Sept. 6, 1938. W. F. JOHNSON 2,129,134

FOUNTAIN PEN

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FIG. 1.

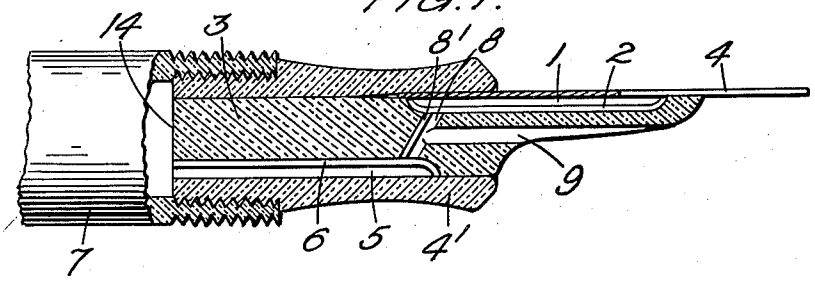

FIG. 2.

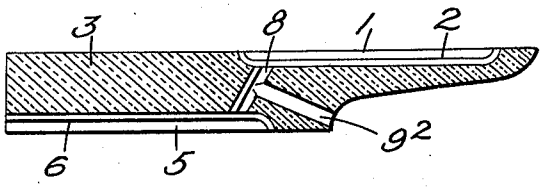

FIG. 3.

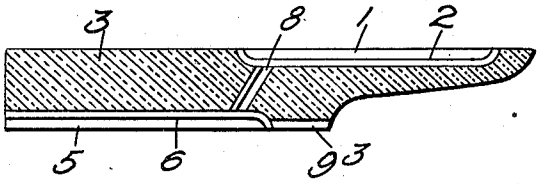

FIG. 4.

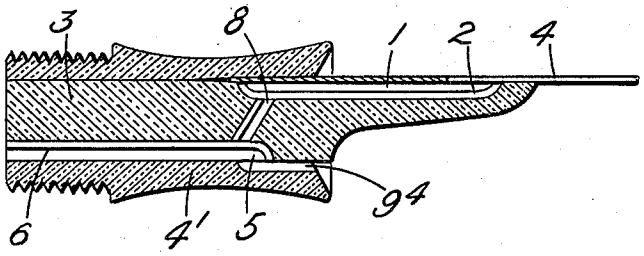

FIG. 5.

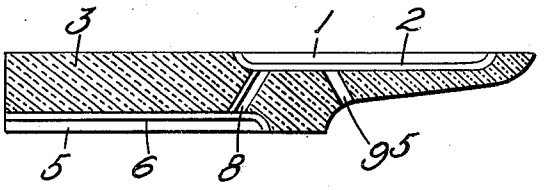

FIG. 9.

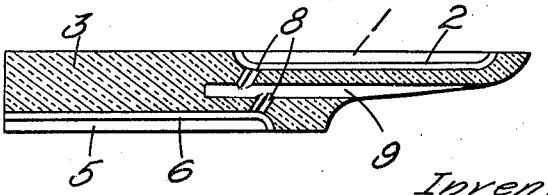

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FIG. 6.

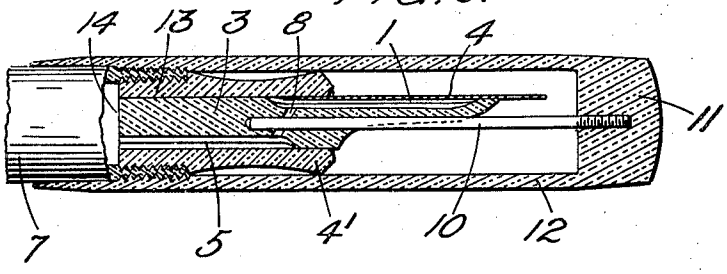
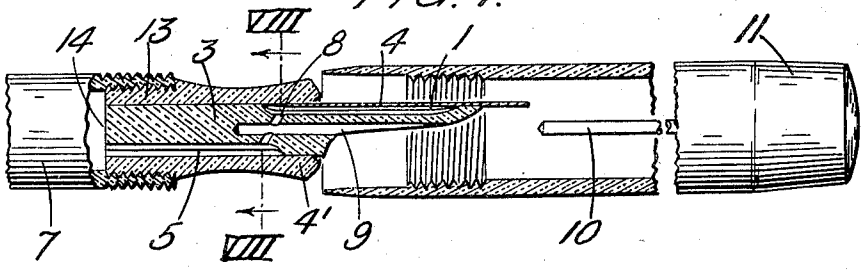


FIG. 7.



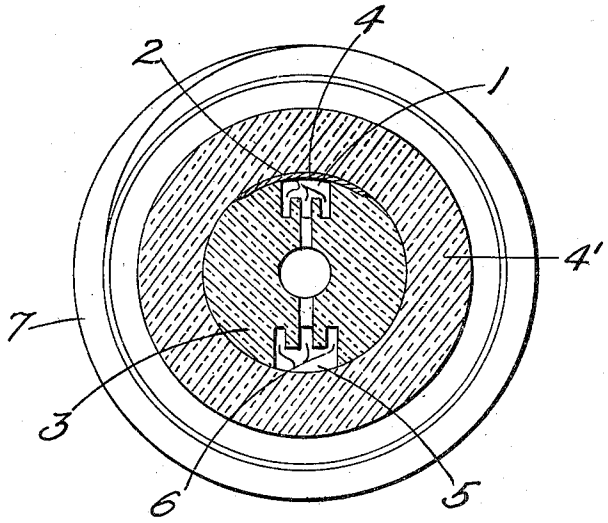


FIG. 8.

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UNITED STATES PATENT OFFICE

2,129,134

FOUNTAIN PEN

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Application July 17, 1937, Serial No. 154,287
In Great Britain July 21, 1936

10 Claims. (Cl. 120—50)

This invention concerns improvements in or relating to fountain pens and has for its general object to prevent or reduce certain irregularities in regard to ink-flow in such pens. One specific object of the invention is to obviate so-called "flooding", that is an undesirably full flow of ink from the ink-container to the nib of the pen when the same is in use. Such full flow is commonly experienced when the reserve of ink in the container is depleted. A further specific object is to obviate undesirable flow of ink from the container to the nib when the cap is in position on the barrel, so that the pen can be carried in any position without leaking and the end of the barrel or nib-section is prevented from becoming damp.

The usual type of feed-section or feed-bar in a fountain pen is circulated at the end which is placed, together with the nib, in the nib-section or open end of the barrel and is cut away at the other end on the side remote from the nib, that is the underside. The nib is held firmly between the bar and the nib-section. Normally in such a feed-bar, an ink-feed channel extends along the surface beneath the nib from the inner end of the bar to within a short distance of its outer end, the said channel having fine grooves in its bottom which constitute capillaries through which the ink flows to the nib.

According to the present invention in a fountain pen, a duct formed in the feed-section or feed-bar or an adjacent portion of the nib-section or barrel communicates at one end with the atmosphere and at the other end with an ink-feed channel communicating with the ink container and leading to the nib.

The whole of the length of the ink-feed channel or sections thereof may be formed with capillary grooves. This arrangement has the effect of substantially overcoming the first-named irregularity referred to above, namely "flooding", even in pens of the type in which the barrel itself forms the ink-container or a part thereof.

According to a further feature of the invention, the feed-bar is formed with a feed-channel section extending beneath the nib but not to the inner end of the bar, a feed-channel section extending outwards from the inner end of the bar but not to the outer end thereof, and an intermediate cross-channel section or duct communicating between the first-named channel section and the second-named channel section and adapted for being closed or cut-off by an obturating device, such as a pin, when the cap is placed on the pen. With this arrangement, the second irregularity referred to above, viz. leakage when the pen is out of use, can also be prevented.

Various embodiments of the invention by way of example will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal section of part of one form of pen,

Figs. 2–5 are detail views of various modified forms of feed-bar,

Fig. 6 is a view similar to Fig. 1, showing a further feature of the invention,

Fig. 7 a view similar to Fig. 6 showing the cap of the pen unscrewed,

Fig. 8 a cross-section on the line VIII—VIII in Fig. 7 to a larger scale, and

Fig. 9 a detail view of another form of feed-bar.

In all of the illustrated embodiments of the invention, a feed-channel 1 with capillary grooves 2 in its bottom extends longitudinally of the feed-bar 3 below the undersurface of the nib 4 to a level just within the nib-section 4' and beyond the level at which the feed-bar is cut-away on its diametrically opposite side. In the latter side, a second rather wider feed-channel 5 with capillary grooves 6 extends longitudinally from the inner end of the feed-bar, where it communicates with the ink-container formed by the barrel 7, to approximately the level at which the channel 1 terminates. These two channels are connected at or near their adjacent ends by an intermediate sloping duct 8 penetrating the centre of the feed-bar. The duct 8 may be a relatively fine capillary duct of circular bore or may also have capillary grooves 8' thoughout its length, preferably over half only of its circumference. Instead of grooves parallel to the duct, a fine helical groove may be provided.

In Fig. 1 and also in Figs. 6–8, a round axial bore 9 wider than the duct 8 is formed centrally in the feed-bar 3 and extends from the outer end of the latter, where it may commence as a part-circular groove in the inner face of the cut-away portion of the said bar, to a level at or somewhat beyond its intersection with the duct 8.

The bore 9, instead of being axial, may be parallel to the axis of the feed-bar or may be inclined or disposed at right-angles to the duct 8, as in Fig. 2. In all these cases, the bore 9 forms a vent extending in the feed-bar from the wall of the duct 8 to the cut-away end-face of the feed-bar.

Alternatively, as illustrated in Fig. 3, the vent may be formed by a groove 9^3 in the lower surface of the feed-bar 3 and may then constitute

an extension of the feed-channel **5** but without the grooves **6**. Similarly, as illustrated in Fig. 4, the vent may be formed by a groove 9^4 in the inner face of the nib-section **4'**. As shown, the duct 9^4 is straight and overlaps the channel **5**, but it might be formed as a helical groove extending between the end of the nib-section and the said channel **5**. According to a further alternative illustrated in Fig. 5, a duct 9^5 is formed obliquely in the end of the feed-bar **3** between its cut-away end-face and the channel **1**.

It is found that fountain pens incorporating a feed-bar constructed and arranged in the manner described are free from the defect of flooding. The explanation is thought to be that air in the ink-container can readily escape from the feed-channels through the vent, when the pen is warmed by the hand, without increasing the quantity of ink supplied by the action of the capillary grooves.

In the pen illustrated in Figs. 6–8, a pin **10** of such size as just to enter the axial bore **9** and to extend down the same beyond the intersection with the duct **8** is mounted in a central axial position on the inside of the end **11** of the cap **12**. The pin **10** is preferably of non-corrodible material, for example stainless steel. When the cap **12** is screwed or, it may be, pressed upon the pen, the pin **10** passes down the bore **9** and obturates the sloping duct **8** in the feed-bar **3**. It thus positively cuts off the feed-channel **1** beneath the nib **4** from the other feed-channel **5** and from the ink-container **7**, so that no leakage can take place. As will be seen, the slope of the connecting duct **8** is towards the nib and upwardly, assuming the nib to be uppermost. Consequently any ink displaced by the entry of the pin will tend to be forced back into the ink-container rather than towards the nib.

The feed-bar illustrated in Fig. 9 differs from the feed-bar of Figs. 6–8 in that the parts of the duct **8** on each side of the duct **9** are out of alignment, the part communicating with the feed-channel **5** being set slightly lower than the part communicating with the feed-channel **1**. This arrangement is very effective in ensuring a regular moderate ink-flow and prevents any danger of ink flowing from the pen should the latter be left with the nib downwardly and with the cap off.

Whilst the invention is illustrated in its application to a pen in which the barrel serves as the ink-container it can also be applied to pens with sac-containers, for instance lever-pens. Any desired form of nib-section may then be adopted. For instance, a reduced inner end-part of the nib-section **13** over which the sac is secured may extend beyond the end **14** of the feed-bar **3**. The length of the latter may be varied to suit the type of pen.

Various further modifications may be made without departing from the invention. For instance, the feed-channel **5** communicating with the ink-container may be replaced by a duct extending through the interior of the feed-bar **3**, for example centrally. The pin **10** and central bore **9** may both be made to taper, so as to provide a large seating surface and more positive sealing.

What I claim is:

1. Fountain pen comprising in combination with an ink-container and a nib, ink-feeding means formed with an ink-feed channel which consists of a section communicating with the ink-container but not leading directly to the nib, a section leading to the nib but not communicating with the ink-container and an intermediate transverse section communicating between the two said sections, and an air duct communicating at one end with the atmosphere and at the other end with the ink-feed channel but not extending into the ink-container.

2. Fountain pen comprising ink-feeding means formed with an ink-feed channel which consists of a capillary section communicating with the ink-container of the pen but not leading to the nib thereof, a capillary section leading to the nib but not communicating with the ink-container and an intermediate transverse section connecting the two said sections, and an air duct communicating between a point in the said transverse section and the atmosphere.

3. Fountain pen comprising ink-feeding means formed with an ink-feed channel which consists of a section communicating with the ink-container of the pen but not leading to the nib thereof, a section leading to the nib but not communicating with the ink-container and an intermediate transverse section connecting the two said sections and sloping from the first to the second section towards the point of the nib, and an air duct communicating between a point in the ink-feed channel and the atmosphere.

4. Fountain pen comprising ink-feeding means formed with an ink-feed channel which consists of a section communicating with the ink-container of the pen but not leading to the nib thereof, a section leading to the nib but not communicating with the ink-container and an intermediate transverse section connecting the two said sections, and an air duct communicating between an intermediate point in the transverse section and the atmosphere, the parts of the said transverse section on each side of the said point being out of alignment with each other and the part communicating with the first named section opening into the air duct at a lower level than does the part communicating with the second-named section.

5. Fountain pen comprising ink-feeding means formed with an ink-feed channel which consists of a section communicating with the ink-container of the pen but not leading to the nib thereof, a section leading to the nib but not communicating with the ink-container and an intermediate transverse section connecting the two said sections, and obturating means adapted for cutting off the ink-feed by closing the transverse section of the ink feed channel.

6. Fountain pen according to claim 5, wherein the obturating means comprises a pin carried upon the cap of the pen and adapted for closing the transverse section of the ink-feed channel when the cap is placed on the pen.

7. Fountain pen comprising ink-feeding means formed with an ink-feed channel which consists of a section communicating with the ink-container of the pen but not leading to the nib thereof, a section leading to the nib but not communicating with the ink-container and an intermediate transverse section connecting the two said sections, a round axial bore formed centrally in the feed means and extending from the outer end thereof to the transverse section, and a pin mounted centrally in the cap of the pen and adapted for projecting down the axial bore to close the said transverse section when the said cap is placed on the pen.

8. Fountain pen comprising in combination with an ink-container and nib, a feed bar, a cap-

illary channel-section extending on one side of the said bar from the ink-container to an intermediate point in the length of the bar, a capillary channel-section extending on the opposite side of the said bar from an intermediate point in its length to the nib, a capillary channel-section extending transversely through the said bar from the first to the second channel section, and an axial bore extending from the outer end of the feed bar to intersect the transverse channel-section.

9. Fountain pen comprising in combination with an ink-container and nib, a feed bar, a capillary channel-section extending on one side of the said bar from the ink-container to an intermediate point in the length of the bar, a capillary channel-section extending on the opposite side of the said bar from an intermediate point in its length to the nib, a capillary channel-section extending transversely through the said bar from the first to the second channel section, and an axial bore extending from the outer end of the feed bar to intersect the transverse channel-section the part of the transverse channel-section on the side of the axial bore remote from the nib opening into the said bore at a point nearer to the outer end of the feed bar than does the part of the said channel-section on the side of the axial bore nearer to the nib.

10. Fountain pen comprising in combination with an ink-container and nib, a feed bar, a capillary channel section extending on one side of the said bar from the ink-container to an intermediate point in the length of the bar, a capillary channel-section extending on the opposite side of the said bar from an intermediate point in its length to the nib, a capillary channel-section extending transversely through the said bar from the first to the second channel section, and an axial bore extending from the outer end of the feed bar to intersect the transverse channel section, the transverse channel section sloping from the first to the second channel-section towards the outer end of the feed bar.

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