June 14, 1932. G. S. VIVIAN 1,862,586

FOUNTAIN PEN

Filed May 3, 1930

Fig. 1.

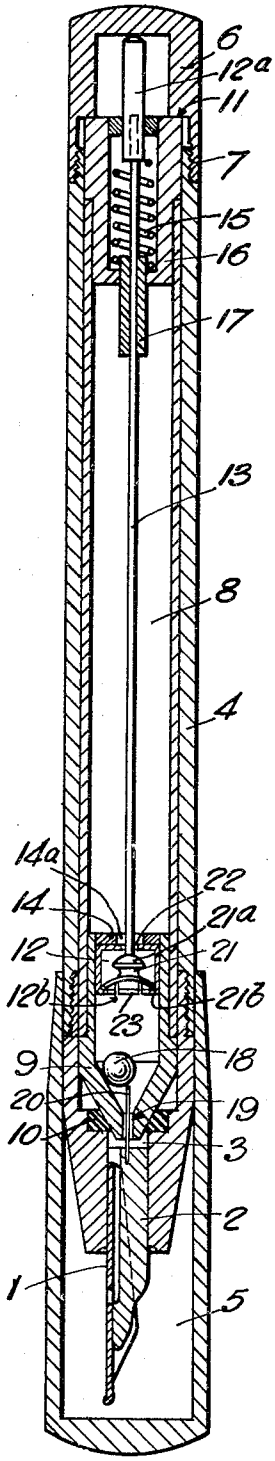


Fig. 2.

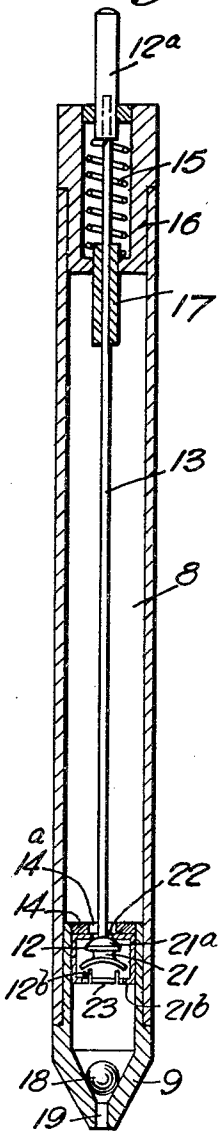


Fig. 3.

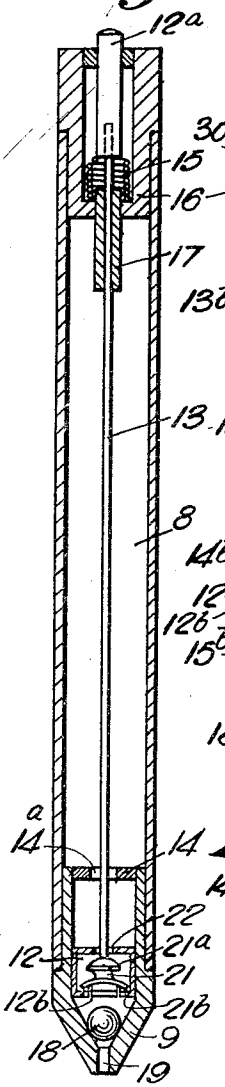


Fig. 6.

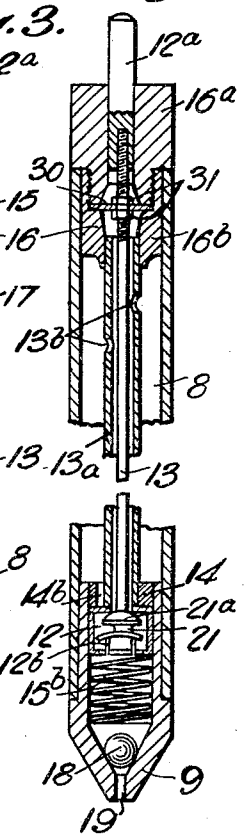


Fig. 7.

Fig. 4.

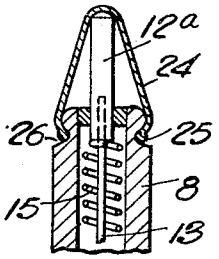
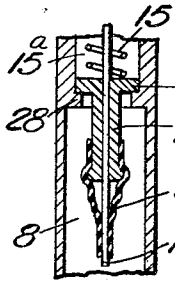


Fig. 5.



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1,862,586

UNITED STATES PATENT OFFICE

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FOUNTAIN PEN

Application filed May 3, 1930, Serial No. 449,604, and in Great Britain May 8, 1929.

This invention relates to fountain pens of the type in which the ink chamber is provided with means whereby it may be charged with ink in what is generally known as a self-filling manner. Heretofore the practice has been to join the ink chamber as an inseparable part of the pen the self-filling mechanism being permanently fitted to the pen, and in most forms the method of filling the pen leaves an undesirable residue of ink around the exterior of the pen. Further by reason of the self-filling mechanism being a permanent fixture of the pen certain restrictions in manufacture arise which render it difficult to provide ample accommodation for ink.

The object of the present invention is to provide a clean and easy method of charging the ink chamber of a fountain pen and also to enable a good supply of ink to be received in such chamber.

Broadly the present invention is characterized in that a fountain pen is formed with its ink receiving chamber readily detachable from the remainder of the pen, such chamber being provided with the means for charging it with ink, the arrangement being that when the pin is to be charged with ink, the ink receiving chamber is removed from the remainder of the pen, charged with ink and replaced in the pen.

Means is preferably provided whereby the complete insertion of the ink chamber in the pen will cause the ink outlet of such chamber to be brought into communication with the nib or stylus passage.

In one form of this invention a fountain pen comprises two tubular parts, one being the outer and normal nib or the like carrying part preferably provided with the usual nib cap, and the other having a nice fit in said outer part and adapted to extend substantially the full length of the interior of the outer part, the inner part being provided with an ink outlet at its lower end and accommodating suitable means, for instance a bucket form of reciprocating plunger pump for drawing ink through such outlet, the outlet being provided with a non-return valve cooperating with the pump device and adapted to be opened and retained open when the inner tubular part is in its normal position inside the outer sleeve.

It is preferred to make the inner tubular member of glass or other suitable transparent material to provide a visual means of ascertaining when the ink chamber is adequately filled.

In order that my invention may be clearly understood and readily carried into effect I have appended hereto a sheet of drawings illustrating an embodiment of same, and wherein:—

Fig. 1 is a sectional elevation of the assembled pen.

Figs. 2 and 3 are sectional elevation views of the ink chamber showing the two extreme positions of the reciprocating pump-like filling device.

Figs. 4 and 5 are detail sectional elevation views showing alternative methods of sealing the upper end of the ink chamber against leakage of ink.

Figs. 6 and 7 illustrate another arrangement.

Referring to the drawing the invention is shown applied to a fountain pen having a nib 1 although it will be appreciated that the nib may be substituted by a stylus. The nib 1 is shown secured by the usual securing member 2 wedged in the ink outlet passage 3 in the lower end of the body part 4 which may be of conventional exterior configuration. A protector cap 5 is preferably provided in well known manner.

The upper end of the body part 4 is normally closed by a cap 6 threaded as shown at 7 to the body part whereby it may be removed to enable an ink receiving chamber inside the tubular body part 4 to be removed.

The ink receiving chamber is a tubular body 8 extending as a nice fit the full length of the interior of the body part 4 and projecting a slight distance beyond the upper end of the body part 4 whereby it may be engaged for withdrawing from the body part 4. In the lower end of the tubular ink chamber 8 is arranged a pump chamber 9 having a conical end and it is preferred to provide a rubber seating 10 against which the conical lower end of the ink chamber 8 is pressed

by reason of the engagement of the upper end of the ink chamber with an annular step 11 in the closure cap 6, thereby obviating loose parts.

The detachable ink chamber is provided with an appropriate device for drawing ink into the lower end 9 so as to charge the ink chamber, and the filling device may be of any suitable form, one form being that illustrated in which the pump chamber 9 at the lower end of the chamber 8 accommodates a reciprocating bucket type of pump 12 connected to an operating rod 13.

The pump member 12 operates between the lower end of the pump chamber 9 and an annular abutment 14 a short distance above such lower end, whereby a number of reciprocations have to be imparted to the member 12 to properly charge the chamber 8 with ink.

A simple method of effecting the desired reciprocation of the pump member 12 consists in extending the upper end of the rod 13, preferably enlarged as a handle 12*a* through the sealed upper end of the chamber 8, a coiled compression spring 15 being provided for raising the rod 13, the depression of such rod being effected by hand. The spring 15 can conveniently be accommodated in a plug 16 permanently closing the upper end of the chamber 8, the spring 15 being held between the base of this plug 16 and the lower end of the handle 12*a*. It is preferred to guide the rod 13 through a sleeve 17 fixed in the base of the plug 16 and fairly tightly fitted about the rod 13 to prevent ink from flowing into the plug 16.

The conical lower end of the chamber 8 accommodates a loose ball valve 18 which co-operates with the pump member 12 in well known manner and when the pumping operation is finished closes the ink outlet 19 in the lower extremity of the chamber 8, whereby the ink is retained in the chamber 8 while re-introducing the chamber 8 in the body part 4. The opening of the passage 19 when the chamber 8 is properly introduced into the body part 4 can be effected by providing on the axis of the body part 4 a pin 20 fixed in the inner end of the nib-holder 2 and adapted to enter the passage 19 as shown in Fig. 1, the pin 20 engaging the ball 18 and holding it clear of the apex of the conical part 9. In a stylograph pen the stylo is carried into the opening 19.

To obviate a delicate and complicated valve mechanism in the pump chamber 9, the necessary valve action for transferring the ink from the pump chamber 9 to the space above the abutment 14 can be obtained by providing on the lower end of the rod 13 a valve member 21, this member 21 being fixed to the rod 13 and having a small amount of lost motion relative to the pump member 12. A port 22 is provided in the top face of the member 12, this member being a shallow hollow cylindrical metal or other suitable member preferably having a number of slits 12*b* in its lower end to provide a certain amount of resiliency whereby it may be tightly fitted in the lower end of the chamber 9 and normally will by reason of such tight fit remain abutting against the abutment 14 so as to leave a clear passage for the ink through a hole 14*a* in the abutment 14, the port 22 and the open base 23 of the piston 12.

The valve member 21 has a spherical or conical upper end 21*a* adapted to engage and close the port 22 during the rise of the piston 12, but normally clearing the port 22 as shown in Fig. 1 to allow the ink to flow freely from the ink chamber 8. The base of the valve member 21 which comprises a cross bar or spider arm does not close the base of the piston 12 but engages an annular ledge 21*b* of such base.

Any suitable air vent may be provided for the escape of air from the chamber 8 due to the rise of ink in the chamber 8. It is preferred to make the tube forming the chamber 8 of glass, celluloid or other suitable transparent material to give a visible indication when the chamber is properly charged.

The pen is charged with ink by unscrewing the cap 6 and withdrawing the chamber 8, when the lower end of the chamber 8 is inserted into an ink vessel and the head 12*a* depressed successively, the actuation of the head 12*a* being conveniently effected by the operator's thumb. When the chamber 8 is charged it is inserted into the body part 4 and the cap 6 is screwed on again. When the cap 6 is screwed home its upper end abuts against the head 12*a* of the rod 13 and slightly depresses such rod, thereby uncovering the port 22 in the piston 12 without moving the piston.

If desired the upper end of the chamber 8 can be fitted with a rubber cap to prevent leakage of ink, for instance as shown in Fig. 4 in which a rubber cap 24 has a beaded rim 25 gripped in a circumferential recess 26 in the top of the tube 8, this cap being stretched over the upper end of the head 12*a* of the rod 13 when the rod is in the normal position. As an alternative or additional sealing means the tubular guide 17 of the rod 13 may be fitted with a rubber tube 27 as shown in Fig. 5, this tube being tightly gripped around the guide 17 and the rod 13 and being shaped to permit the rod 13 to reciprocate. As shown in Fig. 5 the guide 17 can be formed with a flange 17*a* abutting against an annular ledge 28 in the tube 8, the spring 15 being accommodated in a space 15*a* formed in the tube 8 instead of fitting a separate plug 16.

It will be appreciated that the spring 15 may be located elsewhere, for instance be-

tween the base of the piston 12 and the lower end of the tube 8.

In the arrangement shown in Figs. 6 and 7 the pump 12 is connected to the plug 16 by a tube 13*a* which surrounds the rod 13. The lower end of the tube 13*a* is fitted into the annular abutment 14 and its upper end is fitted into the plug 16. Vent holes 13*b* are provided near the upper end of the tube 13*a* and perforations 14*b* are formed in the annular abutment 14 around the tube 13*a*. A resilient diaphragm 30 of rubber or other suitable material is clamped between nuts 31 on the screw threaded upper end of the rod 13. The plug 16 is formed in two portions 16*a* and 16*b* and the outer edges of the diaphragm 30 are clamped between them. The diaphragm 30 may act as a spring to return the pump member 12 and handle 12*a* or an additional spring 15*b* may be arranged in the pump chamber 9 or in any other convenient position.

The vent holes 13*b* are formed to facilitate the filling of the ink chamber 8 until the holes are covered by the ink when further pumping will not be effective. They also ensure an unrestricted flow of ink to the pen when in use. The resilient diaphragm forms an effective seal for the top of the ink chamber 8 and prevents the escape of ink.

By means of my invention a clean and efficient method of charging a fountain pen with a large supply of ink is provided.

I claim:—

1. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, and a closure cap on the upper end of said casing adapted when applied to the casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage.

2. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, a closure cap on the upper end of said casing adapted when applied to the casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage, a conical lower end to said reservoir, said conical lower end being provided with an ink passage therein, and a seating in the lower end of said casing receiving said conical end to provide a liquid tight connection between the reservoir and said ink passage.

3. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, and a closure cap on the upper end of said casing adapted when applied to the casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage, a seating in the upper end of said plunger against which said valve is adapted to seat when the reservoir is being charged, and a rod connecting said valve to said reciprocating member.

4. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, and a closure cap on the upper end of said casing adapted when applied to the casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage, a seating in the upper end of said plunger against which said valve is adapted to seat when the reservoir is being charged, a rod connecting said valve to said reciprocating member, spring means for moving the rod in the direction to seat said valve on said seating in the plunger, relative movement between said valve and said plunger, in said seating being provided with a port for admitting ink to the reservoir, said piston being provided with an outlet for the flow of ink to said passage, the said valve constituting an abutment for transferring the movement of said rod under the influence of said spring means to the plunger, and an abutment in the reservoir limiting the inward movement of the plunger.

5. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, and a closure cap on the upper end of said casing adapted when applied to the

casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage, a seating in the upper end of said plunger against which said valve is adapted to seat when the reservoir is being charged, a rod connecting said valve to said reciprocating members, a tubular member surrounding said rod within the reservoir in said tubular member being provided with vent holes.

6. A self filling fountain pen comprising a casing and an ink reservoir slidable within and removable through the upper end of said casing, said casing being provided with a nib and an ink passage in its lower end, a reciprocating member projecting through the upper end of said reservoir for operating a reciprocating pump plunger in the lower end of the reservoir, a one-way valve in said plunger, a closure cap on the upper end of said casing adapted when applied to the casing to depress said reciprocating member and thereby to set said valve in a position to allow ink to flow from the reservoir into said ink passage, a ball valve in the lower end of said reservoir and an upstanding projection in the lower end of said casing adapted to engage and raise said ball valve.

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