(No Model.)

M. H. KERNER.

STYLOGRAPHIC FOUNTAIN PEN.

No. 307,469. Patented Nov. 4, 1884.

Fig. 1,

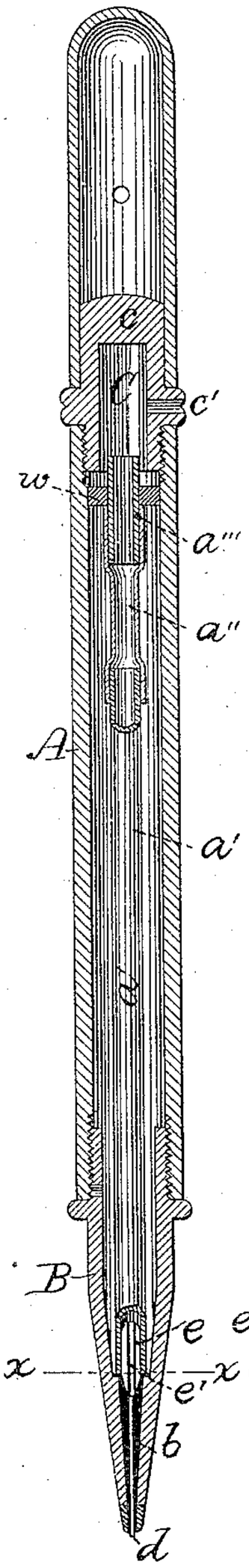


Fig. 3,

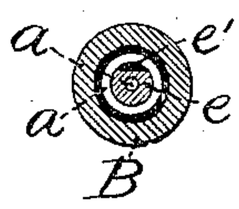
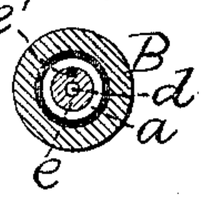


Fig. 2,



WITNESSES

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STYLOGRAPHIC FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 307,469, dated November 4, 1884.

Application filed May 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, MARION H. KERNER, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Stylographic Fountain-Pens, of which the following is a specification.

My invention relates to stylographic pens, consisting of a barrel and "point-section," comprising the ink-reservoir, an air-tube for conveying air from the exterior of the pen thereto, and a needle adapted to vibrate in writing for facilitating the outflow of ink through the writing-point of the pen. In pens of this class the air is admitted from the air-tube directly to the ink, through which the air rises to fill the space above it formed by the outflow of ink in writing. When, however, the gradual consumption of the ink causes the volume thereof to fall below the point where the air enters the ink-reservoir, a large and abnormal quantity of air is at once conveyed directly to the space above the ink, owing to the air in such case not being obliged to pass through the ink, and the weight and pressure of this abnormal quantity of air upon the ink causes the same to flow out of the writing-point with increased rapidity, and much faster than is required for writing, thus producing the objection known as "bleeding" of the pen.

One of the objects of my invention is to obviate this objection as far as possible; and to this end the invention consists in forming a plug fitting in the lower end of the air-tube to constitute the aperture or orifice through which the air is admitted to the ink-reservoir, by which arrangement the air may be admitted to the ink-reservoir from the air-tube at the extreme lower end of the latter, and, owing to this lower position of the orifice, the amount of ink within the pen below said orifice, and capable of rapidly flowing out of the pen by the direct influx of air above it, as above stated, will be correspondingly less.

The invention further consists in a specific formation of said plug, as described hereinafter.

The invention further consists in an air-tube of improved construction, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a stylographic pen embodying my improvements, and Fig. 2 is a transverse section thereof on the line *x x* of Fig. 1. Fig. 3 is a transverse section on the same line, showing a modified form of air-orifice.

Referring to Fig. 1, A is the barrel of the pen. B is the point-section, which is centrally perforated with the duct *b*, for conveying the ink to the writing-point. *a* is the air-tube, and it extends down to the inlet of the duct *b*, as shown, and also acts as a support for the needle. This tube mainly consists of a stiff portion, *a'*, preferably formed of hard rubber, and a portion, *a''*, of flexible material, (preferably soft rubber,) joined at one end to the upper end of the portion *a'*. The portion *a''* is joined at its opposite end to a short section of hard-rubber tubing, *a'''*. This tubing passes tightly through a washer, *w*, which is fitted tightly within the barrel A. The upper end of the tube *a* opens into an air-chamber, C, formed within the cap *c*, into which chamber the air is admitted from the exterior of the pen through the inlet-orifice *c'*. The needle *d* extends through the duct *b*, and normally projects slightly beyond the writing-point, and is attached to the tube *a* by means of a metallic plug, *e*. The needle is attached at its upper end to this plug, preferably by being inserted and rigidly secured within a central perforation in the same. The plug *e* is rigidly secured within the lower end of the tube *a*, preferably by being fitted tightly therein. The air-tube *a'* is adapted, by virtue of the flexible portion *a''*, to laterally bend or flex, and thus affords means for the requisite longitudinal vibration of the needle, which vibration is communicated from said needle to the entire air-tube, owing to its rigid connection therewith, and causes the ink to be agitated and its downward movement facilitated. This general action of the air-tube is also set forth in my former Letters Patent, No. 280,630, granted to me July 3, 1883, on which this present air-tube is an improvement.

The orifice through which the air is admitted from the air-tube *a* to the ink within the pen is preferably formed by a longitudinal groove or channel, *e'*, in the side of the plug *e*, so that when the plug is inserted within the end of the air-tube the said groove will constitute an orifice or aperture in the extreme lower end of said tube, and opening out of the same at the side of the needle and plug, as shown in Figs. 1 and 2. Another manner in which this orifice may be formed is shown in Fig. 3, and consists in the side of the plug *e* being flattened instead of grooved. It will be seen that as the needle-support may be made to extend down to the inlet of the duct *b*, said orifice may be formed at said inlet, as shown, and as the ink-containing capacity of said duct is very small, and the ink will be obliged to descend to its inlet before the air will be admitted directly above the ink, the bleeding of the pen will be in a great measure prevented, since but a very small amount of ink can in such case flow from the pen without complete exhaustion of the supply therein. It will also be seen that as the orifice through which the air is conveyed from the air-tube to the ink-reservoir opens out of the end of the tube, its position is rendered parallel or coincident with the line of motion of the ink in writing, and therefore ink which may have entered the air-tube may be withdrawn therefrom by the capillary attraction of the ink in contact with the portions of said tube and plug *e* adjacent to the orifice in its downward movement. By reason of the air-tube *a* being constructed of stiff or rigid and non-flexible portions, the lateral bending or flexure of the tube always occurs at one point—*i. e.*, the junction of the two portions—and the motion of the tube and consequent agitation of the ink are thus rendered uniform, and by said portions of the tube being arranged with the stiff portion below the flexible portion, as shown in the drawings, this point of bending may be formed near the upper end of the ink-reservoir, and the thorough agitation of the ink within the reservoir thus be assured, since the tube will be obliged to laterally yield and vibrate throughout its entire length.

It will be seen upon reference to Fig. 1 of the drawings that the milled bead, flange, or knurl encircling the cap C, for enabling a firm hold to be obtained upon the cap for screwing it upon or unscrewing it from the barrel A, is formed double—that is, two beads or knurls extend around the cap close to each other, and that between these knurls, or partly in each of them, the air-inlet orifice *c'* is formed. This arrangement I have devised for the purpose of concealing to a considerable extent the orifice *c'* when viewed from the exterior of the pen, which end is attained by the mouth of the orifice opening out of the pen being, under the above-described arrangement, recessed between the knurls. By this partial concealment of the orifice *c'*, the regular appearance of the pen is enhanced.

What I claim herein as my invention is—

1. In a stylographic pen, the combination, with the air-tube, of the plug *e*, rigidly secured in the end of the same, and constructed to form an orifice opening into the ink-reservoir, substantially as set forth.

2. In a stylographic pen, the combination, with the air-tube, of the plug *e*, rigidly secured in the end of the same, and formed with the groove *e'* in its side, substantially as set forth.

3. In a stylographic pen, an air-tube having the needle attached to it, and constructed in longitudinal sections of stiff and flexible material, substantially as shown and described.

4. In a stylographic pen, the air-tube *a*, having the needle attached to it, and comprising the stiff lower portion, *a'*, and the flexible portion *a''*, connected at its upper end to the section *a'''*, and joined at its lower end to the portion *a'*, substantially as set forth.

5. The hereinbefore-described air-tube, consisting of the lower portion, *a'*, constructed of hard rubber or equivalent stiff material, the soft-rubber or flexible upper portion, *a''*, joined to said portion *a'*, the tubing *a'''*, joined to the upper end of said portion *a''*, in combination with the washer *w*, by which the tube is supported, substantially as herein shown and described.

6. The cap C, having a double encircling bead or knurl, and the air-orifice *c'*, formed between or partly in each of the two knurls, forming the double knurl, substantially as shown and described.

Signed by me this 12th day of May, A. D. 1884.

MARION H. KERNER.

Witnesses:
MILLER C. EARL,
WHARTON WAGSTAFF CRAIG.