the sole means for containing ink in the pen, a shell-like guard frictionally fitted in the bore and having a forwardly and upwardly inclined covering element terminating adjacent the forward end of the bore, an arcuate nib in the bore with a writing tip projecting forwardly of the bore, said guard surrounding and confining the forward portion of the filler-and-reservoir element and retaining it in capillary ink feeding relation to the nib and the forward end of the filler-and-reservoir element substantially filling the space surrounded by the guard and nib, the guard and nib being retained in the bore by frictional engagement therewith, and the guard, nib and filler-and-reservoir element together forming a writing unit retained in the bore solely by friction and removable as a unit solely through the forward end of the bore and when out of the bore

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forming a self-sustained unit the parts of which are held together by friction.

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