A. P. McARTHUR.

FOUNTAIN PEN.

APPLICATION FILED SEPT. 2, 1913.

1,222,555.

Patented Apr. 10, 1917.

Fig. 1.

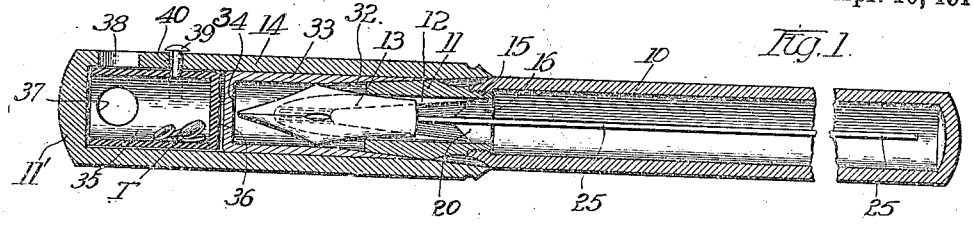


Fig. 3.

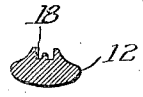


Fig. 2.

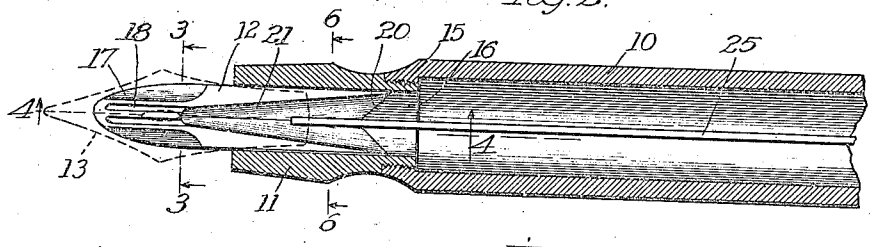


Fig. 4.

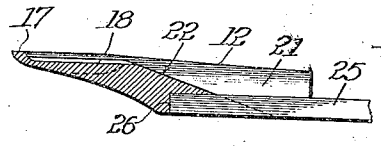


Fig. 6.

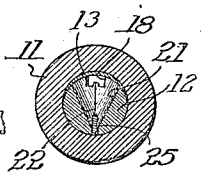


Fig. 5.

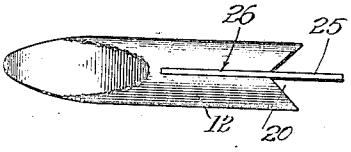
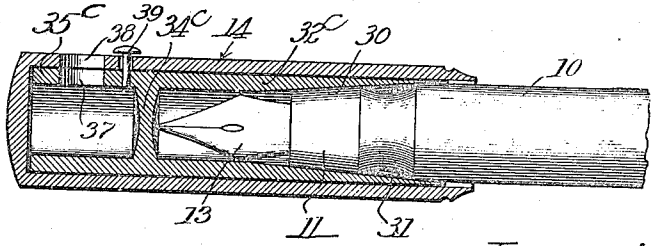


Fig. 7.



Witnesses:
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Arthur McCabe

Inventor:
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Attys

UNITED STATES PATENT OFFICE.

ALEXANDER P. McARTHUR, OF CHICAGO, ILLINOIS.

FOUNTAIN-PEN.

1,222,555. Specification of Letters Patent. Patented Apr. 10, 1917.

Application filed September 2, 1913. Serial No. 787,592.

To all whom it may concern:

Be it known that I, ALEXANDER P. McARTHUR, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fountain-Pens, of which the following is a specification.

My invention relates to fountain pens, and has for one of its objects to provide a pen structure in which the feed bar is made self-draining, to obviate the danger of "sweating."

Another object of my invention is to provide a construction for insuring prompt and certain delivery of the ink to the pen point as soon as the pen is turned to writing position, and also to prevent the ink-tube or reservoir from being bridged by bubbles or an ink-film which will tend to prevent proper flow of the ink.

A further object of my invention is to provide a "safety" pen construction of simple and efficient form.

In the drawings

Figure 1 is a longitudinal cross-section, with parts in elevation, of a pen embodying my invention.

Fig. 2 is a longitudinal cross section through parts of the pen, showing the feed-bar in plan, and the pen point in dotted lines.

Fig. 3 is a cross sectional detail on line 3—3 of Fig. 2.

Fig. 4 is a longitudinal section, on line 4—4 of Fig. 2.

Fig. 5 is a bottom plan view of the feed-bar.

Fig. 6 is a cross section on line 6—6 of Fig. 2.

Fig. 7 is an elevation of the barrel and pen with a modified form of cap shown in section.

In the drawings, 10 is the barrel, 11 the pen-point-section, 12 the feed bar, 13 the pen point, and 14 the cap.

The barrel and point section are shown screwed together at 15, as is usual in "dropper-filled" pens. The feed bar preferably has its rear end located within the length of the feed bar bore 16, in the point-section and it may have its protruding delivery end, or finger 17, shaped in any desired fashion. The top surface of the feed bar is provided at its finger end with the feed channel 18, preferably shaped in cross section as shown in Fig. 3, to provide two or more partially-separated grooves. These features are all broadly old, and may be varied in detail.

Within the length of the feed-bar itself, and within the length of the feed-bar bore 16 of the point section, I provide means for creating a capillary action, when the pen is up-ended to inoperative position, which will promptly and with certainty empty the ink-channel of the feed-bar, and therefore prevent the pen from "sweating" under applied heat. To this end, I provide in the butt end of the feed bar, at its outer surface where it contacts with the wall of the feed-bar-bore 16, and diametrically opposite to the feed channel 18 a recess or cut having draining connection with the feed-channel 18, and so shaped that when the pen is up-ended the capillary action at such juncture of the recess and the point-section bore will drain the ink out of the feed bar. Specifically 20 is a V-shaped recess appearing in the cylindrical face of the feed-bar, widening toward the butt end so that the apex of the recess lies well within the length of the feed-bar, and 21 is a draining channel or groove extending from said recess, on an appropriate slope, into draining communication with the feed-channel 18. This construction I provide by grooving the V-shaped drain passage diagonally upward on a gradual slope, so that, viewed in plan (Fig. 2) it tapers from approximately the full width of the feed bar at the rear end of the latter to about the width of the channel at its point of communication with the latter, and so that the bottom 22 of the V-shaped drain channel extends from a point of juncture with the peripheral face of the feed bar between the ends of the latter, across the axis of the bar to its intersection with the groove 18, said cut preferably approximately paralleling the under-surface of the protruding finger of the feed bar. (See Fig. 4.) Such construction I find to be very efficacious for all purposes of the invention, and to preserve the strength of the feed-bar adequately to give proper support and retention to the pen-point. Also it is my preference, as shown in Fig. 2, that the forward extremity of the drain channel 21 shall extend forward almost to the pen-eye, or to the root of the pen-nibs, although variations in this particular may be made according to the construction of the pen points.

I preferably provide in the pen a feed-and-drain ribbon 25. This I preferably make of celluloid and mount in a longitudinal slot 26 in the feed-bar so that its edge coincides with the cylindrical surface of the feed bar, and bisects the angle of the recess 20, and so that, viewed in section (Fig. 6) it bisects the angle of groove 21, said ribbon preferably extending from about the middle of the length of the feed-bar almost to the end of the barrel 10. I find that a strip of celluloid about $\frac{1}{32}$ by $\frac{1}{16}$ inch in cross section well serves the purposes of the invention.

The construction described I find to work great improvement in the operation of the fountain pen. When the pen is up-ended so that the major portion of the ink flows back into the bottom of the barrel there is a tendency for the body of ink which in writing occupies the feed-bar-channel to remain pocketed in said channel, and under the influence of heat,—as when the pen is placed in the pocket and receives the warmth of the body,—and the consequent expansion of the air in the barrel said ink is forced out over the pen-point, fouling the point-section in a fashion familiar to all fountain-pen users. With my construction, however, this difficulty is overcome most effectively. The wide drain-channel 21 makes the feed channel 18 rather short, to begin with, and affords ready escape for such part of the ink as may flow away by gravity, promptly clearing the feed bar of a major part of its contained ink, and at the juncture of the channel and the recess 20 capillary action is set up to conduct ink from the drain channel onto the wall of the feed-bar-bore, whence it may escape into the barrel, the open drain from such point to the channel 18 insuring that all ink in said feed channel will be vented through this passage and the channel 21 itself cleared leaving the feed bar dry and entirely free from ink in a short space of time, and of course preventing the gradual filling of the feed bar channel with the solid component of the ink, as is apt ultimately to occur if the channel, 18, is left ink-filled after each use of the pen. The V-shaped construction of such drain-recess 20 and channel 21 I find to be especially efficacious, but it may be varied in structural detail. The action above referred to is furthered by the provision of the conducting-strip 25, which subdivides the angle of the drain-recess at said point where capillary action takes effect, and which affords additional conducting surface down both sides of the strip from said point to the ink-body within the barrel. When the pen is turned to writing position this conducting strip directs the ink instantly into the broad channel 21, which is preferably open almost to the root of the pen-nibs, both sides of the strip 25 delivering ink into the channel 21, so that although the pen-point and feed channel 18 are perfectly dry after a short period of dis-use of the pen, ink flow begins instantly when the pen is again used. Also, it will be observed, the conducting strip 25, which extends preferably eccentrically with respect to the barrel practically the whole barrel-length, tends effectively to prevent the formation of bubbles or films of ink across the barrel, either in filling or in use, and insures ready ink-flow until the barrel is completely exhausted.

I preferably construct the pen cap and point-section for safety fit, so that the pen may be carried in any position without fouling the portion of the point-section with which the fingers contact in writing. Preferably also, I make the air-tight cap-chamber in which the point fits of small size, to reduce its air-capacity, and I employ the outer end of the cap for the provision of a receptacle wherein ink tablets may conveniently be carried.

To these ends the exterior of the point-section 11 is tapered as shown at 30 for frictional wedge connection with a similarly tapered surface interiorly provided by the cap-structure, such tapered area 30 being preferably relatively short, and the point-section beyond said taper being preferably grooved as at 31 for clearance.

32 indicates the tapered wall of the cap, for wedge coöperation with the point section. This may be provided on the integral wall of the cap, or on a sleeve 33 fitted within the cylindrical bore of the cap section (Fig. 1). As shown in Fig. 1, I prefer that the sleeve 33 shall make a tight fit in the bore of the cap, and that it shall provide a transverse head-wall 34 in position just beyond the end of the pen-proper, all of the walls of this shell being imperforate. The cap 11, in this construction, has an end wall 11′ and in the interspace between walls 18 and 34 I arrange a thimble 35, preferably having a bottom closure 36, adjacent to but spaced apart from the wall 34, said thimble being rotatable within the cap so that by its rotation two orifices, 37 and 38 in the thimble and cap respectively may be brought into or out of register. A pin 39, taking through a slot 40 in the cap-wall and fastened in the thimble affords means whereby the thimble is supported in its position in the cap and may be moved from the exterior of the cap. The compartment in the cap, thus provided in what otherwise would be waste space, may be used for the storage of water-soluble ink tablets T of suitable size to be dropped into the pen-barrel and adapted when immersed in water, with which the barrel may preliminarily be filled, each to provide one filling of writing fluid. The shortening of the pen-receiv-

ing compartment of the cap, which makes air tight fit with the point-section, effectively minimizes the air space around the pen-point and contributes to the "safety" feature of the pen. Fig. 7 shows a construction in which the tapered sleeve 32c, cross wall 34c and thimble 35c are made integral and the whole structure, connected with the cap by a pin and slot connection as above described, is rotatable within the cap.

While I have herein shown and suggested modifications of structure embodying my invention, it is not my intention to limit my invention to the particular details or modifications shown, further than as specified in the claims, and it will be apparent to those skilled in the art that changes may be made in the specific structure without departure from the spirit of my invention and within the scope of the appended claims.

What I claim is:—

1. In a fountain pen, the combination with the barrel and feed bar, said feed bar having therein a feed channel and a drain channel leading from said feed channel to the side of the feed bar and terminating at the side of the feed bar in a recess leading to the butt end of the bar, of a conducting ribbon connected with and carried by the feed bar and leading from said recess at the side of the feed-bar into the barrel.

2. In a fountain pen, the combination of a barrel having a feed-bar-bore, a feed bar within the bore, said feed bar having therein a feed channel in its upper side for underlying a pen point and a drain channel formed in said feed bar and leading from the feed channel to the ink reservoir, the opposite walls of said drain channel being substantially flat and lying in downwardly converging inclined planes, the bottom boundary of said drain channel extending in a non-angular unbroken line from the bottom of the feed channel to the opposite wall of the feed bar bore, affording a surface for the presence of a continuous film by which the residual ink in the feed bar channel will be led away and the said feed bar channel left empty when the pen is inverted to non-use condition.

3. In a fountain pen, the combination with the pen point, of the barrel having a feed-bar-bore, a feed-bar within the bore, said feed-bar having therein a feed channel in one side terminating at its rear end in advance of the rear end of the pen point and a drain channel leading from the rear end of the feed channel to the wall of the bore at the opposite side of the feed bar, the walls of the drain channel being substantially flat and lying in planes inclined to each other with the line of intersection extending from the rear end of the feed channel to a point near the rear end of the feed bar and at the side opposite to the feed channel, and a conducting ribbon connected with and carried by the feed bar with its forward portion lying within the drain channel and contacting with the intersecting walls thereof at the line of intersection.

4. In a fountain pen, the combination of a barrel having a feed-bar-bore, a feed bar within the bore, said feed bar having therein a feed channel in its upper side underlying a pen point and a drain channel formed in said feed bar and leading from the feed channel to the ink reservoir, the bottom boundary of said drain channel extending in a non-angular unbroken line from the bottom of the feed channel to the opposite wall of the feed-bar-bore, affording a surface for the presence of a continuous film by which the residual ink in the feed bar channel will be led away and the said feed bar channel left empty under non-use conditions.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

ALEXANDER P. McARTHUR.

In the presence of—

FORÉE BAIN,

MARY F. ALLEN.