March 24, 1936. D. F. MOHNS 2,035,372

FOUNTAIN PEN

Filed Sept. 8, 1934

Fig. 1

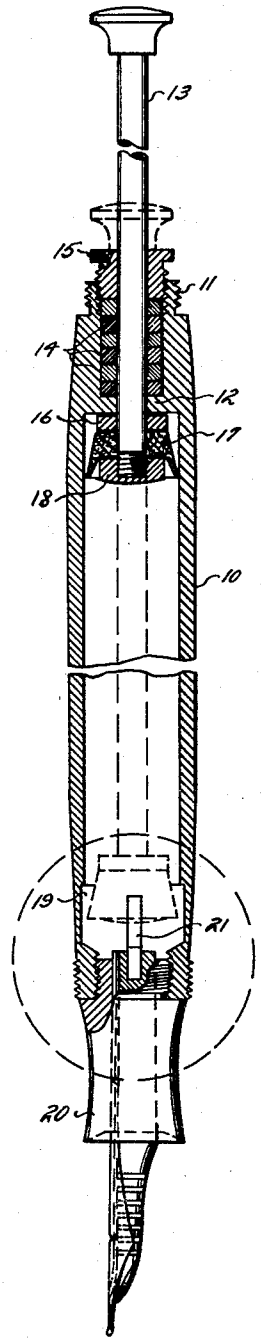


Fig. 2

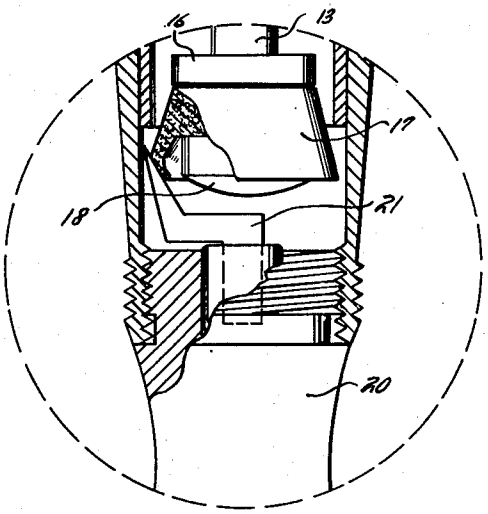


Fig. 3

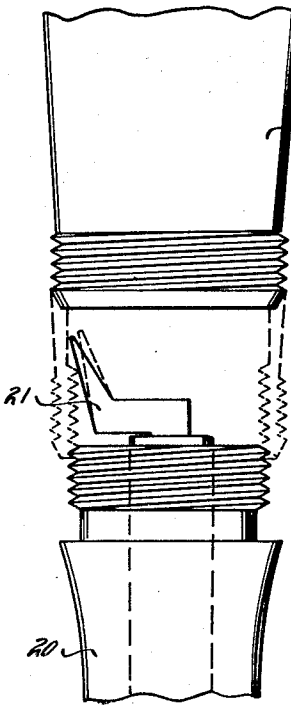
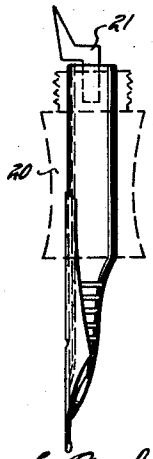


Fig. 4



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2,035,372

FOUNTAIN PEN

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Application September 8, 1934, Serial No. 743,205

4 Claims. (Cl. 120—47)

My invention relates to fountain pens and particularly to that class of pens commonly known as one-stroke pump fillers, which devices are filled with ink by actuation of a plunger and piston which causes a partial vacuum to be formed in the ink reservoir in the rear of the piston as said plunger and piston move toward the section end. Upon the piston reaching its limit of forward movement, it enters an exhaust chamber, the inner diameter of which is larger than the outer diameter of the piston, whereupon the partial vacuum created in the rear of the plunger is transmitted to the feed and communicating feed channels (immersed in ink during the filling operation), causing the ink to be drawn through the ink channels, past the disengaged piston into the ink reservoir.

There have been several patents issued disclosing pump fill pens of the above described type and some of the devices have been marketed. However, they have, without exception, one exceedingly undesirable feature that I eliminate in my device, namely, what is commonly called in the industry liquid locking. Of necessity the outer periphery of the piston is spaced but a short distance from the inner wall of the exhaust chamber in which the piston lies at the lowermost limit of the filling stroke and the great portion of the ink in the barrel lies above this piston. Upon the ink below the piston being exhausted through writing or otherwise, rather severe methods such as shaking the pen must, of necessity, be employed to cause the ink locked above the plunger to flow into the chamber below the plunger. Furthermore, the lower the ink in the reservoir above the plunger, the greater the partial vacuum in the reservoir above the ink level and the said vacuum, coupled with the piston obstacle, is exceedingly hard to overcome, so that in normal writing pens of this construction will "liquid lock" upon the ink in the chamber below the piston being exhausted and, as stated above, severe methods must be employed to cause the pen to function again.

The principal reason the column of ink will not flow freely from the reservoir into the chamber below the piston is because of the surface tension of the ink exerted on the outer periphery of the piston and the inner face of the wall immediately adjacent the said piston. The said surface tension is sufficient to effectually block or dam the inlet space between the plunger and the inner wall of the exhaust chamber. This damming effect, coupled with the pull of the partial vacuum above the ink level, is extraordinarily hard to overcome and necessitates a severe shaking of the pen to cause ink to flow to the feed.

The principal object of my invention is to overcome liquid locking in the one-stroke plunger type of pen and to provide means whereby ink will freely flow from the reservoir above the piston to the feed.

Another object of my invention is to provide a fountain pen of this class that is simple in construction and economical to manufacture.

For better understanding of the invention, attention is directed to the accompanying drawing in which:

Figure 1 is a longitudinal view partially in section and partially in plan;

Fig. 2 is an enlarged fragmentary view of the portion of the barrel and section outlined by a circle in Fig. 1;

Fig. 3 is a fragmentary plan view showing the section detached from the barrel; and

Fig. 4 is a side plan view of the feed and nib assembly.

Specifically the device consists of an axially drilled barrel 10, the rear end of which is reduced and threaded as at 11 to provide means for attaching a removable cap (not shown). In the drilling of the barrel, a shoulder 12 is formed therein adjacent the rear end thereof, the axial opening in which approximates the diameter of a plunger 13 adapted to reciprocate therein.

Surrounding this plunger in the chamber above the wall 12 are packing washers 14 which are held compressed against the plunger by an axially drilled squeeze nut 15 which engages the internally threaded open end of the packing chamber. By adjustment of the nut 15, a desirable tension may be exerted on the plunger and an effective ink tight joint made.

A washer 16 is fitted over the lower end of the plunger 13 and affixed thereto immediately adjacent the lower end thereof, and a flexible inverted cup shaped piston having an axially located opening approximately the diameter of the plunger is slipped over the end of said plunger as to abut the lower face of the washer 16. An internally threaded nut 18 is then screwed onto the threaded lower end of the plunger, thus firmly affixing the said piston to the plunger.

The diameter of the lower peripheral edge of the plunger is such as to effect a snug fit between the said edge and the inner wall of the ink reservoir and upon downward movement of the said plunger and assembled piston, a partial vacuum will be created above the piston, which vacuum tends to draw the flexible cup shaped

wall of the piston into closer engagement with the inner wall of the reservoir, thus making an effective seal between said wall and said piston.

The lower end of the ink reservoir immediately adjacent the section end of the barrel is counterbored to provide an exhaust chamber 19, the interior diameter of which is considerably greater than that of the balance of the reservoir in order that the piston may clear the wall of the said reservoir at approximately the lowermost limit of its downward stroke to afford a clearance whereby the partial vacuum created on the downward stroke may be transmitted to the feed channels.

The section end of the barrel is externally and internally threaded, the external threads to receive a cap (not shown) to cover the nib and feed and the internal threads to receive a threaded section 20. The feed and nib disclosed are of the usual construction with the exception that the inner end of the feed is recessed axially and within the said recess is mounted a capillary auxiliary feed member 21. Said capillary feed member 21 is blanked out of hard rubber or other similar feed stock material. The piece is angular in form and its outer extremity reduced to a point which is adapted to engage the inner wall of the exhaust chamber above the peripheral edge of the piston so that a connection is established between the ink in the reservoir above the peripheral edge of the piston (where liquid locking occurs) and the feed.

Due to the fact that the reduced outer end of the capillary feed is flexible, it will bend sufficiently to clear the internal threads in the barrel when the section is screwed thereinto and snap into engagement with the inner wall of the exhaust chamber when the said capillary feed clears the threads.

The capillary feed member functions as follows:

When the barrel is filled with ink, the piston rests in the exhaust chamber with its peripheral edge clear of the inner wall of the said chamber. Ink will be fed from the reservoir above the piston to the feed through the medium of the auxiliary capillary feed, it having broken the surface tension of the ink between the peripheral edge of the piston and the inner wall of the lower chamber, and by capillary attraction causing the ink to flow from the upper portion of the reservoir to the feed. Furthermore, the basic design of the capillary feed member 20 is such that when the piston is in normal position, the flexible edge of the said piston engages the tapered edge of the capillary feed and is bent inwardly, thus forming a larger opening between the piston and the inner wall of the lower chamber, which assists in breaking the "liquid lock" and permits more of the capillary feed to be exposed to the ink in the reservoir above the piston.

In summarizing, it will be seen that the forward portion of the ink receiving bore of the barrel is enlarged diametrically to form a discharge reservoir and that the section that is threaded into the barrel at the forward end of the discharge reservoir is provided with a relatively fixed capillary feed member having an angled terminal portion engaging one side wall of the discharge reservoir at an acute angle thereto; with a piston movable into the discharge reservoir and having a peripheral sealing medium of flexible material. In addition, the angled terminal portion of the capillary feed member has one surface thereof intersecting the path of advance of the flexible sealing member at an acute angle to such path of advance and thus constituting a means to engage and press laterally on the flexible sealing medium only while the piston is in the discharge reservoir. In other positions of the piston it is free of this lateral pressure. The piston engaging surface of the capillary feed member is inclined downwardly and inwardly toward the axial center of the discharge reservoir so that the lateral pressure exerted on the piston is gradually increased as the piston is advanced.

It will further be seen that the angled terminal portion of the capillary feed member is flexible, first, so that the engagement of the same with the flexible sealing medium will not result in damage to the sealing medium and, second, so that the angled terminal portion will yield during the attachment of the section to the barrel and will assume a position in engagement with one side wall of the said discharge reservoir.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a fountain pen, a barrel having a bore diametrically enlarged at the forward portion thereof to form a discharge reservoir; a section threaded to the barrel at one end of the discharge reservoir and having a relatively fixed capillary feed member, the feed member being provided with an angled terminal portion engaging one side wall of the discharge reservoir at an acute angle thereto; and a piston movable into the discharge reservoir and having a flexible peripheral sealing medium, said angled terminal portion of the capillary feed member having means intersecting the path of advance of the flexible sealing medium at an acute angle to such path of advance to engage and press laterally on the flexible sealing medium only while the piston is in said discharge reservoir.

2. In a fountain pen, a barrel having a bore diametrically enlarged at the forward portion thereof to form a discharge reservoir; a section threaded to the barrel at one end of the discharge reservoir and having a relatively fixed capillary feed member, the feed member being provided with an angled terminal portion engaging one side wall of the discharge reservoir at an acute angle thereto; and a piston movable into the discharge reservoir and having a flexible peripheral sealing medium, said angled terminal portion of the capillary feed member having means intersecting the path of advance of the flexible sealing medium at an acute angle to such path of advance to engage and press laterally on the flexible sealing medium only while the piston is in said discharge reservoir, said angled terminal portion of the capillary feed member being flexible for harmless engagement with the flexible sealing medium and so that the angled terminal portion will yield during the attachment of the section to the barrel.

3. In a fountain pen, a barrel having a bore diametrically enlarged at the forward portion thereof to form a discharge reservoir; a section threaded to the barrel at one end of the discharge reservoir and having a relatively fixed capillary feed member, the feed member being provided

with a terminal portion engaging the side of the discharge reservoir; and a piston movable into the discharge reservoir and having a flexible sealing medium, said terminal portion of the capillary feed member having means to engage and press laterally on the flexible sealing medium only while the piston is in said discharge reservoir.

4. In a fountain pen, a barrel having a bore provided at the forward portion thereof with a discharge reservoir; a section threaded to the barrel at one end of the discharge reservoir and having a capillary feed member, the feed member being provided with a contact element engaging one side wall of the discharge reservoir; and a piston movable through the bore and into the discharge reservoir and having a flexible sealing medium, there being means constantly within said reservoir and in the path of advance of said flexible sealing medium and extending in toward the center of the discharge reservoir and in the direction of advance of the sealing medium to engage and press laterally on the sealing medium only while the piston is in the discharge reservoir.

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