No. 619,701. Patented Feb. 14, 1899.

A. A. WATERMAN.

FOUNTAIN PEN.

(Application filed Mar. 8, 1897.)

(No Model.)

Fig. 1.

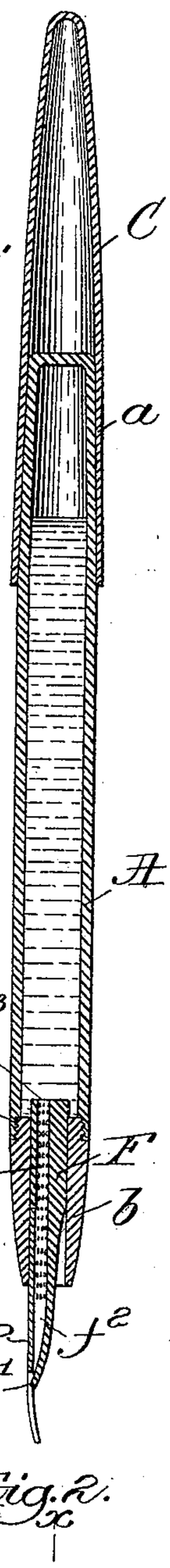


Fig. 2.

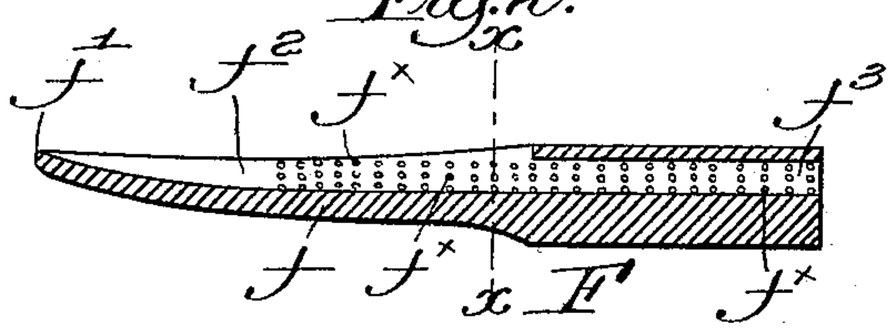


Fig. 3.

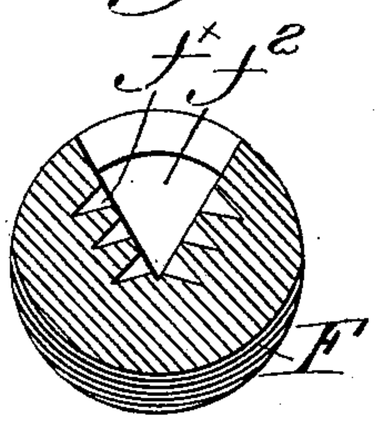


Fig. 4.

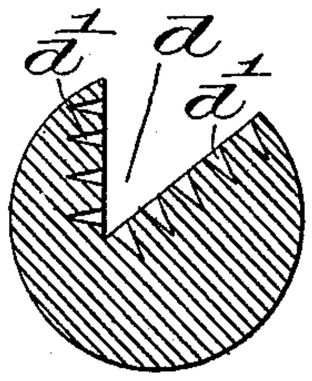


Fig. 5.

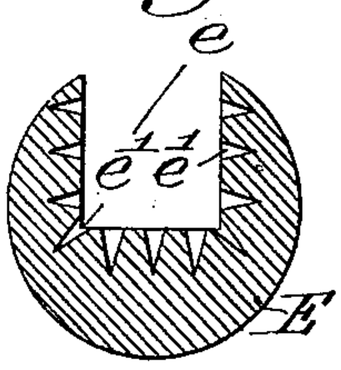
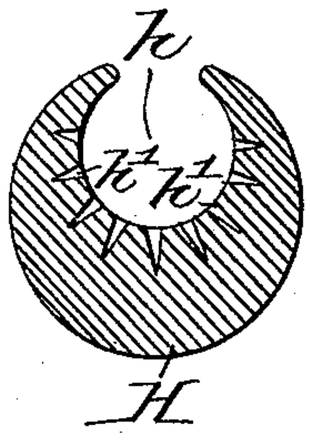


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 619,701, dated February 14, 1899.

Application filed March 8, 1897. Serial No. 626,396. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR A. WATERMAN, of Arlington, county of Middlesex, State of Massachusetts, have invented an Improvement in Fountain-Pens, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to fountain-pens wherein the fluid from a suitable reservoir is supplied to the pen of ordinary construction by a feeder or feed-bar; and my invention has for its particular object the improvement of the feed-bar whereby the initial movement of the ink along the longitudinal duct thereof is hastened.

Despite the fact that there are numerous ingeniously-contrived fountain-pen feeds on the market many of them are complicated in construction and are made without effective reference to the essential means to secure instant action when the pen is put in position to write, and the result in a majority of cases is a slow feed movement or flow of ink exceedingly annoying to the user even when the pen has been unused for but a very short time. This difficulty is due to the lack in the ink-duct of an extensive properly-moistened ink-directing surface, so that the passage of the ink from the reservoir down this duct is made slow and irregular, for in this case the force of gravity acting alone on the ink has to overcome both the retarding (or friction-like) effect of the dried surfaces of the duct and the external pressure of the air. To secure a frictionless or, as it were, a lubricated passage for the ink, I make practical use of the well-known fact that after a surface has been wetted by a fluid mere gravity will cause more of the fluid to spread or flow readily over the wetted surface. I provide, therefore, for maintaining in the ink-duct of my fountain-pen feed a damp or moist ink-directing surface or a contiguous series of such surfaces, and I attain this end in my present invention by a very simple and novel means. I provide minute storage chambers or pits in the surface of the ink-duct in the feed, these pits when once wetted with ink having a twofold function—first, that of keeping themselves moist by means of the very strong capillary attraction in their minutest portions and over their surfaces, and, second, that of holding by the force of cohesion enough more ink in storage to keep the pits quite full to their mouths. Adhesion or capillary attraction then acts again to draw from the mouths of these numerous pits enough ink in a film to cover the surface of the duct between the mouths of the pits, and so the entire surface of the ink-duct is maintained moist.

The storage chambers or pits in the surfaces of the ink-duct are easily filled for the first time, or after being emptied for special causes, by dipping or soaking the feed in water or ink, or, if the ink-reservoir is already filled, by jarring or shaking or by allowing the pen to stand for a time with the point down. Thereafter with the pits once filled and the surfaces of the duct thus made damp the moment the penholder is slanted or tipped for writing the ink is forced into the duct by gravity, and the same force continues to cause a free feed or supply of ink down the duct to the pen as needed.

It is to be noted that the storage chambers or pits have no feed function—that is, to supply ink to feed the pen—but they merely provide for comparatively small storage-bodies of ink sufficient to maintain a damp or moist track when the pen is not in use to facilitate the initial movement of the ink in the feed-duct from the reservoir.

Figure 1 is a longitudinal sectional view of a fountain-pen embodying my invention. Fig. 2 is a like view, enlarged, of my novel ink-feeder shown in Fig. 1. Fig. 3 is a greatly-enlarged transverse section of the feeder on the line $x\,x$, Fig. 2; and Figs. 4, 5, and 6 are enlarged cross-sectional views of modified forms of ink-feeders to illustrate various forms of feed-duct and storage chambers.

In Fig. 1 the tubular body portion A, of rubber or other suitable material, is preferably tapered externally at *a* to readily enter and fit snugly in a removable cap C when the pen is in use. The open end of the body is threaded at *a*, or otherwise adapted to receive a tightly-fitting tubular holder *b*, which supports the ink-feeder, to be described, the pen P, of usual construction, being held between the holder and ink-feeder, the exterior

of the holder being tapered to receive cap C when the pen is not in use.

The feeder consists of a bar F, (shown separately in Fig. 2,) the base portion thereof fitting tightly in the holder *b* and tapering therefrom, as at *f*, beneath the pen, the tip *f'* of the feeder normally resting upon the under side of the pen P, as in Fig. 1. This feed-bar is made preferably of hard rubber, but, obviously, if made of any other substance its interior surfaces when finished must not be oily or repellent to ink. The bar is longitudinally grooved on its side next the pen, as at f^2, the groove being open and gradually decreasing in depth to the tip, though it may be of uniform or irregular depth.

As herein shown, the base of the feeder F may be channeled, as at f^3, in continuation of the groove, or the groove itself may continue back to the reservoir, said groove forming the ink-feed duct to convey the ink by gravity from the body or reservoir A to the nib of the pen.

Along the surface of the feed-duct, which I prefer to make acutely V-shaped in cross-section, I make small pits or depressions $f^\times$, as closely arranged as may be found convenient or necessary from the inner end of the feed-bar to near its tip. While the depressions may be of any shape, I prefer to make them inversely conical, as shown in Fig. 3, to the better act in retaining and storing each a small body of ink at all times, the surface of the feed-duct thus being provided with a number of closely-related pools of ink that maintain the rest of the surface damp or moist. The preferred V-shaped groove is also important, as the bottom of the very acute-angled groove acts as a storage-chamber of itself to retain or store ink therein by capillarity and cohesion as do the pits or depressions. The various moist portions of the surface of the duct thus serve to cause a rapid initial movement of the ink from the reservoir when the pen is inverted for use, and once the flow is established the special function of the pits or depressions ceases, gravity feeding the ink down the duct to the nib of the pen. The feed of the ink to the pen tends to create a vacuum in the reservoir, such tendency being more or less counteracted by the entrance of air passing upward through the duct, such passage of air also preventing excessive flow of ink, the supply of the latter to the under side of the pen being regulated by the pressure of the pen on the stream of ink.

It is not necessary to place the pits in such close proximity to each other as to maintain a continuous passage, as the front of the advancing stream of ink will quickly leap from one to another of the mouths of the pits in case by some accident any part of the surface between the mouths becomes greasy or is otherwise not able to retain its proper film of moisture which the mouths of the pits are expected to supply.

In Fig. 4 the ink-feed duct *d* is V-shaped; but one of its walls is substantially in a vertical plane when the pen is in use, and the storage chambers or pits *d'* may be in both walls of the duct, as shown, or only in the inclined wall.

In Fig. 5 the feed-bar E is provided with a rectangular feed-duct *e*, the side walls and bottom being all provided with storage-chambers *e'*, while in Fig. 6 the bar H has a partially-cylindrical duct *h*, provided with chambers *h'*.

The inverted conical shape of the storage-chambers, my preferred form, is advantageous by reason of the greater capillary action thereby attained in retaining the storage-bodies of ink and the larger exposed surface thereof, and, furthermore, they are more conveniently made in such form.

The construction and arrangement of the feed-bar may be varied, as may be the number, size, and shape of the storage pits or chambers, without departing from the spirit and scope of my invention, the gist thereof residing in the provision of a number of minute capillary storage chambers or pits in the ink-feed duct to maintain damp or moist inciting-surfaces for the initial feed movement of the ink from the reservoir.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An ink-feeder for fountain-pens, consisting of a bar having a longitudinal duct through which the ink is fed by gravity, and minute depressions or chambers in said duct, to retain and store ink at all times, substantially as and for the purposes set forth.

2. An ink-feeder for fountain-pens, consisting of a bar having a longitudinal duct through which the ink is fed by gravity, and inverse conical capillary chambers in the said duct, to retain and store ink at all times, to thereby present a series of moist portions, substantially as described.

3. An ink-feeder for fountain-pens, consisting of a bar having a longitudinal, gravity feed-duct for the ink, V-shaped in cross-section, and minute capillary chambers in the surface of the duct, to retain and store ink therein at all times, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR A. WATERMAN.

Witnesses:
JOHN C. EDWARDS,
AUGUSTA E. DEAN.