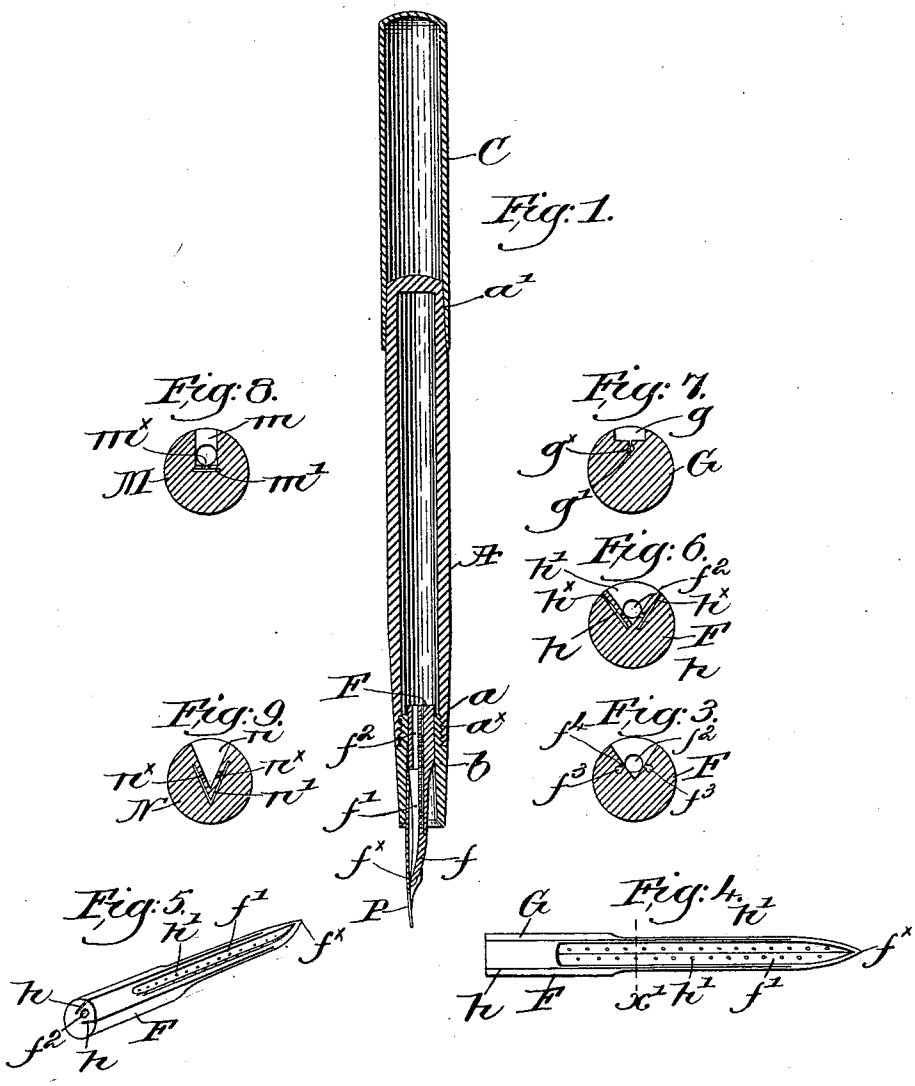
(No Model.)

A. A. WATERMAN.

FOUNTAIN PEN.

No. 592,847. Patented Nov. 2, 1897.



Witnesses.
Edward H. Allen.
A. C. Harwood.

Inventor:
Arthur A. Waterman
by Crosby Gregory.
Attys.

UNITED STATES PATENT OFFICE.

ARTHUR A. WATERMAN, OF ARLINGTON, MASSACHUSETTS.

FOUNTAIN-PEN.

SPECIFICATION forming part of Letters Patent No. 592,847, dated November 2, 1897.

Application filed January 6, 1897. Serial No. 618,105. (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 of that class wherein a writing-pen of ordinary construction is supplied with fluid from a suitable reservoir, usually, for convenience, formed in the handle or holder.

My invention has for its particular object the improvement of the ink-feeder, or "feed-bar," as it is sometimes termed, whereby the initial feed movement of the ink through the longitudinal duct in the feeder is greatly hastened, such end being attained by providing novel means for maintaining the duct moist or damp when the pen is not in use.

Trouble is frequently experienced in the use of fountain-pens by reason of the very tardy feed movement or flow of the ink after the pen has been unused for a time, and this retardation is due mainly to the fact that the surface of the feed-duct has become dry and the passage therefrom of the ink from the reservoir by gravity is rendered slow and irregular, as it is resisted by the repellent effect of the dried surface of the duct and by the external pressure of the air.

It is well known that a fluid will flow or spread rapidly by cohesion over a moistened surface, following such moistened or damp portion to the practical exclusion of the dry parts, and in my present invention I have utilized this principle of maintaining a damp or moist ink-directing surface in the feed-duct or a series of such surfaces in contiguity. This is effected by providing a storage or sub chamber separated from the feed-duct, but connected thereto by minute passages to provide a small storage body of ink in the bar when the pen is not in use, the ink being conducted by capillary attraction from the storage-chamber to the feed-duct to maintain the latter damp or moist.

When the penholder is slanted or tipped for use, the ink from the reservoir will rapidly creep or spread by cohesion along the damp portion of the duct, wetting the same, and the feed of the ink by gravity will immediately be effected along such wetted duct, which is of large cross-sectional area relative to that of the storage-chamber.

The storage or sub chamber is in no sense a feed-chamber, as it has no function in supplying ink to feed the pen, its outer end terminating within the bar, but it merely provides a comparatively small storage body of ink sufficient to maintain a damp or moist track when the pen is not in use to facilitate the initial movement of 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 longitudinal sectional view, enlarged, of my novel ink-feeder shown therein; Fig. 3, an enlarged transverse section thereof on the line $x\,x$, looking to the right. Fig. 4 is a top or plan view of another form of feeder. Fig. 5 is a perspective view thereof. Fig. 6 is a transverse sectional view, enlarged, on the line $x'\,x'$, Fig. 4; and Figs. 7, 8, and 9 are enlarged cross-sectional views of modified forms of ink-feeders to illustrate various arrangements of feed-duct and storage or sub chamber.

Referring to Fig. 1 of the drawings, the tubular body portion A, made of rubber or other suitable material, is preferably tapered externally at each end, as at $a\,a'$, to readily enter and fit snugly in a removable cap C, the cap protecting the pen when not in use. The open end of the tubular body A is threaded, as at $a^{\times}$, to receive a shouldered and threaded tubular holder b, fitting tightly within the body, said holder supporting the ink-feeder to be described, and the pen P, of usual construction, is supported between the holder and ink-feeder.

The feeder consists of a bar F, Figs. 1 and 2, preferably of rubber, adapted at its base to fit tightly in the holder b and tapering therefrom, as at f, to extend beneath the pen P, the tip $f^{\times}$ being adapted to normally rest upon the under side of the nib of the pen, Fig. 1. Upon its side next the pen the bar is grooved longitudinally at f', the groove being open and gradually decreasing in depth to the tip $f^{\times}$, as herein shown, though it may

be of uniform or irregular depth, while the other portion of the feeder F may have the groove continued back to the ink-reservoir, or it may be channeled, as shown at f^2, in continuation of the groove, forming therewith an ink-feed duct of relatively large cross-sectional area to convey the ink by gravity from the reservoir or body A to the nib of the pen.

A small storage or sub chamber f^3 is made in the bar in any suitable manner, preferably one at each side of the feed-duct, extending from the inner end of the bar to near its tip, terminating at its outer end within the bar and separated from the duct by a thin intervening portion of material, but connected therewith by a series of short, minute, or capillary passages f^4. The capillary passages at the inner end of the bar, where it is channeled at f^2, Fig. 2, are conveniently formed by drilling through the bar from the exterior, and the outer ends of the passages are closed by cement or in any other suitable manner.

The sub chamber and passages f^4 receive a small quantity of ink from the reservoir when the pen is first filled with ink, and they retain or store a small body of the ink when the pen is not in use, very much as a fine sieve will hold a fluid in its meshes, so that the feed-duct is maintained damp or moist by the capillary action of the ink in the subchamber and passages.

To fill the reservoir, the holder b is unscrewed, the ink poured in and the holder replaced, and when this is done for the first time it is well, in order to charge the storage or sub chamber, to screw the holder in with the pen inverted, as the pressure upon the air in the reservoir will force ink along the feed-duct and into the storage-chamber and capillary passages. This is a convenient mode of charging the storage-chamber, as it were, but other means may be employed to attain the same end.

Now when the pen is to be used the ink will feed down the feed-duct by gravity to the nib of the pen, and I utilize the action of cohesion to cause a rapid initial movement of the ink from the reservoir along the surface of the duct maintained damp or moist by the storage-chamber. As soon as the surface is wet the action of gravity continues the feeding of ink through the duct to the pen, tending to create a vacuum within the reservoir, which tendency is more or less counteracted by the entrance of air passing upward through the duct. Excessive flow of ink is prevented by the passage of air through the duct in the opposite direction, and the variation of pressure of the pen on the stream of ink regulates the supply thereof to the under side of the pen.

Even should the connecting-passages between the storage-chamber and the duct fail to maintain a continuous film of moisture thereon, they will still act to facilitate the initial feed movement of the ink when the pen is brought into use, as the leading end or boundary of the advancing stream will quickly leap from one to the other of the wetted portions or spots formed by the mouths of the capillary connecting-passages.

In Figs. 4, 5, and 6 I have shown a modified form of subchamber, the feed-bar F being in general shape as described, and provided with the feed-duct f' f^2. A fine saw-cut h is made in the bar at each side, substantially parallel to the sides of the duct and separated therefrom by a thin diaphragm or body of the material of the bar, the cuts constituting the subchambers, connected by fine capillary passages h' with the surface of the feed-duct. The cuts extend from the inner end of the bar to or near to its extremity or tip $f^\times$, and if desired the cuts may be closed at their outer longitudinal edges by cement or in any other suitable manner, as at $h^\times$. (Most clearly shown in Fig. 6.)

In Fig. 7 the subchamber g' is shown as below and adjacent the feed-duct g of the bar G and connected therewith by capillary passages $g^\times$, while in Fig. 8 the feed-duct m in the bar M is shown as quite deep, with a transverse shallow subchamber m' connected by the capillary passage $m^\times$ with the duct.

In Fig. 9 the feed-bar N has a V-shaped feed-duct n, and the storage chamber n' is similarly shaped, the sides of the latter being parallel and close to the sides of the duct, with which the chamber is connected by minute passages $n^\times$.

By reference to the drawings it will be apparent that in all cases the storage or sub chamber is separated from but closely adjacent to the feed-duct and connected therewith by short capillary passages.

My invention is not restricted to the precise construction and arrangement of feed-bar herein shown and described, nor to the shape, size, or location of the storage or sub chamber, the gist of my invention residing in the provision of the subchamber separated from the feed-duct, but connected therewith by short, minute, or capillary passages to maintain a damp or moist inciting-surface for the initial feed movement of the ink from the reservoir along the duct.

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

1. An ink-feeder for fountain-pens, consisting of a bar having a single longitudinal duct of relatively large cross-sectional area through which the pen supply of ink is fed by gravity, and a longitudinal separated communicating subchamber in the bar, and closed at its outer end, to store ink when the pen is not in use and maintain the feed-duct moist, substantially as described.

2. An ink-feeder for fountain-pens, consisting of a bar having a single longitudinal feed-duct of relatively large cross-sectional area, a separate longitudinal ink-storage chamber, within the bar, its outer end terminating within the bar, and minute connections be-

tween the feed-duct and storage-chamber, to maintain the feed-duct moist when not in use, substantially as described.

3. An ink-feeder for fountain-pens, consisting of a bar having a single longitudinal, gravity feed-duct, of relatively large cross-sectional area, for the pen supply of ink, a separate longitudinal ink-storage subchamber formed in the bar, its outer end terminating within the bar, and a series of capillary passages connecting said storage-chamber and feed-duct, throughout the length of and to maintain the latter moist, to thereby facilitate the initial feed movement of the ink, substantially as described.

4. An ink-feeder for fountain-pens, consisting of a bar having a longitudinal, gravity feed-duct of relatively large cross-sectional area for the pen supply of ink, and a plurality of longitudinal separated ink-storage chambers formed within the bar and connected at intervals with said feed-duct, the outer end of the said chambers terminating within the bar, substantially as and for the purpose set forth.

5. An ink-feeder for fountain-pens, consisting of a bar having a partially-opened, longitudinal duct of relatively large cross-sectional area through which the pen supply of ink is fed by gravity when the pen is in use, a longitudinal storage-chamber in said bar, substantially parallel to the feed-duct and closed at its outer end, and minute connecting-passages between said chamber and feed-duct, whereby the latter is maintained moist when not in use, 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.