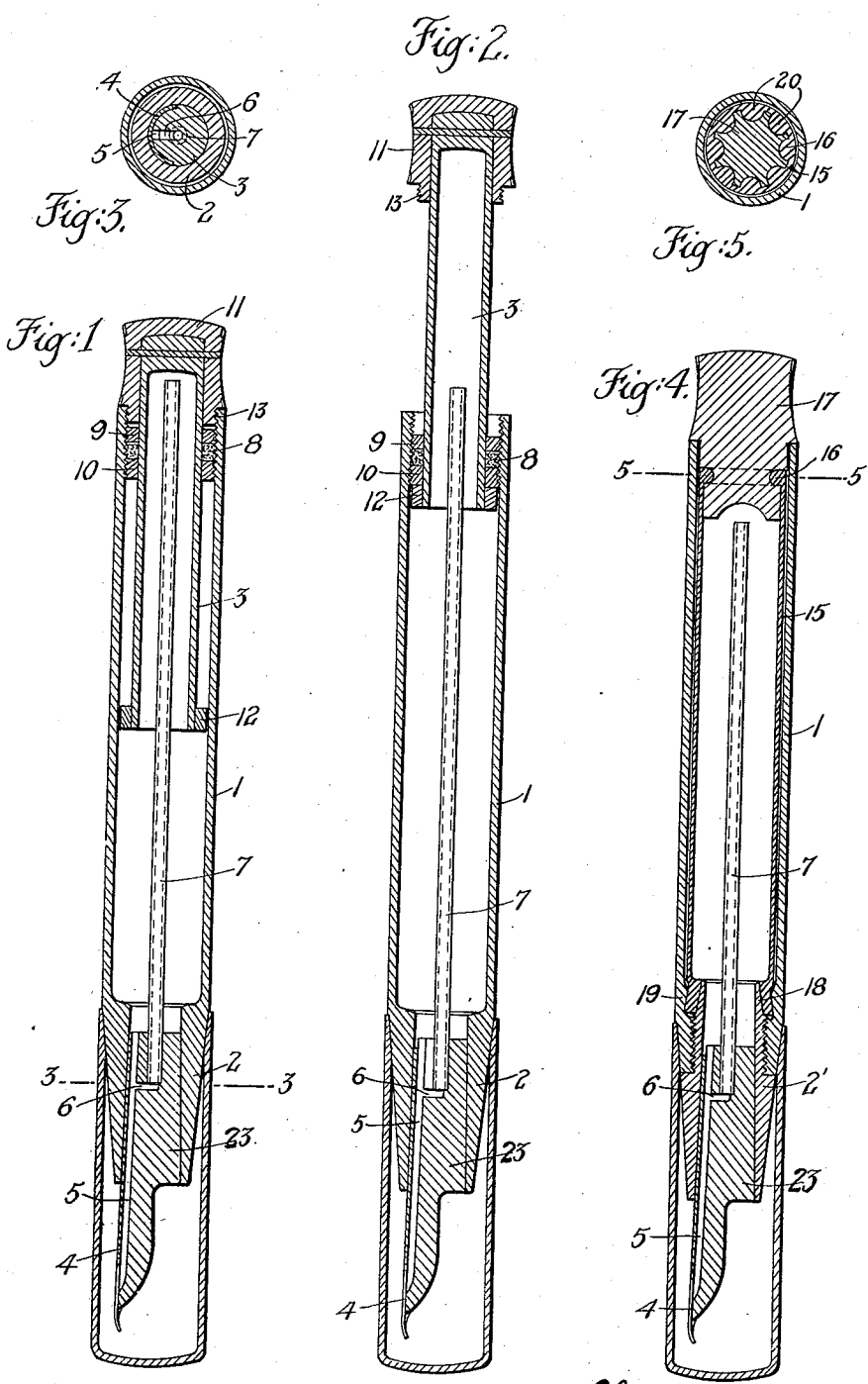


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 SELF FILLING FOUNTAIN PEN.
 APPLICATION FILED APR. 7, 1917. RENEWED APR. 22, 1920.

1,359,880. Patented Nov. 23, 1920.



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SELF-FILLING FOUNTAIN-PEN.

1,359,880.

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To all whom it may concern:

Be it known that I, CHARLES DUNN, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Self-Filling Fountain-Pens, of which the following is a specification.

This invention relates to self filling fountain pens, and the object of the invention is to provide such a pen which will be simple in construction and reliable in operation without valves or spring controlled parts.

A further object of the invention is to provide a pen in which successive reversals of the direction of pressure on a supply passage will operate to completely fill the reservoir so that there is no waste space within the pen.

In the accompanying drawing, Figure 1 is a longitudinal sectional view of a fountain pen embodying the invention; Fig. 2 is a similar view with the operating plunger extended;

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 1;

Fig. 4 is a longitudinal sectional view of a modified reservoir construction, and

Fig. 5 is a section on the line 5-5 of Fig. 4.

In Figs. 1 to 3 of the drawing, the invention is shown embodied in a self filling fountain pen of the plunger type in which the barrel or reservoir 1 is provided with a solid end 2 at one end carrying the pen and the reciprocating plunger cylinder 3 at the other end. The solid end 2 carries the feed 23 and the pen 4 wedged in its bored central recess. The feed 23 is provided with a longitudinal supply passage or duct 5 leading from the pen point to the reservoir and with the air outlet 6 opening into the supply passage 5 from the air tube 7 fitted centrally in the feed 23 to have its passage communicate with the outlet 6.

When the pressure in the reservoir 1 is reduced and the lower end of supply passage 5 is dipped into the ink the liquid will be drawn up into the reservoir through the passage 5 rising slightly also in tube 7 through outlet 6. Very little liquid will enter the tube 7 because of the small size of its passage and the sharp bends between passages 5, 6 and 7. Upon reversal of the operation the rise of pressure in reservoir 1 will be communicated to the air column in tube 7 tending to discharge air through

outlet 6 and passage 5. The rise in pressure on the surface of the liquid in the reservoir also tends to drive the liquid directly out through passage 5, and a liquid outflow of sufficient velocity through passage 5 draws out the contents of outlet 6 and tube 7 by ejector action, carrying the air from tube 7 out through passage 5. Thus, by the combined pressure within the tube 7 and the ejector action of any escaping liquid in passage 5, each rise in pressure within the reservoir 1 is accompanied by a discharge of some of the air within the reservoir and successive alternations of pressure and vacuum within the reservoir will fill it.

In the plunger type of filler shown in Figs. 1 to 3, the variations in pressure within the reservoir 1 are brought about by the cylinder plunger 3 fitted in packing 8 of cork or similar material pressed between screw rings 9 and 10. At its outer end the cylinder carries the manipulating handle 11 locked in down position by screw threads 13; and at its inner end the cylinder is provided with an annular guiding ring or piston 12. Reciprocation of this plunger 3 after unscrewing of threads 13 will alternately enlarge and diminish the size of the reservoir and cause corresponding fluctuations of pressure on the passage 5 and the tube 7 to fill the pen as above described.

In order to permit the liquid to enter the space around the outside of plunger 3 and above the piston 12, this piston is fitted loosely within the reservoir so that the ink or other liquid may pass around it when the reservoir is filled up to its level. This loose fit does not, however, prevent the piston from having effective action in increasing the fluctuations of pressure within the reservoir for a given movement of the plunger 3 as at low levels of ink in the reservoir the liquid adhering to the piston will form a fairly tight airproof seal and when the ink reaches the piston 12 the dash-pot action of the ring in the liquid will serve to increase pressure on the down stroke and increase the vacuum on the up stroke.

In the modified construction shown in Figs. 4 and 5, an internal tubing 15 of pliable material, such as soft rubber, is provided fastened at its outer end by a flange 16 and an annular recess of a handle piece 17 fitted to rotate in the outer end of the barrel 1. The other end of the tubing 15 is caught between the wedge 18 of screw plug 2' and wedge walls 19 of the barrel 1. The

flange 16 is composed of a series of knobs or corrugations 20 fitting into similar recesses in the handle piece 17 so that upon turning the handle 17 about its longitudinal axis the upper end of the tubing 15 will turn with it. As the lower end of the tubing is held fast with the barrel 1 the turning of the handle 17 from normal position shown in Fig. 4 will twist tubing 15 to collapsed or partially collapsed condition reducing the size of the reservoir within the barrel 1 and raising the pressure therein. Upon turning the handle or knob 17 in the reverse direction back to the normal expanded condition of tubing shown in Fig. 15, the size of the reservoir will be increased and the pressure therein decreased to draw in ink or other liquid through passage 5 into the reservoir and to some distance in air tube 7. Upon again rotating handle 17 to collapse the tubing 15 the pressure within the reservoir will be increased and force a small amount of fluid out through passage 5 and with it a quantity of air out of the reservoir through tube 7, outlet 6 and passage 5. By repeating back and forth rotation of the handle 17 the reservoir formed by the tubing 15 will be completely filled.

The passages 5, 6 and 7 assembled with the pen 4 are preferably capillary in nature, retaining any fluid within from flowing out by gravitation alone. As the ink from the reservoir is used air will find its way back through passage 5 into the reservoir to allow the liquid to feed down. In order to empty the reservoir it is only necessary to alternate pressure and vacuum within the reservoir 1 in the same manner as for filling but keeping the end of passage 5 out of the liquid. Upon depression of the plunger 3 or twisting of tubing 15 to raise the pressure in the reservoir, the liquid will be forced out through the passage 5 and upon raising plunger 3 or expanding the tubing 15 air will be drawn into passage 5 to replace the discharged liquid. And by repeating the process the reservoir can be entirely emptied.

No valves or spring pressed parts are used in the construction of the pen which is simple in structure and reliable in its operation. With each rise in pressure a maximum quantity of air is ejected and very little liquid as the air tube 7 is maintained substantially empty until the final filling stroke. Each drop in pressure sucks a maximum amount of ink into the reservoir because the passage 5 is direct and free from resistance and very little liquid finds its way into air tube 7. The reservoir 1 is completely filled by a few alternations of the pressure within it and there is no waste space left occupied by air.

It is apparent that the arrangement, sizes and proportions of parts may be varied without departing from the principle of the

invention which is not confined to the particular embodiments shown and described but is intended to cover such modifications thereof as fall within the scope of the appended claims.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent, is:—

1. In a self filling fountain pen, the combination with an ink reservoir, of an ink feed passage permanently connecting said reservoir to the writing pen, an air tube permanently opening from a point in said passage to the opposite end of said reservoir, the resistance of said passage to the flow of fluid between said point and said reservoir being less than the resistance of said air tube thereto, and pressure varying means permanently in connection with said reservoir for alternating the pressure therein above and below atmospheric pressure and adapted to produce a rise in pressure sufficient to cause an outflow of air through said tube and feed passage so that said reservoir may be filled with ink by the alternations in pressure therein.

2. In a self-filling fountain pen, the combination with an ink reservoir, of an ink feed passage permanently opening into said reservoir, an air tube permanently opening from a point in said passage to the opposite end of said reservoir, the resistance of said passage to the flow of fluid between said point and said reservoir being less than the resistance of said air tube thereto, and pressure varying means permanently in connection with said reservoir for alternating the pressure therein above and below atmospheric pressure and adapted to produce a sufficient rise in pressure to cause an outflow of air through said tube, comprising a hollow cylinder surrounding said air tube and having a piston ring at its inner end substantially smaller than the bore of said reservoir to permit ink to pass between the piston and the reservoir wall and fill the space around the plunger.

3. In a self-filling fountain pen, the combination with an ink reservoir, of an unobstructed ink feed passage permanently connecting one end of said reservoir to the writing pen, an air tube permanently opening from a point in said passage to the opposite end of said reservoir, a reciprocating plunger in said reservoir for alternating the pressure therein above and below atmospheric pressure and adapted to produce a rise in pressure sufficient to cause an outflow of air through said tube and feed passage so that said reservoir may be filled with ink by the alternations in pressure therein without the intervention of valves or any constricted passage.

CHARLES DUNN.