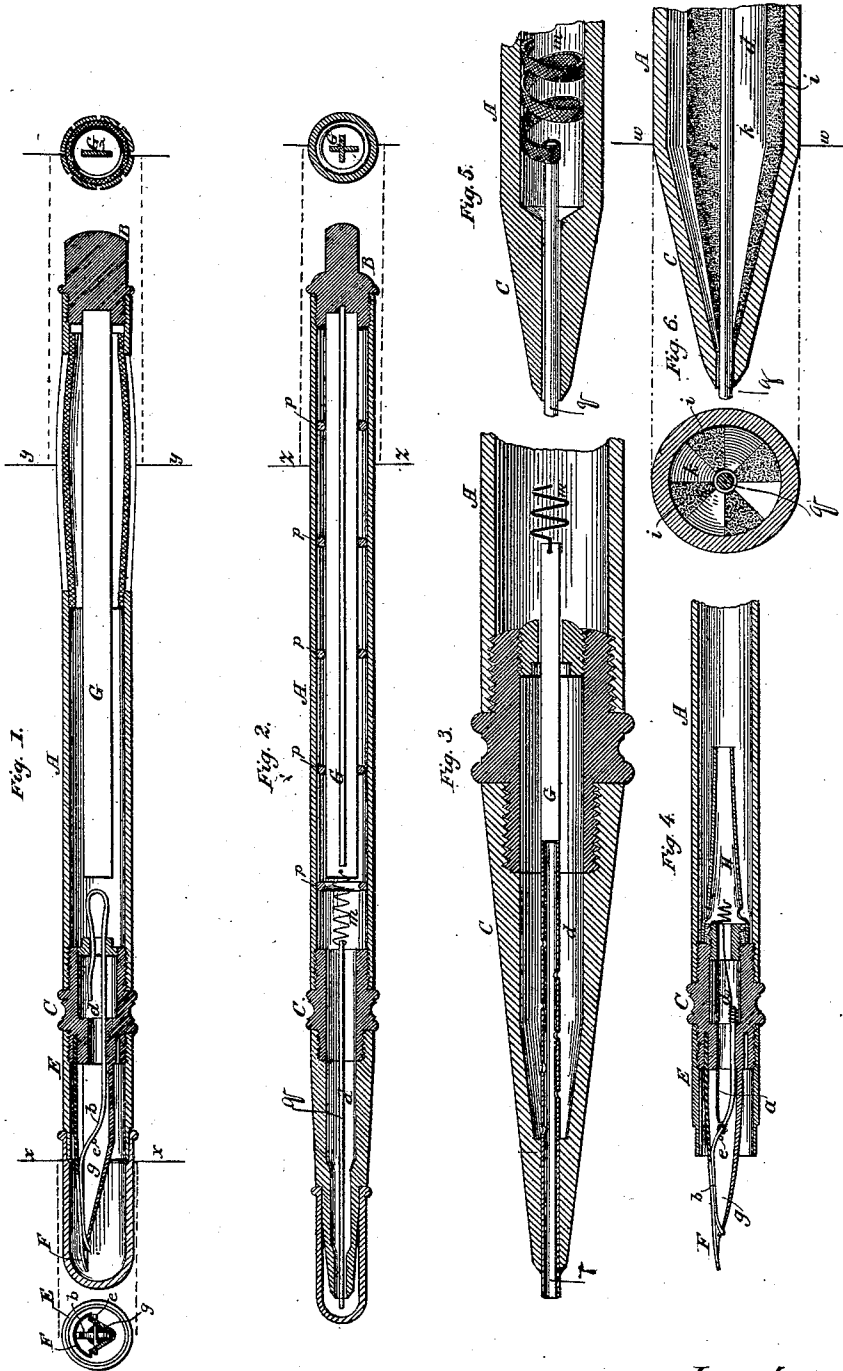


(No Model.)

W. W. STEWART.
FOUNTAIN PEN HOLDER.

No. 253,953.

Patented Feb. 21, 1882.



Attest:

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FOUNTAIN PEN-HOLDER.

SPECIFICATION forming part of Letters Patent No. 253,953, dated February 21, 1882.

Application filed March 30, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WASHINGTON STEWART, of Brooklyn, county of Kings, State of New York, have invented new and useful Improvements in Fountain Pen-Holders, of which the following is a full and exact description.

This invention relates to that class of pen-holders wherein a supply of ink is contained in the holder, and is delivered therefrom to the pen to compensate the discharge from the pen to the paper in writing. In this class of pens the delivery of ink from the reservoir to the pen has been effected by the gravity of the ink alone. If not restrained, the gravity of the ink would cause it to escape in a steady stream without reference to the quantity required by the pen. It has therefore been necessary to control said escape, and to limit it to the varying quantities required. To do this various expedients have been resorted to; but they all may be classed under a single designation, as "barometric," because the flow is controlled by atmospheric pressure, the pen-holder being a sealed tube, and the escape of the ink being resisted by the external pressure until said pressure is neutralized by the entrance of air. Therefore for each drop of ink delivered a corresponding volume of air was admitted.

The various practical difficulties attending the application of the gravity principle, as above indicated, have given rise to a number of inventions for their alleviation, and for these many patents have been issued.

In the present invention I have invoked a physical principle never before utilized for any similar purpose, and by it the delivery of ink from the fountain-holder is rendered positive, independent of gravity and independent of atmospheric pressure. That physical principle is capillary attraction, and by means of it the ink is carried out of the reservoir and delivered to the pen. The vehicle or medium whereby the capillary action is made effective is a permeable strand or cord which is caused to extend from the ink within the reservoir to the pen. This strand may be of natural or woody fiber—such as broom, straw, &c.—or of fabric—such as a loosely twisted or braided thread or cord. This permeable substance becomes saturated with the ink, and thereafter will form a duct for the passage of the same, and a nucleus to

conduct the flow of an additional quantity which will flow along the wetted surface of said conductor.

In addition to the capillary action of the permeable thread or cord, I employ as an auxiliary the allied force derived from the quality of certain surfaces to attract or repel fluid contact. Thus a roughened surface will, as it were, attract fluids—that is to say, it enables them to cling and augments the capillary action—whereas smooth and glazed surfaces have the contrary effect. I therefore introduce within the reservoir roughened or capillary surfaces, to which the ink will cling at the exterior, and in the central part smooth, glazed, or repellent surfaces, along which the air as it enters will move with facility to escape to the upper part of the reservoir. The gravity of the ink is diminished by capillary adherence to the roughened or capillary walls, and the escape of the entering bubbles of air is facilitated by the repellent or glazed surfaces, while the permeable cord or strand and the capillary force acting in the same cause a forced and positive flow of the ink to the pen under all circumstances. The glazed surfaces may be metallic, vitreous, or animal, and among animal substances suitable quill has been found to be very satisfactory. The permeable strand or cord is placed in connection with the pen, so that the movements of the pen in writing will move said strand, and thereby cause sufficient agitation of the ink to prevent clogging by bubbles or sediment.

That others may fully understand my invention, I will more particularly describe it, having reference to the accompanying drawings, wherein—

Figure 1 is a longitudinal section of a pen-holder provided with my improvements, as described herein. Fig. 2 represents the same applied to a stylograph. Figs. 3, 4, 5, 6 represent modifications in the structure useful to adapt the invention to different conditions or purposes.

It is to be understood that the structure shown in Fig. 1 is typical of my invention, and that I do not propose to limit myself to the details shown and described, but only to limit myself to the features essential to the results described, as set forth above.

The barrel or reservoir A may be made of

any suitable material; but for this purpose vulcanite or celluloid is preferred. Its upper end is closed by a head, B, which, for convenience in manufacture and for convenience in cleaning and repair, is made removable. The lower end of the barrel A is partly closed by a point or pen-section, C, which carries the ink-chamber, together with the pen and devices which contribute to the proper flow and distribution of the ink. The point-section C contains the immediate-delivery ink-chamber *d* and the exterior protector or jacket, E. This jacket, together with the ink-chamber having an ink-tube arranged to deliver ink to pen on its concave side and one or more threads of permeable material arranged lengthwise in said chamber, does not form a part of the invention included in this patent, being described and claimed in another specification which I have filed. The ink descends from the larger reservoir in the barrel A to the smaller reservoir or ink-chamber, *d*, and thence to the pen. These parts are well understood. As the ink is discharged from the reservoir its place is filled by equal volumes of atmospheric air from outside. The interference of the outflowing fluid and inflowing air causes the flow of ink to be uncertain and more or less intermittent, and to overcome this practical difficulty many devices have been resorted to. In this invention the force of capillary attraction is employed in a way which gives it a positive action to control and compel the desired flow of fluid, notwithstanding the opposition of air-bubbles passing in an opposite direction. The vehicle for the exercise of the capillary force is a permeable strand, fiber, or cord, which is extended through the ink-chamber *d* and to and in contact with the pen. This strand or cord becomes saturated with ink, and is capable of constituting a duct through which the ink will flow, even though surrounded by air. In practice I employ a small strand of broom-corn or other similar woody substance, (represented by *b*, Fig. 1,) or it may be vegetable fiber—such as cotton, as at *a*, Fig. 4, preferably lightly twisted; and when the latter is employed it may be stretched through the ink-spaces, being secured at both ends, or it may be wound around a wire or other rigid support. This latter is the preferred mode. Instead of wood fiber, the part *b* may be a light spring of gold or other non-corrodible metal, and be wound from end to end with the fine fiber or thread. Said spring is fastened at its point to the point of the ink tube or gutter *g*, whence it curves upward, so as to be in contact with the pen F, and thence downward over a supporting-pin, *e*, and in through the ink tube and chamber *d*. Each movement of the pen in writing causes the spring to flex, and its forward end being fixed in the end of the gutter, the motion occasioned by the flexure of the spring is resolved into a longitudinal motion of that part which is within the ink tube and chamber *d*.

The permeable strand above described has

the capillary effect described; but this effect is facilitated by the employment in connection therewith of vitreous or otherwise glazed surfaces, to which the bubbles of entering air will not cling, and therefore they pass rapidly away to the upper end of the chamber or reservoir. For this purpose pieces of quill seem to be well adapted, and I have used a slender cutting of quill, inserted in the chamber *d*, with excellent results. I also employ plates of quill or of glass or other artificial glazed material in the body of the reservoir, as shown at G, and I have also employed the glazed surface in the form of a tube, as shown at H, Fig. 4.

When the stylus is employed, instead of a pen, as shown in Figs. 2, 5, and 6, it is advantageous to connect said stylus at its upper end with a coiled spring, *m*, of fine non-corrodible wire, as shown in said figures, and said spring may be made of thin flat wire covered with a fibrous material, as shown in Fig. 5, whereby the capillary surface is composed of a permeable fibrous substance, and its capillary action is thereby increased. The capillary and repellent effect may be also in a large measure effected by roughened and polished surfaces *i k* on the interior of the barrel, and these surfaces will, to the best advantage, be arranged in alternate stripes, as shown in Fig. 6. The rings or ribs *p* are placed in the reservoir to assist the ink to cling to the wall.

As hereinbefore stated, the structures shown in the accompanying drawings are merely typical of the invention and designed to illustrate the invention and its mode of operation; hence in Figs. 2, 5, and 6 a stylographic needle, *q*, is represented instead of a pen, and in Fig. 3 a permanently-fixed tube, *r*, is substituted for a pen. This latter will serve for coarse writing, such as is done in directing tags, packages, &c.; but the instrument for final delivery of the ink to the paper or other surface is not material to the subject-matter of this invention. For the purpose of certainty I will recapitulate that the entering bubbles of air are the obstructers of the ink-flow, and that the fibrous or permeable strand by capillary action forces a downward flow of ink past said obstructing bubbles, and that the glazed surface, by a species of repellent action, facilitates the upward movement of the air-bubbles. It will be apparent, also, that the capillary and repellent forces may be graduated and adjusted as to each other so as to adapt the flow to any defined requirement, either as to use or quality of ink.

Having described my invention, what I claim as new is—

1. A holder with its interior made of vulcanite or other material, and provided, substantially as described, with capillary and glazed surfaces, whereby the capillary surfaces will co-operate with the gravity of the fluid, and the glazed surface will facilitate the movement of the entering bubbles of air.

2. A holder portions of the interior surface whereof are made dissimilar—viz., roughened and glazed—and so arranged that capillary attraction of the one and the non-capillary
5 action of the other will be graduated with relation to each other for the purpose of regulating the flow.

3. A permeable strand or cord, arranged to be moved by the pen as a pipe to draw off the
10 ink from the reservoir, combined with said pen and a trough or bath under the same.

4. A fountain pen-holder provided with an ink tube or gutter, *g*, and a pen, *F*, combined
15 with a permeable elastic strand, *b*, at its end, secured to the point of the ink-gutter *g*, and

maintained in contact with the pen by a pin, *e*, substantially as set forth.

5. In combination with a fountain-holder provided with interior smooth or glazed surfaces, a permeable fibrous covering for a part
20 of said glazed surface, substantially as set forth.

6. A permeable strand or cord to act as a pipe to draw off the ink from the reservoir, combined with an elastic part in contact with
25 the pen, whereby the motion of the pen will impart motion to said strand, as set forth.

WILLIAM W. STEWART.

Witnesses:

R. D. O. SMITH,
J. C. TURNER.