No. 698,859. Patented Apr. 29, 1902.

W. W. SANFORD.

STYLOGRAPHIC PEN.

(Application filed Oct. 8, 1901.)

(No Model.)

Fig. 1

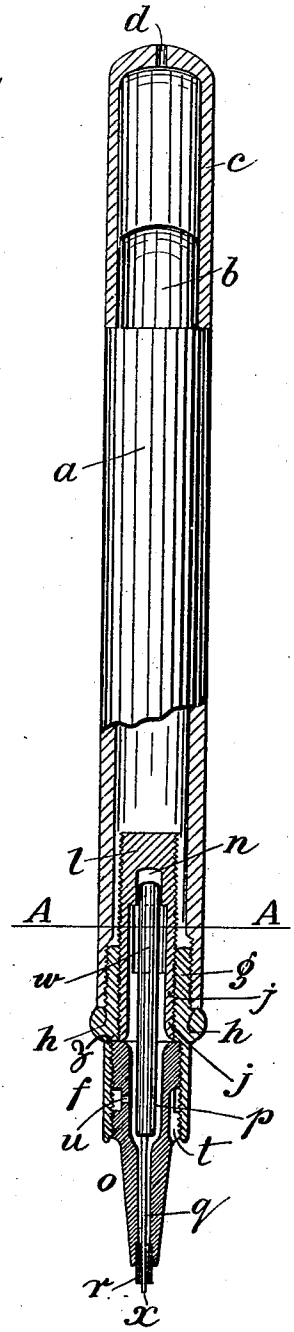


Fig. 2

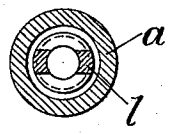


Fig. 3

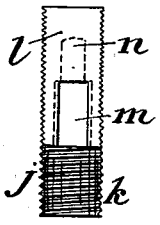


Fig. 4

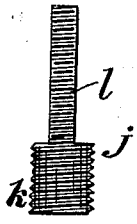
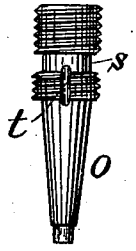


Fig. 5



Witnesses,
Bert B. Jones.
Ivan Koniasberg.

Inventor,
William W. Sanford.
By his Attorney
Walter Brown

UNITED STATES PATENT OFFICE.

WILLIAM W. SANFORD, OF EAST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF TO FREDERICK D. BENNETT, OF FREEHOLD, NEW JERSEY.

STYLOGRAPHIC PEN.

SPECIFICATION forming part of Letters Patent No. 698,859, dated April 29, 1902.

Application filed October 8, 1901. Serial No. 77,971. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. SANFORD, a citizen of the United States of America, and a resident of East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Stylographic Pens, of which the following is a specification.

This invention relates to improvements in stylographic pens.

It is the purpose of the invention to provide a smoothly and evenly writing stylographic pen of simple and durable construction and in which the usual air-tube which extends into the ink-reservoir is dispensed with. By thus dispensing with the air-tube the capacity of the reservoir to hold the ink is much increased and the frequency with which the reservoir has to be refilled is correspondingly diminished.

It is also the purpose of the invention to provide a slightly-movable needle, so as to insure smooth and even writing and to effect this without springs, which are necessarily delicate and easily broken.

It is a further purpose of this invention to provide such a construction of the air-passage that while freely delivering air to the reservoir to maintain a steady and uniform flow of the ink to the needle the ink cannot be accidentally ejected in spurts through the air-passage to make blots on the paper.

It is a further purpose of the invention to so combine the ink-feed, the air-feed, and the needle that no resistance of the air—as a bubble, film, or air-cushion—shall be formed to interfere with the constant and uniform flow of the ink to the needle-point when writing.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a broken sectional elevation of the stylographic pen with the parts assembled for writing. Fig. 2 is a cross-section in the plane of the line A A of Fig. 1. Fig. 3 is a front elevation of the sleeve in which the weighted needle is guided and through which the ink flows to the needle. Fig. 4 is an edge view of the said sleeve. Fig. 5 is an elevation of the cone or tip in which the needle is guided. This figure shows the groove which forms a part of the air-passage.

In general the pen as a whole consists of the penholder, which constitutes the ink-reservoir and head which is secured in the lower end of the penholder, and consists of the sleeve, the coupling, and the cone or tip, the head containing the movable needle and being assembled before insertion into the holder with the needle and then secured in the holder as one.

The hollow holder *a*, preferably made of hard rubber and with its upper end solid, is provided at said upper end with the boss *b*, on which is fitted the cap *c* when the stylograph is in use, *d* being the air-inlet. When the stylograph is not in use, said cap *c* is fitted on the end of the coupling *f* to protect the needle. Into the lower end of said holder *a* is threaded the neck of said coupling *f*, which coupling is also interiorly threaded, as seen in Fig. 1, and shouldered at *h*. Into the upper end of said coupling *f* is threaded the lower end of said tube or sleeve *j*. The upper end of said sleeve *j*, above the threads *k*, is cut away at the sides to form a rectangular stem *l*, through which is a slot *m*, the transverse dimension of said slot *m* being the same as the diameter of the hole through the round threaded end of the said sleeve. Said slot *m* is of such vertical length and so positioned that when the sleeve *j* is assembled in the coupling *f* the lower end of the slot *m* is preferably below the upper end of said coupling, and the upper end of said slot *m* projects above the upper end of said coupling *f*, as seen in Fig. 1. Said stem *l* is counterbored at *n* to guide the end of the needle-weight *w* and to such a depth as to allow of a slight longitudinal movement of said weight. Into the lower end of said coupling *f* is threaded the cone or tip *o*, which is hollowed out at its upper part, as shown at *p* in Fig. 1, to form a chamber for the lower end of said weight *w*, said chamber being of such a diameter as to allow the weight *w* of the needle to have an easy-working fit therein and at the same time allow the ink to flow readily therethrough, and from the lower end of said chamber *p* out through the lower end

of said tip is made a small bore or capillary tube q, through which the needle x passes with easy-working fit. When the needle x is in said bore q, it so nearly fills the bore that the ink flows to the writing-point by capillary attraction aided by gravity and will not splash out to blot and blear the writing. The usual tube r, of platinum or other non-corrosive metal, is fixed in the lower end of said tip o. A circumferential groove s is formed around the upper threaded end of the tip o, dividing the threads into two parts, and a longitudinal superficial groove t is cut in one side of said tip o, preferably being cut through the threads, as shown. Diametrically opposite said groove t is made a small hole u from the groove s into the interior chamber p of said tip o to admit air to the said chamber p and thence to the interior of the penholder. It is of the greatest importance that there should be as little inrush of air upward through the capillary bore q as possible and that no films or bubbles of air having the effect of an air-cushion be formed between the needle and the bottom of the weight, as such conditions seriously affect the necessary uniform and continuous flow of the ink to the needle-point x, and we have found by experience that this desired effect can be best accomplished by so locating the hole or air-outlet u that it shall be both as near the point of the needle as is practicable and at the same time be always above the bottom of the weight w when the pen is in operation. By arranging the air-passage as above described the air will enter by the groove t, pass therefrom into the annular groove s, and thence flow around to the diametrically opposite hole or outlet u and through said outlet to the interior of the chamber p and on upward to the ink-reservoir, and this circuitous path of the air, together with the small area of the outlet u, effectually prevents the accidental spurting of drops of ink through and out of said air-passage. Said needle x, preferably of aluminium, is firmly fixed into the lower end of said weight w, which weight is preferably made of type-metal and is of slightly-smaller diameter than the slot m and chamber p, and the lower end of said chamber p is preferably shaped as a cone, the lower end of said weight being square, so that a slight cavity is left under the end of the weight to contain a small quantity of ink. This construction facilitates a continuous and even flow of ink to the writing-point and at the same time serves to guide the needle-point into the capillary bore q.

The coupling f from the lower end thereof to the small shoulder z, being the part into which is threaded the tip o, is reamed out to a slightly-larger diameter than the other part thereof, into which the sleeve j is threaded, so that said shoulder z forms a stop against further upward threading of said tip o, and as said tip o is always normally held threaded in place and is only to be removed therefrom to repair the pen this construction serves also to furnish a stop for the sleeve j when said sleeve is being threaded into the coupling.

In assembling the parts the tip o is threaded into the coupling until its further movement is arrested at the shoulder z. The needle x, with its weight w, is then placed in the said tip, the said needle dropping down through the capillary bore q and a very little below the lower end of the tube r—that is to say, until the lower end of said weight w comes to rest against the said conical end of the chamber p. Then the sleeve j is preferably threaded home into the upper end of said coupling f until it brings up against the tip o, the upper end of the weight w entering part way into the counterbore n. Now the head, which, as hereinbefore stated, consists of the tip o, coupling f, and sleeve j, with the needle and weight assembled in them, is threaded as one into the lower end of the holder a, which holder has been previously filled with ink.

In writing the needle x, with its weight w, has sufficient longitudinal play to insure very smooth and even writing, the weight w holding the point of the needle upon the paper with the proper force, while yielding to all inequalities or roughnesses of the paper. The ink passes from the reservoir around the stem l and by the slot m into the interior of the head and is fed by capillary attraction and gravity to the needle, the air passing up by said slot m into the reservoir.

It is evident that in place of forming the groove t on the outside of the tip o it might be formed on the inside of the coupling f, being positioned so that it shall register with the annular groove s and be at all times diametrically opposite to the hole u.

It is one of the special advantages of the device that by dispensing with an internal air-tube in the ink reservoir or barrel of the pen we are enabled to have the upper end of said barrel made of one solid piece of material, whereas in pens having the said internal air-tubes the upper end of said barrel has to be left open until the air-tube is assembled, and said end is then closed by a plug or similar fitting, and this plug tends invariably to work loose and permit a slight leakage of ink from out the reservoir, which is an annoyance that cannot possibly occur in my construction.

It is a further advantage of my construction that if the capillary tube becomes clogged it can be readily cleaned by pushing the needle back and forth through it, the sleeve j having been first removed. In this way I can quickly and conveniently accomplish a result which in other pens necessitates the use of a special appliance and is likely to occasion trouble and vexatious delay.

Now, having described my improvements, I claim as my invention—

1. The combination in a stylographic pen, of an ink-reservoir, a weighted longitudinally-movable needle, and a hollow head in which

said weighted needle moves adapted to close the lower end of said reservoir and provided with an air-passage having substantially right-angled bends which connects the interior of the head with the outer atmosphere at a point between the ends of the weighted portion of said needle, substantially as described.

2. The combination in a stylographic pen, of an ink-reservoir, a hollow head adapted to close the lower end of said reservoir, a hollow tip on said head provided with a capillary bore for the needle and with an air-passage having sharp-angled bends which connects the interior of said tip with atmosphere, and a weighted needle longitudinally movable in said head, substantially as described.

3. The combination in a stylographic pen, of an ink-reservoir, and a hollow head adapted to close the lower end of said reservoir and consisting of a sleeve having a side orifice which is adapted to establish communication between the said reservoir and the interior of said head, a hollow coupling, and a hollow tip having a capillary bore for the needle and a sharply-angled air-passage connecting the interior of said head with atmosphere, substantially as described.

4. In a stylographic pen, the ink-reservoir *a*, at the lower end of which is the hollow tip *o* provided with a capillary bore *q* for the needle and with groove *t* the annular groove *s* which connects with said groove *t* and the diametrically opposite hole *u* which connects the groove *s* with the interior of said tip *o*, substantially as described.

5. In a stylographic pen, the ink-reservoir *a*, the coupling *f* which is adapted to close the lower end of said reservoir, the sleeve *j* fitted into the upper end of said coupling *f* and provided with the slot *m* which connects the said ink-reservoir with the interior of said sleeve *j* and coupling *f*, and the hollow tip *o* which is fitted into the lower end of said coupling *f* and is provided with a capillary tube or bore *q* for the needle and with the groove *t* the annular groove *s* connecting with said groove *t* and the diametrically opposite hole *u* connecting said groove *s* with the interior of said tip *o*, substantially as described.

6. In a stylographic pen, the combination with the ink-reservoir and weighted needle, of the hollow tip *o* which is provided with a capillary tube or bore for the needle, a conically-ended chamber for the weight of the needle and a sharply-angled air-passage which connects the interior of said tip *o* with atmosphere at a point between the ends of the weighted portion of said needle, substantially as described.

7. The combination in a stylographic pen of an ink-reservoir, a hollow head adapted to close the lower end of said reservoir, a weighted needle longitudinally movable in said head, a chamber in said head having its lower end so shaped as both to guide the needle-point into the capillary bore and to prevent the weight on said needle from quite reaching the bottom of said chamber, and an air-passage in said head, substantially as described.

8. The combination in a stylographic pen, of an ink-reservoir, a hollow head adapted to close the lower end of said reservoir, an air-passage in said head from atmosphere to a chamber in said head, and a weighted needle movable in said head and with its range of motion so limited that the lower end of the weight thereon shall always be below the outlet of said air-passage, substantially as described.

9. The combination in a stylographic pen, of an ink-reservoir which is without an internal air-tube, a hollow head adapted to close the lower end of said reservoir and having a weighted needle longitudinally movable therein, and said head consisting of a sleeve having a side orifice which is adapted to establish communication between the said reservoir and the interior of said head, a hollow coupling, and a hollow tip having a capillary bore or tube for said needle, and a sharply-angled air-passage connecting the interior of said head with atmosphere and having the outlet thereof always above the lower end of the weight on said needle, and a chamber in said tip so shaped as to serve both to guide the needle into the capillary bore and to prevent the weight on said needle from quite reaching the bottom of said chamber, substantially as described.

10. The combination in a stylographic pen, of an ink-reservoir, a head-section at one end of the reservoir, a tube in said section cut away at the side and communicating with atmosphere, and a weighted needle movable in said section, substantially as described.

11. The combination in a stylographic pen, of an ink-reservoir, a head-section at one end of said reservoir, a channel connecting said reservoir with atmosphere, a tube in said section cut away at the side, and a weighted needle movable in said section, substantially as described.

12. In a stylographic pen, the combination of the sleeve *j* provided with the stem *l* and the slot *m*, and a needle provided with a weight vertically movable in said sleeve *j*, substantially as described.

Signed at New York city this 27th day of September, 1901.

WILLIAM W. SANFORD.

Witnesses:
BERNARD J. ISECKE,
DAVID WALTER BROWN.