(No Model.)

P. E. WIRT.

FOUNTAIN PEN.

No. 330,358. Patented Nov. 10, 1885.

Fig. 1.

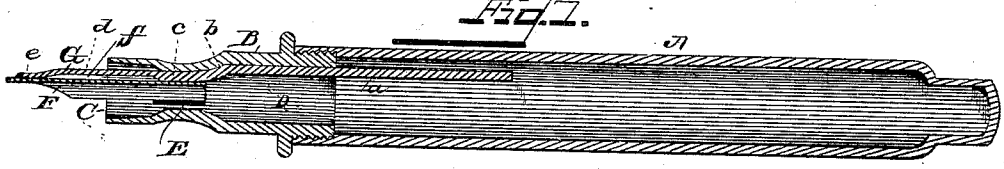


Fig. 3.

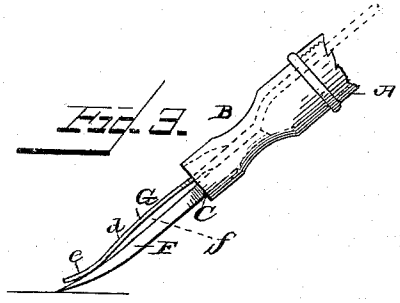


Fig. 2.

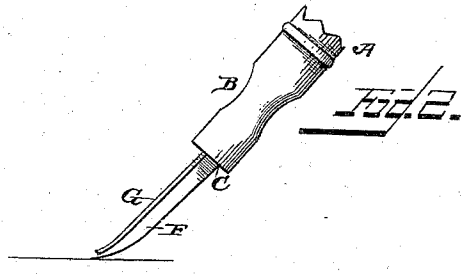


Fig. 4.

Fig. 5.

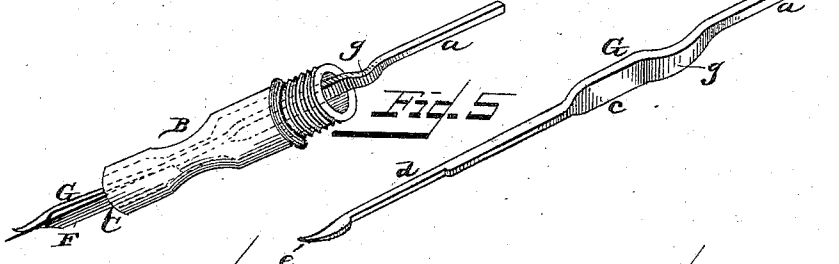


Fig. 6.

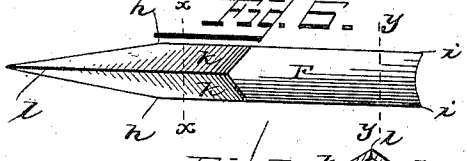


Fig. 7.

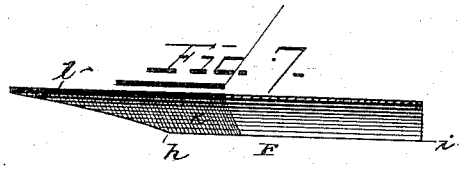


Fig. 8.

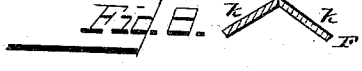
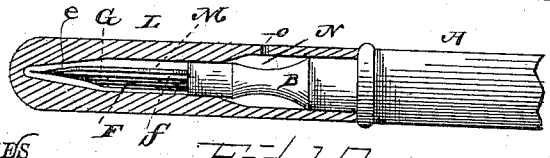


Fig. 9.

Fig. 10.



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UNITED STATES PATENT OFFICE.

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FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 330,358, dated November 10, 1885.

Application filed March 27, 1885. Serial No. 160,284. (No model.)

To all whom it may concern:

Be it known that I, PAUL E. WIRT, a citizen of the United States, residing at Bloomsburg, in the county of Columbia and State of Pennsylvania, have invented a new and useful Improvement in Fountain-Pens, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to fountain-pens, and is designed as an improvement on the construction set forth in Letters Patent No. 311,554, granted to me February 3, 1885, and in the application No. 150,988, filed December 22, 1884.

The objects of the present improvement are threefold: first, to provide an improved form of feeding-shaft by which a greater opening or space is left between the pen and the shaft, into which space the ink accumulates, and is brought down upon the nibs of the pen in a greater quantity as the heavier strokes are made in writing, and correspondingly less as the lighter strokes are made, instead of having the ink adhering to the pen and shaft, as formerly, so as to cause skipping; second, to provide an improved form of pen, by which greater flexibility, strength, and elasticity are gained and a very small pen may be used with all the advantages and the pleasant springing action of a large pen; third, to provide an improved form of cap which will prevent hardening, gumming, or drying of the ink upon the pen or shaft, and thus insure the ready and effective working of the pen as soon as it touches the paper.

With these ends in view the said invention consists in the peculiar construction and novel combination of parts, as will be hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a fountain-pen embodying my improvements. Fig. 2 is a view illustrating the action of the pen and shaft as formerly constructed. Fig. 3 is a similar view, showing the proper action when the pen and shaft are constructed in accordance with the present improvements. Fig. 4 is a detail view of the feeding-shaft. Fig. 5 illustrates a modified form of the shaft. Fig. 6 is a detail view of the pen. Fig. 7 is a longitudinal sectional view of the same. Fig. 8 is a transverse section on the line *x x*, Fig. 6. Fig. 9 is a transverse section on the line *y y*, Fig. 6. Fig. 10 is a longitudinal section through the cap, showing the same fitted over the nozzle of the pen.

Like letters are used to indicate corresponding parts in the several figures.

Referring to the drawings, A designates the hollow barrel or reservoir, and B the nozzle, threaded to screw into the open end of the reservoir, both the nozzle and hollow barrel being preferably constructed of hard rubber in any desirable form to suit the taste and fancy of the manufacturer. The nozzle B is made hollow, as shown, the front end being provided with a bell or funnel shaped mouth, C, and the rear end having an enlarged recess or chamber, D, the latter being connected with the mouth by a central passage, E. The pen F, the construction of which will be hereinafter described, is seated at its rear end in slots provided in the side walls of the passage E.

The features above enumerated do not form part of the novelty of the present improvement, but have been included in the prior patent and application hereinbefore alluded to, and reference is hereby made to the same for a fuller and more detailed description of the said parts than is herein given.

G designates the feeding-shaft, which is shown detached in Fig. 4. This shaft is constructed of hard rubber, and comprises the main straight portion *a*, bent downward at *b*, and extending horizontally, as shown at *c*, for a short distance, then cut out and extending along in this plane, as at *d*, and finally enlarged and turned down near the front end to provide a bearing-edge, *e*.

By reference to Fig. 1 of the drawings it will be seen that when the shaft G is fitted in place, the main straight portion *a* fits against the top wall of the recess or chamber D, and extends up within the reservoir or barrel A, to conduct the ink therein down into the said chamber or recess, where it accumulates, and may be drawn down upon the nibs of the pen by the action of the latter in writing. The short horizontal depressed portion *c* is located within the passage E of the nozzle, and is re-

ceived in the space between the rear end of the pen and the inner top face of the nozzle. The reduced front portion, *d*, does not touch the pen, but leaves a space between the shaft and the pen, while the enlarged bearing-edge *e*, which may be turned slightly upward at the point, as in Figs. 3, 4, and 5, rests upon the nibs of the pen. It will be observed that by this construction an inclosed space or chamber, *f*, is provided between the part *d* of the shaft and the back of the pen and between the depressed part *c* and the bearing-edge *e*, in which space *f* the ink accumulates or is brought down from the recess D by capillary attraction.

In the construction shown in my former patent, (see Fig. 2,) the shaft was located flat against the back of the pen, so that the ink is caused to adhere to the pen and shaft, and in making heavy strokes "skipping" would often occur; but by providing a space or chamber, *f*, for the ink to accumulate upon the back of the pen the ink is attracted or brought down by capillary attraction in a greater quantity as the heavier strokes are made when writing, and thus provide a greater tendency of the ink to flow downward onto the paper. (See Fig. 3.)

When the shaft is properly constructed, as herein shown and described, the pen presses against the bearing-edge *e* of the shaft, and as the latter is very pliable it bends outward and causes the space or chamber *f* to be increased in size, according to the nature of the stroke given to the pen. In making light strokes a less quantity of ink will be attracted down upon the pen, and when heavy strokes are made the action will be the reverse. This feeding-shaft G may be shaped as shown, or of such form as to bend more at a point near or within the end of the nozzle, and not close down to and with the nibs of the pen, as illustrated in the old form, Fig. 2. It should be so constructed that when the lower end, as it lies upon the points or nibs of the pen, springs upward with the points in writing, the shaft will bend, so as to give increased space between the pen and the shaft outside the nozzle, into which space the ink will be drawn by capillary attraction. The same result may be attained by reducing the thickness of the shaft from point *c* to the edge *e* to provide the space or chamber *f*, instead of bending down the shaft at the edge or point *e*, in the manner shown and described.

In Fig. 5 is illustrated a modified form of shaft, which consists in making the rear end, *a*, with the enlargement *g*, by means of which the shaft is wedged or held within the nozzle, the extreme end of the part *a* extending up within the reservoir to conduct the ink therefrom. The depressed horizontal part *c*, the elevated portion *d*, to form the inclosed space *f*, and the bearing-edge *e* are substantially the same in construction as hereinbefore described and shown, the front end of the shaft being reduced in thickness from points *c* to *e* to provide the space *f* when fitted in place. The operation of this form of shaft is essentially the same, and therefore need not be repeated.

F designates the pen, (shown in detail, Fig. 6,) which is preferably constructed from gold, and is made of equal width from the shoulders *h h* to the heel *i i*. The nibs *k k* are made flat and set at an angle to each other, the width of the nibs increasing to the shoulders *h*. The slit *l*, which separates the nibs *k*, should terminate at the point where the pen begins to assume an oval or rounding form, which continues back to the heel *i*. The cross-sectional views, Figs. 7 and 8, show the construction of the pen at the shoulders *h* and the heel.

The object in shaping the pen as shown is to avoid the use of a large pen, and at the same time to gain elasticity and strength. By this shape and construction a very small pen may be used, and almost any degree of elasticity attained by making the slit between the nibs longer or shorter, as desired. It will also be observed that flexibility and considerable strength for a small pen are also attained, and may be preserved by the construction shown, as the stock or material from which the pen is made is much thicker along the length of the nibs than can or would be the case in a small pen of the ordinary shape—that is, one with oval or rounding nibs.

In my improvement the nibs are flat throughout and of the same width from the shoulders *h* back to the shank of the pen, and for this reason the action or spring can be made much greater or longer than in any other form to obtain the requisite springing action of a large pen. The points or nibs of the ordinary pen (one rounding over the back) are likely to become flabby and easily strained or sprung apart, and when reduced to such a state will not recover their former firmness, especially when such ordinary pen is very small and handled in the usual manner. Furthermore, a small pen of the usual construction must be thin to have elasticity; hence it will be comparatively frail. Its slit cannot be lengthened to gain elasticity, for the shape and width of stock or material will not admit of such a change, and the pen will remain flabby, weak, and sprung, so as to be easily damaged.

As stated, the construction employed by me allows of thickness of material to add strength, and length of nibs to give elasticity to the pen, while at the same time a very small and cheap pen may be made, which will in every essential working or writing feature resemble a large heavier pen, although it will cost only one-half as much. From the point where the slit *l* ends, the material or stock assumes gradually thicker proportions until it reaches the heel *e*. The thickness of the nibs is also gradual from the extreme points to the end of the slit *l*. This slight grading of the thickness of the pen body and nibs renders the spring or elas-

ticity pleasant and gradual, giving an easy working sensation in the hands of a writer.

When this improvement of the pen is considered in connection with the operation of the feeding-shaft, its advantages are more clearly seen. The peculiar construction of said shaft G with the ink-supply chamber or space *f* for the ink to accumulate on the back of the nibs enables the latter, when under pressure of the hand and fingers in writing, to yield readily, so that the heavy strokes in writing will make the space *f* larger, causing capillary attraction and agitation to bring a better and more adequate supply of ink on the pen under the shaft near the point, thus preventing the common fault of skipping in fountain-pens. To insure a regular and plentiful supply of ink, (however, not too much,) the feeding construction or arrangement should be such as to place more ink upon the pen when the heavy strokes or dashes are made than when ordinary and uniform small lines are made.

If the pen were so constructed at the nibs as to give a very short action or spring as resulting from the use of the ordinary shaped small pen, and the feeding-shaft were to lie flat or close to the nibs and bend uniformly with them while writing, (see Fig. 2,) there would be no greater supply for heavy strokes than for light ones, and the result would be that the pen would skip. The space between the pen and the shaft fills up by capillary attraction and agitation, so that a sufficient supply of ink is upon the pen at the time when it is desired to transfer it to the paper. Of course, when the pressure is relieved, the shaft and pen spring back to their place, causing the flush of ink to recede by capillary attraction up the shaft and within the nozzle.

As is well known, heavy lines in writing require more ink ready and with a tendency to leave the pen than light lines, and my construction of shaft and pen provides for this, and affords a continuous and complete supply, as the exigencies of writing may require.

I am aware that it is not new to construct a pen with flat nibs running to any angle; but such pens have been used as ordinary "dipping-pens," and have not been constructed with a view to save material, or to produce a small pen of special strength, and with a ready springing action to the nibs back of the shoulders, as well as in the lower or front part of the nibs. The nibs of such pens end where the shoulders *h* begin, or at the front end of the shank or body, and they have been used as dipping-pens with indifferent success, for in a dipping-pen of this construction the lateral spreading motion of the nibs and the shape thereof tend to drag the ink off the pen precipitately, to cause blotting, as the ink does not adhere firmly to them when used in that connection.

My pen as constructed could not be used as a dipping-pen, and is only practical and useful as a writing-instrument when employed in combination with the feeding-shaft of a fountain-pen. For such purposes I claim novelty and utility. The peculiar form of pen shown and described has special advantages in point of cheapness, strength, and capacity to work just as readily as a long-nibbed pen.

In Fig. 10 is shown my improved form of cap fitted over the nozzle of the fountain-pen. This cap (designated by the letter L) is constructed of hard rubber, having one end open and the other end closed, the interior thereof having a passage or opening therein of peculiar shape. At the open end of the cap the interior passage is enlarged, as at N, to receive the rear end of the nozzle, while the remainder of the passage M is reduced or decreased in diameter or width, so that the front end of the nozzle on each side is clasped by the inner walls of this passage M. Since the width of the latter is just sufficient to allow the front end of the nozzle to be inserted through or into the lower or outer entrance of the same, the walls of this passage will hermetically seal the connection with the nozzle and prevent the entrance or passage of air to the pen to dry off the ink thereon. Although the passage M fits the front end of the nozzle closely, yet the beveled entrance to and the width of the same are sufficient to permit the free introduction and passage of the pen and shaft without any possibility of injury thereto.

To insure the proper working of the pen, the interior of the nozzle around the same at the lower or front entrance, and also the surfaces between the feeding-shaft and the pen to the extreme tip or points, must first be moistened with the ink and retained in that moist state, otherwise the ink will not flow at once from the points, or will flow off precipitately or too freely and blot. The surfaces between the pen and the shaft, outside the nozzle particularly, should always be kept moist, and it is for this purpose that the cap is constructed, as shown and described, to prevent evaporation and hardening, gumming, or drying of the ink upon the pen and shaft. As is well known, dry surfaces repel fluids and prevent to a great extent the operation by capillary attraction. It is therefore necessary to provide a cap which will retain the pen in a moist state by hermetically inclosing the pen and shaft. This is effected by the improved form of cap shown, which will fit closely around the front end of the nozzle with as little space about the pen as possible, to avoid all tendency of the ink drying on the extreme points of the pen. If there was a large space about the pen, there would still be a tendency of the ink to dry somewhat on the extreme points of the pen, particularly if there was an air-vent in the cap to allow escape of compressed air. By contracting as much as possible the space about the inclosed pen, moisture is more directly retained about the points of the pen and

shaft, so as to insure the proper immediate working of the pen as soon as it touches the paper; also, in carrying the pen in the pocket, should it have its point extending down, ink that might be shaken from the case could not settle within the cap in any large quantities, and what ink would settle or be shaken there would be more likely to be retained by atmospheric pressure and capillary attraction within the narrow end of the cap until it is again placed over the pen, when it would be attracted back within the barrel or reservoir when the latter is properly carried with the pen-point extending up. This construction also gives strength to the cap, which is very desirable in a pen-case that must be carried in the pocket, as the cap is braced, when over the pen, both at a point about the middle of its length and also about the lower open rim. In replacing or removing this cap from over the pen the compression of air is very slight within the little space hermetically closed, while the escape and entrance of air are provided for by the air-vent *o*, bored through the enlarged passage N, which allows air to enter or pass out from this passage. Heretofore caps have been constructed with an air-vent communicating with the hollow interior or passage of the same, and allowing a circulation of air, which soon dries off the surface or points of the pen and ink-conducting shaft. The disadvantages and objections to this form have been pointed out; but by my improvement air is only allowed to enter and circulate in the enlarged passage N, and does not have a continuous circulation to dry off the pen and shaft.

The operation of my invention will be readily understood from the foregoing description taken in connection with the annexed drawings.

The barrel or reservoir A is filled with a requisite supply of ink and the nozzle screwed over the open end of the same. When the pen and ink-conducting shaft G have been properly arranged, as shown in the drawings, the pen is in condition for use.

It will be observed that the rear or inner end of the shaft, which projects into the ink within the reservoir, serves to attract or conduct the ink down to the recess or chamber D at the inner end of the nozzle, as described in my aforesaid patent. Since the front end of the shaft lies over the nibs of the pen the pressing of the latter upward in writing causes the front end of the shaft to bend to a degree corresponding to the stroke given to the pen. As the front ends or points of the shaft and pen are pressed or bent upward, the middle of the shaft is also slightly elevated to increase the width of the space *f* which exists between the pen and the shaft. This action causes the ink which accumulates within the recess or chamber D to be attracted down upon the pen and accumulate in the space *f*, from whence it flows or is drawn down directly to the points or nibs. In this manner a continuous supply is drawn from the reservoir down upon the points or nibs of the pen, the amount or quantity of the flow being determined or regulated by the pressure applied to the pen, so that light and heavy strokes may be made with my improved fountain-pen as by any other writing-instrument.

My improvements are intended to simplify and cheapen the construction of pens of this character, and also to produce an article which for efficiency and sureness of action cannot be surpassed.

The shaft G may have its bearing-edge *e* turned upward, as in Figs. 3, 4, and 5, or bent down to lie flat upon the nibs of the pen.

Having described my invention, I claim—

1. In a fountain-pen, the combination, with the barrel or reservoir and the nozzle carrying the pen, of the ink-conducting shaft arranged above the pen and having its front end adapted to leave a space or chamber between it and the pen for ink to accumulate in, for the purpose set forth.

2. In a fountain-pen, the combination, with the barrel or reservoir and the pen section or nozzle, of the ink-conducting shaft held at an intermediate point of its length within the pen section or nozzle, the rear end extending into the ink reservoir or barrel, and the front end arranged above the pen so as to leave a space or chamber between the parts arranged and operating, whereby when the pen is pressed upward in writing the action of the nibs causes the said space or chamber to be increased or decreased, according to the stroke given thereto, for the purpose set forth.

3. In a fountain-pen, the combination, with the barrel or reservoir and the pen section or nozzle, of the ink-conducting shaft extending through the nozzle and having its front portion arranged to leave a space or chamber between it and the pen, the extreme front end resting on the nibs thereof, so that the shaft will be operated to increase the width of the space or chamber, according to the degree of stroke, as set forth.

4. In a fountain-pen, the combination, with the barrel or reservoir and the pen section or nozzle, of the ink-conducting shaft extending through the latter and resting at an intermediate point on the rear end of the pen, the front portion being arranged to leave a space or chamber between it and the pen, and the extreme point or front end resting upon the nibs thereof, arranged and operating so that the space between the intermediate point and the extreme front end may be increased in width, according to the stroke given to the pen, as set forth.

5. In a fountain-pen, the combination, with the reservoir or barrel and the pen section or nozzle, of the ink-conducting shaft comprising the main portion *a*, the depressed portion *b*, the chambered portion *d*, and the front bearing-edge, *e*, the latter resting on the nibs of the pen, for the purpose set forth.

6. In a fountain-pen, the combination, with the barrel or reservoir and the pen section or nozzle, of the ink-conducting shaft passing through the latter, and the pen fitted in the nozzle below the shaft and comprising the two flat nibs set at an angle to each other, and a rounding shank or body, as set forth.

7. In a fountain-pen, the combination, with the barrel or reservoir and the pen section or nozzle, of the ink-conducting shaft and the pen comprising the rectangular shank or body, the flat nibs set at an angle to each other and extending back and forming part of the body, the latter commencing to assume a rounding shape from the point where the nibs terminate, for the purpose set forth.

8. In a fountain-pen, the combination, with the ink reservoir or barrel and the pen section or nozzle, of the ink-conducting shaft and the pen comprising the shank or body, and two flat nibs set at an angle to each other and extending back and forming part of the body, as set forth.

9. In a fountain-pen, the combination, with the nozzle, of the herein-described cap having an interior passage therein, the front or closed end of the passage being reduced while the rear or open end is enlarged, for the purpose set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

PAUL E. WIRT.

Witnesses:

C. C. PEACOCK,

GEO. S. ROBBINS.