C. W. LIVERMORE.

FOUNTAIN PEN.

No. 363,526. Patented May 24, 1887.

Fig. 1.

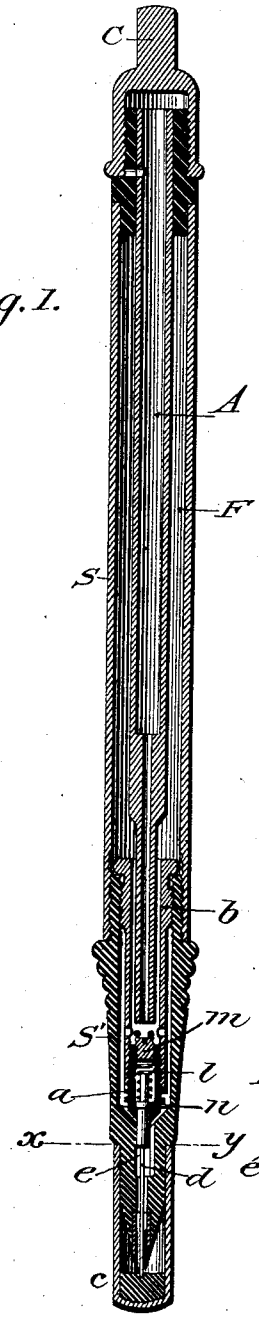


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

CHARLES W. LIVERMORE, OF PROVIDENCE, RHODE ISLAND.

FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 363,526, dated May 24, 1887.

Application filed August 15, 1879.

To all whom it may concern:

Be it known that I, CHARLES W. LIVERMORE, of the city and county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Fountain-Pens, of which the following is a specification.

My invention relates to those fountain-pens or ink-writers provided with a fine vibrating needle projecting slightly from a tapering or cone-shaped writing-point, the ink finding its way through the same passage occupied by the needle from the ink-reservoir in the interior of the handle.

In the accompanying drawings, Figure 1 is a longitudinal central section of a fountain-pen embodying my improvements, and Fig. 2 is a cross-section thereof on line *x y*.

F is the fountain or ink-reservoir; A, an air-tub; C, a cap screwed upon the top of the handle, which governs the ingress of air into the air-tube. A cross-section of the tube or handle is made at some point near the writing end, dividing the pen into two unequal parts or sections. The upper and longer section is designated by S, the lower and shorter section by S′. These parts or sections are united by screw-threads or other convenient means by which they can be readily coupled and uncoupled.

The interior of section S′ is occupied by the tube *b*, whose external diameter is slightly less than the internal diameter of section S′, except at the top, where tube *b* is sufficiently enlarged to entirely fill the space, and where the two are united by screw-threads or other convenient means, allowing of the ready removal of the tube *b* when required.

It is obvious that the tube *b* can be readily adjusted longitudinally by screwing or slipping the same up or down at will. By this means the needle *d*, attached to the lower end of said tube, as hereinafter explained, may be made to project more or less from the end of the writing-point, and said needle *d* may by the same means be adjusted with respect to such projection from time to time to compensate for wear of the parts at that point.

l is a small cylinder screwed or otherwise fastened into the lower end of tube *b*, and closing it against the passage of ink. Both ends of this cylinder are closed, the upper end by a plug or screw, *m*. Through the lower head of this cylinder the needle *d* is passed, having an interior collar, *n*, to hold it from falling out. The upper end of the needle extends above the collar. A small wire spring, *a*, is placed within the cylinder, one end of which rests against the collar *n* of the needle, winding around the inwardly-projecting end of the needle, while the other is confined by the screw or plug *m* in the opposite end of the cylinder *l*. The needle extends from this point of attachment down through the length of the writing or tapering point and protrudes slightly therefrom. Pressure upon this needle-point in the act of writing causes it to recede until it is flush with the writing-point, thereby compressing the spring *a*, resting against the collar of the needle within the cylinder *l*, and the moment this pressure is removed from the needle-point it is again thrust out by the spring *a*.

The course of the ink is from the larger space or reservoir, F, around the air-tube in section S, downward into the tube *b*, and through the length of that tube until it is arrested by the cylinder *l* in the bottom of the tube. It then flows through apertures in the side of the tube and into the lower cavity of section S′, and thence into the needle-passage, following the needle until it reaches the point and is shed upon the paper.

As it is desirable to have the needle *d* centrally located and parallel with the bore or passage *e*, in which it has its longitudinal play, I provide for guides or bearings against the shank of the upper portion of the needle itself. For this purpose I enlarge the shank and also the upper portion of the bore, making the shank fit the bore, or, in other words, fill it. As this would check the flow of the ink, I cut one or more grooves, *e′*, in the side of the bore *e* around the closely-fitting shank, to allow the ink to pass below the shank and flow around the needle below. These grooves *e′* are shown by cross-section in Fig. 2 on line *x y*. The needle is thus centrally guided and free from any tendency to bind or unduly rub against the sides of the channel in which it works.

Instead of enlarging the shank of the nee-

dle, a tube or sleeve corresponding to the enlargement of the shank may extend downward from the head of the cylinder, surrounding and guiding the needle.

C is a simple cap or point-cover, only used to protect the point when the pen is not employed.

In filling or replenishing the reservoir, the two sections S and S′ are first separated; but in the construction here shown all the slender and delicate parts located in section S′ remain undisturbed and unexposed, and as fully protected as when the two sections are coupled together.

It will be observed that the needle derives its support from the cylinder in tube *b*, while the latter is supported by the walls of section-piece S′, and, further, that the needle-support is fixed and secure, and liable to no displacement when the two main sections S and S′ are separated; also, that the spring *a*, which actuates the needle, is inclosed and protected from the corrosive action of the ink, and in cleaning the more intricate parts from sediment or ink that has become thick it is only necessary to withdraw the tube *b*, which, with its immediate attachments, presents comparatively smooth surfaces, which are therefore easily cleaned.

I do not broadly claim the handle or open case of a fountain-pen made in sections and provided with a needle holding and supporting tube inserted and secured in the lower section, nor the handle or case of a fountain-pen provided with a needle-supporting tube attached to and supported by the wall of the handle or case, nor a fountain-pen having an air-tube in sections.

I do not claim, broadly, in a sectional handle, a needle-holder inserted and secured in the lower section, the same having been adjudged by the office to be the invention of George F. Hawkes, in an interference declared between this application and that of said Hawkes, filed September 4, 1880. My improvement consists in the detachable feature of such needle-holder, which enables me to construct the said lower section entire and afterward to introduce the needle-holder with its needle, and to connect the said lower section directly to the upper section without the interposition of any connecting-piece or coupling. My said construction also enables me to withdraw or detach the said needle-holder from the lower section to clean or repair the same, or to substitute a new holder or new needle. The construction of the said Hawkes shows no such capacity, and said adjudication in favor of Hawkes does not point out any construction whereby these results can be accomplished.

I am aware that the handle of a fountain-pen has been provided with a point-section containing a perforated diaphragm through which the spindle passes and by which it is guided; but such does not constitute my invention.

What I claim, and desire to secure by Letters Patent, is—

1. In a fountain-pen, the combination, with upper and lower sections, S S′, of a spindle or needle holding tube removably secured to and solely supported by the lower section, S′, substantially as described.

2. In a fountain-pen, the combination of the sections S S′, directly connected together at their adjoining ends, and a detachable needle holding and supporting tube, *b*, secured to and solely supported by the lower section, S′, substantially as described.

3. In a fountain-pen, the combination of the sections S S′, directly connected together at their adjoining ends, and a needle holding and supporting tube, *b*, solely supported by the lower section, S′, and adjustable lengthwise therein, substantially as described.

4. The combination, with the handle of a fountain-pen, of a removable needle-holding tube, *b*, supported therein, a cylinder, *l*, connected with the lower end of said tube, a needle, *d*, and a spring located in said cylinder above the needle for actuating the latter, substantially as described.

5. The combination of the sections S S′, directly connected together at their adjoining ends, a removable needle-holding tube, *b*, secured in and solely supported by the lower section, S′, a cylinder, *l*, connected with the lower end of the tube, a needle, *d*, and a spring located in the cylinder above the needle for actuating the same, substantially as described.

6. The section S′, provided with a needle-passage for guiding and steadying the upper portion of the needle-shank, in combination with the removable needle holding tube *b*, secured in and supported by said section, a cylinder, *l*, connected with the lower end of the tube, a needle, *d*, and a spring located in the cylinder above the needle to actuate the latter, substantially as described.

7. The section S′, provided with a needle channel or passage the upper portion of which holds and steadies the needle-shank, and is formed with side grooves for the passage of ink, substantially as set forth.

8. In a fountain-pen, a spindle-holder adjustably held at the lower end of the ink-reservoir in a fixed part of the outer case, substantially as described.

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Witnesses:

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