June 7, 1938. F. MOORE 2,120,059

FOUNTAIN PEN

Original Filed Dec. 14, 1933

Fig. 1.

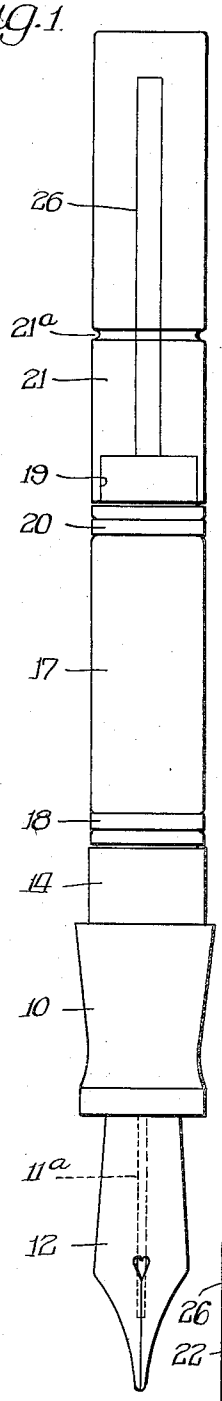


Fig. 2.

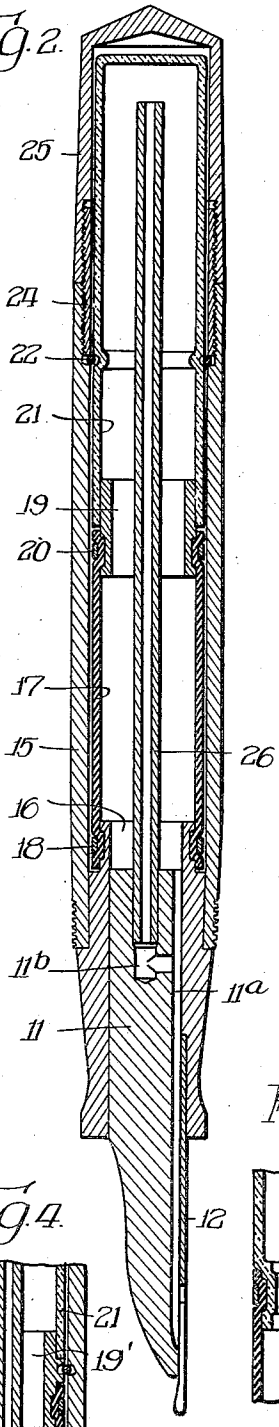


Fig. 3.

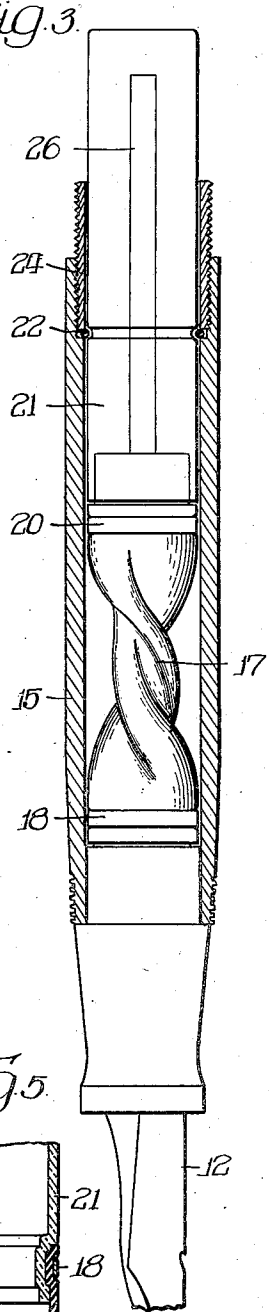


Fig. 4.

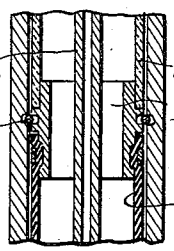
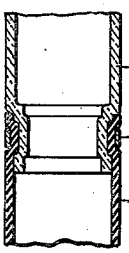


Fig. 5.



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Patented June 7, 1938 2,120,059

UNITED STATES PATENT OFFICE

2,120,059

FOUNTAIN PEN

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Application December 14, 1933, Serial No. 702,321
Renewed November 11, 1937

7 Claims. (Cl. 120—46)

This invention relates to fountain pens of the kind having self-contained filling means.

A general object of the invention is the provision of an improved construction for such a pen which will have large ink capacity for its size, which comprises few and simple parts which are easily assembled, which may be manipulated with facility in the filling operation, and in which the filling mechanism is both durable and susceptible of replacement easily and at but very little expense.

Another object is the provision of an improved construction for a pen of the type specified which admits of the relative quantity of its ink content being ascertained by visual observation.

Other and further objects of the invention will be pointed out or indicated hereinafter, or will be apparent upon an understanding of the invention or its employment in use.

For the purpose of aiding in a disclosure of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter described, certain structural forms in which it may be embodied. It is to be understood, however, that these are presented merely by way of illustration and are not to be construed in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 is an elevational view of an assembled unit which includes the filling mechanism, same being divested of the barrel or housing portions;

Fig. 2 is a longitudinal sectional view illustrating the complete pen assembly, with the exception of the pen point cap;

Fig. 3 is a part longitudinal section showing the relationship of parts at one phase of the filling operation;

Fig. 4 is a detail in the nature of a part longitudinal section illustrating a modified feature; and

Fig. 5 is a detail illustrating an alternative feature of construction.

Described generally, the invention provides a manipulable filling element which includes an elastically collapsible or deformable tubular or hollow member which forms a part of the ink reservoir or container, together with a manually operable portion whereby the elastic member may be operated. This manually operable member forms a part of the ink reservoir or container and is transparent or translucent so that the presence of ink in the ink reservoir may be visually ascertained.

A more detailed understanding of the invention may be gathered from the illustrative embodiment which is shown in the drawing, and which will now be described.

The construction here illustrated includes a sleeve 10 which constitutes part of the pen section, the feed bar 11 and pen point 12 being mounted therein in a customary fashion. The sleeve 10 has a reduced portion 14 adapted to fit retentively within the lower end of the tubular barrel 15, the bearing areas of these two parts being sufficiently close and extensive to secure them against wabbling. The upper portion of the sleeve member is still further reduced externally to form a peripherally grooved nipple 16.

A flexible elastic tubular or hollow member 17, such as a section of strong rubber tubing, has its lower end portion disposed in encompassing relationship to the nipple 16 and tightly bound thereto by a constricting band 18. The diameter of the tubular member 17 approximates the internal diameter of the barrel, but said member is of a length such as to occupy only a portion of the length of the barrel. The upper end portion of the tubular member encompasses the lower portion of a rotatable sleeve 19 and is tightly bound thereto by a constraining band 20, said sleeve 19 being of sufficiently small diameter to admit of its being readily moved in the barrel.

To the upper end portion of the sleeve 19 is fixedly secured, as by cementing, a hollow manipulating member 21, which occupies the upper portion of the barrel and extends beyond the upper end thereof, said manipulating member being closed at its upper end. It is of generally cylindrical form, conforming to the size and contour of the barrel cavity, and is movable therein. This manipulating member 21 is formed of a suitable rigid transparent or translucent material such as pyroxylin. In the constructions illustrated in Figs. 1, 2 and 3, it is formed with a peripheral groove 21a, which receives freely a spring detent ring 22. This ring is mounted in an internal groove in the barrel and retained in place by a bushing 24 which is screwed into the upper end of the barrel. The detent ring does not clutch the manipulating member to the barrel but normally holds them against relative longitudinal movement, while permitting them free rotary movement relative to each other. By application of sufficient longitudinal pressure to the manipulating member, the spring detent ring may be cammed out of the groove, thus allowing relative longitudinal movement of the two portions, as in assembling or disassembling.

The bushing 24 has a screw-threaded part which extends beyond the upper end of the barrel and which affords a mounting for a cap 25 which, when in place thereon, houses the projecting upper end portion of the manipulating member.

The feed bar 11 has a restricted ink feed duct 11a appropriately associated with the pen point, said duct opening at its upper end in communication with the internal cavity of the flexible elastic tubular member 17. The feed bar is also provided with a passage 11b of larger flow capacity than the ink feed duct, which communicates with the ink feed duct 11a at a substantial distance from the upper end of the latter. Mounted in the feed bar and communicating with the passage 11b is a slender by-pass tube 26 which extends upwardly, on approximately the axis of the pen, within the flexible elastic member 17, sleeve 19 and manipulating member 21, and terminates a short distance from the upper end of the latter.

By virtue of the construction, the conjoined flexible member 17 and manipulating member 21 form an elongated tubular receptacle or ink reservoir which is closed at its upper end and has communication at its lower end with the ink feed duct 11a. It will be observed that the capacity of this ink reservoir represents a very considerable proportion of the cubic capacity of the pen shaft, and it is desirable that the rigid section formed by the member 21 and sleeve 19 be of somewhat greater capacity than the collapsible section formed by the member 17, so as to accommodate upward displacement of ink from the member 17 when it is collapsed.

In the assembly of the pen, the unit illustrated in Fig. 1 having been assembled as above described, the upper end of the manipulating member is inserted in the lower end of the barrel 15 and is slid longitudinally therethrough. In this operation the by-pass tube 26 may function as a stop to limit the extent to which the manipulating member may be displaced longitudinally toward the pen section, and act as a pusher to propel the upper portion of the manipulating member to a point where it may be grasped and drawn outwardly until the detent ring seats in the groove 21a, the pen section sleeve 10 meanwhile being pushed into the lower end of the barrel, where it seats securely. The unit likewise may be withdrawn from the barrel by pressing the projecting porton of the manipulating member inwardly and withdrawing the pen section sleeve from the barrel.

In the modified construction illustrated in Fig. 4, the detent groove is formed in the sleeve 19', instead of in the manipulating member itself. In this modification as well as in the construction illustrated in Figs. 1, 2 and 3, the sleeve 19 or 19' constitutes a reinforcement for the lower end of the hollow manipulating member, as well as a connection between it and the tubular member 17. However, as illustrated in Fig. 5, this sleeve may be dispensed with and the lower end portion of the manipulating member may be somewhat reduced and formed with a peripheral groove and the tubular member 17 may be connected directly to it.

To effect the filling operation, the cap 25 having been removed, the portions of the pen point and feed bar which project beyond the lower end of the sleeve 19 are immersed in a body of ink, and the manipulating member 21 is rotated by manipulation of its upper end portion. This causes a twisting and collapsing of the tubular member 17, approximately as illustrated in Fig. 3. This has the effect of reducing the capacity of the ink reservoir, a portion of its air content being expelled through by-pass tube 26 and ink feed duct 20a. Upon restoration of the manipulating member to its normal position, as by the elastic reaction of the twisted tubular member 17, the normal capacity of the ink reservoir is restored, this resulting in an air pressure differential as between the interior of the reservoir and the surface of the body of ink in which the feed bar is immersed. As a consequence, the superior air pressure on the body of ink will force some of the fluid upwardly through the ink feed channel and into the reservoir, some of it also entering the lower portion of the by-pass tube 26. The operation of collapsing the sac and effecting its restoration to normal distended condition is repeated. With each collapsing operation a portion of the air remaining in the reservoir is expelled through the by-pass tube, and with each restoration of the tubular member 17 to its normal distended position a further quantity of ink will be caused to enter the reservoir. With each collapsing of the tubular member 17 such ink as is in the lower portion of the by-pass tube will be forced out ahead of the air, and there will necessarily be some increase of pressure on the surface of the ink column in the reservoir. However, ink is freely displaced upwardly into the member 21 from tube 17 when the latter is being collapsed and less resistance is offered to the outflow of air from member 21 through the tube 26 and the ink feed duct, than to outflow of ink from the ink reservoir through the ink feed duct and the air pressure in the ink feed duct from the passage 11b will oppose, or in part counterbalance, the pressure at the upper end of the ink feed duct. Consequently, while there will be some ink ejected at each collapsing of the tubular member 17, it will be considerably less in volume than the quantity of air ejected, and likewise less than the quantity of ink which enters the reservoir incident to the restoration of the tubular member to normal position. As a result, therefore, the ink reservoir may be filled by repeated operations of the manipulating member. By observation of the transparent or translucent projecting portion of the manipulating member, it may be ascertained when the reservoir is full. Likewise, the cap being removed and the pen held horizontally, the extent to which the reservoir is filled with ink may be ascertained by observation of the transparent projecting portion of the manipulating member. It has been pointed out that the construction provides a self-filling pen having a large ink capacity. It will be observed, moreover, that it also permits the use of a collapsing member which is relatively short in comparison to the length of the reservoir. This is of advantage, in that it renders the elastic member quick-acting in its restoring movement. It will be appreciated that in the absence of means which is effective to hold the manipulating member against longitudinal movement, the filling operation may be accomplished by the collapsing and restoration of the flexible tubular member 17 longitudinally through longitudinal reciprocation of the manipulating member. It will also be understood that the pen is equipped with the customary removable cap for protection of the pen section.

What I claim is:

1. A fountain pen reservoir unit adapted for insertion in a pen barrel, comprising in combination, a pen section, a flexible tubular member

having its lower end secured to said pen section, a stiff hollow manipulating member secured to the upper end of said tubular member, said manipulating member being closed at its upper end and having its cavity in communication with the cavity of the tubular member so that in conjunction they form an extended ink reservoir, said manipulating member being operable to flex the tubular member and thereby vary the content capacity of said reservoir, and a stiff by-pass tube carried by the pen section and extending longitudinally in the reservoir and adapted for engagement with the upper end of the manipulating member to limit displacement of same toward the pen section during intrusion of the reservoir in the barrel.

2. In a fountain pen, the combination of a tubular barrel open at both ends, a pen section adapted for attachment to the lower end of the barrel and affording a passage for flow of ink to the pen point, and a reservoir attached to the upper end of the pen section and movable in the barrel, said reservoir comprising a collapsible tubular section which is open at both ends and is connected at its lower end to the pen section and a rigid tubular section which is closed at its upper end and has its open lower end connected with the upper end of the collapsible section so that conjointly they form a continuous tubular receptacle, said reservoir being of such diameter that it may be inserted through the lower end of the barrel and being of such length that when the pen section is attached to the lower end of the barrel the upper end portion of the rigid section projects beyond the upper end of the barrel to an extent permitting it to be grasped by the fingers.

3. In a fountain pen, a structure as specified in claim 2 and wherein the rigid tubular section of the reservoir has peripheral bearing cooperation with the bore wall of the tubular barrel, and the projecting end portion of said rigid section is manually operable to collapse the collapsible section.

4. A fountain pen as specified in claim 2 and including also a slender by-pass tube having its lower end fixed in the pen section and communicating with the ink-flow passage thereof, said tube extending upwardly in the reservoir through the collapsible section thereof and into the rigid section thereof.

5. A fountain pen as specified in claim 2 and wherein the ink-holding capacity of the rigid section of the reservoir is greater than that of the collapsible section, and a slender by-pass tube is mounted in the pen section in communication with the ink-flow passage thereof, said tube extending upwardly in the reservoir through the collapsible section thereof and into the rigid section thereof.

6. In a fountain pen, a combination as specified in claim 2 and wherein the upper end portion of the rigid reservoir section is sufficiently translucent to permit presence of ink therein to be visually ascertained.

7. In a fountain pen, a combination as specified in claim 2 and wherein the collapsible section is collapsible by longitudinal movement of the rigid section in the barrel from pressure applied to the projecting end portion of said rigid section.

FRED MOORE.