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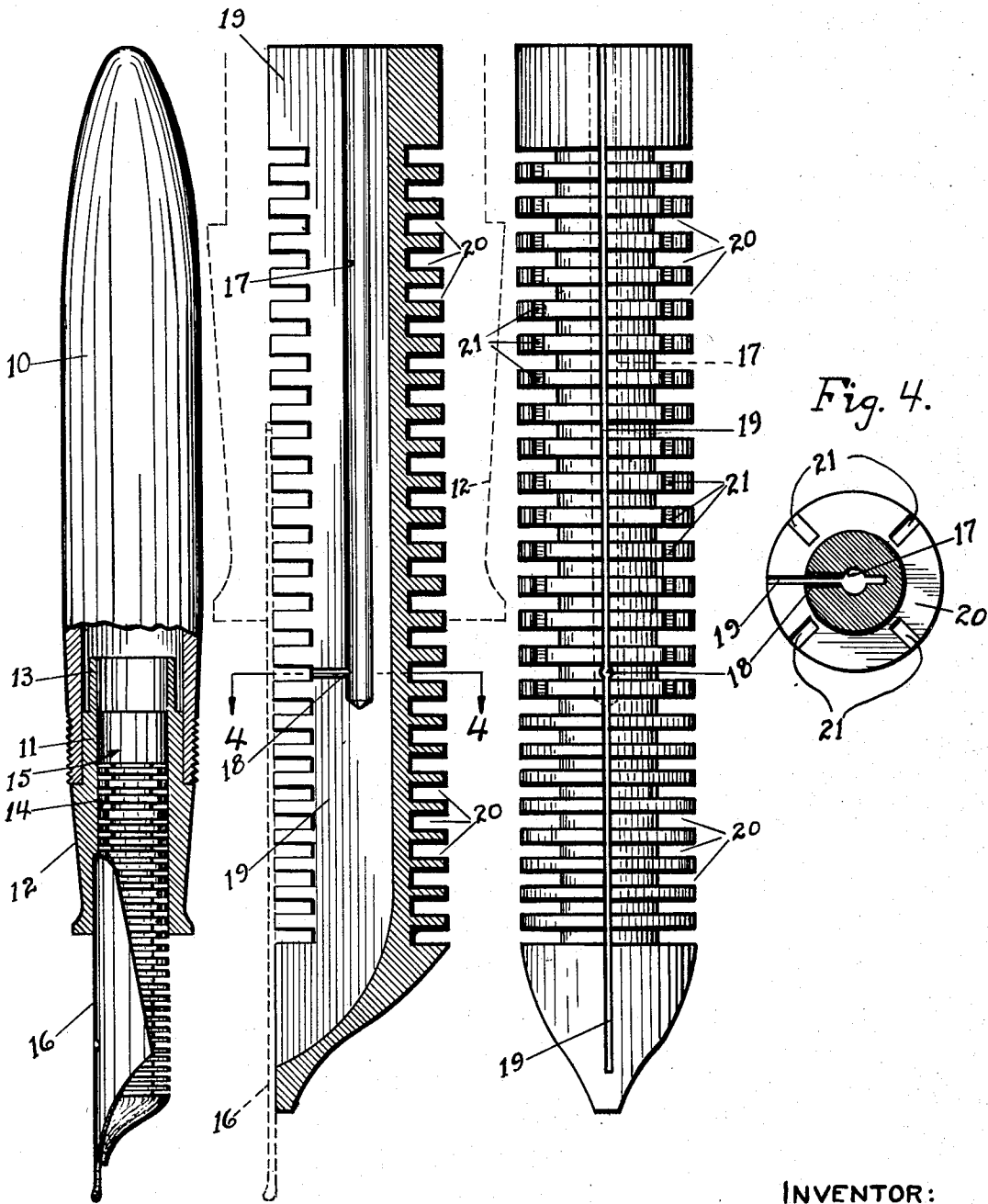
FOUNTAIN PEN

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Fig. 1.

Fig. 2.

Fig. 3.



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FOUNTAIN PEN

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15 Claims. (Cl. 120—50)

This invention relates to a fountain pen and has special reference to the feeding mechanism of a fountain pen for directing writing fluid from the reservoir to the pen nib and therefrom to a writing surface.

More particularly, this invention relates to a fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel. An internal duct extends longitudinally of the feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of the feed bar preferably outside the end of the barrel, being in communication with the internal duct. A longitudinally extending fissure of capillary dimensions extends in the feed bar from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, the fissure extending from the nib supporting surface transversely through and below the internal duct.

Of recent years, it has been the tendency of fountain pen manufacturers to increase the fluid capacity of fountain pens. In the normal operation of a fountain pen, writing fluid is fed from a reservoir to the nib and therefrom onto a writing surface, air being directed into the reservoir to take the place of the writing fluid drawn therefrom. The air in the fluid reservoir is affected by temperature and pressure changes, and the greater the amount of air in the reservoir and the lesser amount of writing fluid therein, the more difficult it is to control a normal supply of writing fluid to the writing surface. For example, heat from the hand when the fountain pen is held in writing position tends to expand the air behind the fluid. A larger capacity pen, or course, has a larger amount of air to expand under comparable conditions.

The larger fluid chamber, holding a comparatively greater amount of air when partially filled, tends to supply a greater amount of writing fluid to the writing surface than is necessary for ordinary writing, causing what is called a "flooding" of the pen, if the feeding mechanism is not capable of diverting a comparatively greater excess of fluid from the writing point. Such expansion, for example, accompanies a change of temperature conditions such as is attendant in holding the pen in writing position after the fountain pen has been maintained at a substantially lower temperature, and accompanies a

change of atmospheric pressure, as when a fountain pen is carried by a passenger in an airplane. The present invention contemplates the elimination of flooding or leaking of the fountain pen by being capable of diverting fluid in excess of that necessary for normal writing into storage chambers, the amount of storage space being sufficient to accommodate more than a normal expectant change in temperature and pressure conditions.

One of the objects of the present invention is to provide a fountain pen having a feeding mechanism capable of diverting a maximum amount of fluid not necessary for normal writing to storage chambers to eliminate flooding or leaking of the fountain pen.

Another object of this invention is to provide a fountain pen having a feeding mechanism which is simple and efficient in operation, is comparatively inexpensive to manufacture, and is durable.

Other objects and advantages will hereinafter be more particularly pointed out, and for a more complete understanding of the characteristic features of this invention, reference may now be had to the following description when taken together with the accompanying drawing, in which latter:

Figure 1 is a longitudinal elevational view partially in section of a fountain pen incorporating the features of this invention;

Fig. 2 is an enlarged central vertical sectional view of the feeding mechanism shown in Figure 1, the end of the barrel of the fountain pen and the fountain pen nib being shown in dotted lines;

Fig. 3 is a plain elevation view of Fig. 2; and Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

Referring now more particularly to the drawing, the fountain pen incorporating the features of the present invention comprises a barrel 10 having a reduced extension 11 of a feed section 12 frictionally engaging the bore of the barrel at one end thereof, a second reduced extension 13 of the feed section being adapted to support a flexible sac for forming a reservoir for writing fluid. In a sacless type fountain pen, the barrel thereof acts as the reservoir for the writing fluid.

The feed section 12 is provided with an axial bore 14 for receiving the shank portion 15 of a feed bar, the feed bar extending beyond the end of the pen section 12 to provide a nib supporting portion on which the nib 16 is mounted, the nib extending into the bore of the feed section 12. While the feed bar is shown as being

received in the bore of the pen section 12, the section is, in effect, merely an extension of the barrel 10 and for purposes of this application, the feed bar will hereinafter be referred to as being mounted within the end of the bore of the barrel, the pen section being provided for convenience in manufacture.

Referring now more particularly to Figs. 2, 3, and 4 of the drawing, the feed bar is provided with an internal duct 17 which extends longitudinally thereof from the reservoir end to a point intermediate the ends thereof. A vent opening 18 extends transversely of the feed bar and preferably outside the end of the barrel or pen section 12, the vent opening communicating with the internal duct 17. A longitudinally extending fissure 19 extends from the reservoir end of the feed bar to a point adjacent the other end thereof, for supplying writing fluid from the reservoir to the nib 16. The fissure 19 is of capillary dimensions and extends from the nib supporting surface of the feed bar transversely through and below the internal duct 17.

A plurality of comb cuts 20 extend transversely on the periphery of the feed bar and communicate with the fissure 19. In the instance of the structure shown in the drawing, the comb cuts extend entirely about the circumference of the feed bar, although, of course, it is to be understood that it may be desirable in instances of use for the comb cuts to extend but partially about the circumference of the feed bar on each side of the fissure 19. The comb cuts are preferably of greater width than the width of the fissure and extend over a major portion of the length of the feed bar. As a matter of fact, it has been found desirable to extend the comb cuts outwardly from a point within the bore at the end of the barrel.

A plurality of cuts 21 extend longitudinally over the periphery of the feed bar for connecting a major portion of the comb cuts and particularly those comb cuts within the bore of the end of the barrel. The longitudinal cuts preferably connect all of the comb cuts within the bore of the end of the barrel and extend outside the end to the atmosphere. In the drawing, four such longitudinal cuts have been shown, the longitudinal cuts being greater in width than the width of the comb cuts and being of lesser depth than the depth of the comb cuts.

In the normal writing action of a fountain pen employing a feed bar now in popular use, when diverting excess fluid not necessary for normal writing operation the fluid was conducted from the reservoir through an internal duct to the fissure on the nib supporting periphery near the writing point and, the excess fluid being directed into comb cuts at the writing point end first and then progressively upwardly in the direction of the comb cut nearest the reservoir end of the feed bar. It has been found that the height to which fluid could be raised and released to comb cuts in this manner was materially limited and the capacity of the comb cuts within such height was insufficient for such abnormal conditions as should be accommodated.

The present invention determines that the height to which fluid may be maintained in the fissure and comb cuts of a feed bar when in writing position is greater than the height to which fluid can be raised and released by such a fissure into its communicating comb cuts. Comb cuts are disposed internally of the end of the bore of the fountain pen and permit the storing of fluid

in excess of that needed for writing in a greater amount than has been done previously, the fissure on the feed being connected with the fluid reservoir and communicating with comb cuts within the end of the bore of the barrel. The comb cuts nearest the reservoir are filled by fluid as the fluid is drawn by capillary attraction along the fissure in the direction of the writing point and, at the same time, the comb cuts nearest the writing point end of the feed bar fill in a direction upwardly therefrom. In writing position, therefore, the comb cuts fill progressively inwardly from the ends thereof.

It has been found difficult to conduct writing fluid into and out of comb cuts on the periphery of the feed bar within the bore of the end of the barrel. Such difficulty has been overcome in the provision of the four longitudinally extending cuts 21 which are spaced equi-distantly from each other and connect the comb cuts inside the bore of the barrel, the longitudinal cuts extending outside the bore of the barrel for communication with the atmosphere. By reason of the longitudinally extending cuts being made slightly less in depth than the comb cuts and slightly greater in width, the film strength of the fluid is weakened so that they are emptied by the cohesion of the fluid in them with the fluid in the long connecting fissure 19 on the top of the feed prior to the emptying of the comb cuts. Also, the longitudinal cuts, by reason of their dimensions, are the last to fill with excess fluid so that all of the air previously contained in the comb cuts within the bore of the end of the barrel is forced thereout prior to the time that the longitudinal cuts begin to fill.

The provision of longitudinally extending cuts and the provision of transversely extending comb cuts within the bore of the end of the barrel increases the capacity of the feed bar for diverting excess writing fluid from the nib. However, to further increase this capacity, the depth of the comb cuts is increased without weakening the structure of the feed bar. The central drilling 17 is provided with the fissure 19 passing from the periphery of the feed bar through and below the central drilling or so-called internal duct, 17. The weakest fluid film is thus formed between the fissure and the central drilling or internal duct 17 somewhere between the lower end of the drilling and the reservoir end thereof, and in order to make all the fluid contract back into the fluid chamber, it has been found desirable to have this weakest fluid film formed near the front end of the center drilling. The vent opening 18 was provided near the forward end of the internal duct 17 to connect the internal duct with the atmosphere and to locate the point of weakest film formation thereat. Thus, contraction from the front or writing point end is accomplished in a desirable manner and fluid which is in the comb cuts and longitudinal cuts within the bore of the end of the barrel is drawn by capillary attraction out of the upper or back end of the fissure 19 where the fluid film is stronger than the film in the air vent, the air vent making the fissure purposely weak at the forward end of the internal duct 17. Fluid will be contracted back through the fissure at a point nearest the reservoir since the fluid film at that point will not break before the film at the air vent and the latter film will not break until the comb cuts adjacent the writing point end have emptied. Thus it is assured that an expansion chamber free of liquid is formed capable of diverting excess fluid to its

full capacity, should expansion occur after contraction.

In normal writing, when the expansion chambers—that is, the transverse comb cuts and the longitudinal cuts—are full, the comb cuts closest to the reservoir empty first. When the expansion chambers are empty, fluid leaves the fissure 19 at the writing point end and fluid taking the place of that leaving the fissure at the writing point end is directed from the reservoir in the bottom of the fissure 19 below the internal duct 17 in an unbroken condition and builds up in a direction from the writing point end toward the reservoir to control the air vent 18.

When contraction takes place due to cooling of the air in the reservoir or to a change in atmospheric pressure, if the expansion chambers are full and the pen is carried with the point directed upwardly, the comb cuts immediately adjacent the writing point end of the feed bar are relieved of fluid first and thereafter the comb cuts are relieved progressively toward the reservoir. Of course, if the expansion chambers are empty, such contraction will merely result in the intake of air. When a change in temperature or atmospheric pressure is had, resulting in expansion, if the expansion chambers are empty and the fountain pen is held in a normal writing position, the comb cuts are filled with writing fluid in excess of that needed for normal writing through the fissure above the central drilling to comb cuts nearest the reservoir and at the same time through fissure 19 below the internal duct 17 to the comb cuts farthest from the reservoir. This has been found to be normal, although this condition varies with a variance in the length of the feed bar and the rate of expansion.

While but a single embodiment of this invention is herein shown described, it is to be understood that various modifications thereof may be apparent to those skilled in the art without departing from the spirit and scope of this invention, and, therefore, the same is only to be limited by the scope of the prior art and the appended claims.

I claim:

1. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, and a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct.

2. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, and a

longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said air vent being greater in diameter than the width of said fissure and said fissure extending from said nib supporting surface transversely through and below said internal duct.

3. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, and comb cuts extending transversely on the periphery of said feed bar in communication with said fissure.

4. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, and comb cuts extending transversely on the periphery of said feed bar in communication with said fissure, said comb cuts being of greater width than the width of said fissure.

5. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, and comb cuts extending transversely from within the bore of the barrel outwardly over a major portion of the periphery of said feed bar in communication with said fissure.

6. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending

longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely from within the bore of the barrel outwardly over a major portion of the periphery of said feed bar in communication with said fissure, and a plurality of cuts extending longitudinally over the periphery of said feed bar connecting said comb cuts.

7. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely from within the bore of the barrel outwardly over the periphery of said feed bar, said comb cuts being in communication with said fissure and being of a greater width than the width thereof, and a plurality of cuts extending longitudinally over the periphery of said feed bar connecting said comb cuts, said longitudinally extending cuts being of greater width than the width of said comb cuts.

8. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely over a portion of the periphery of said feed bar, said comb cuts being in communication with said fissure and being of a greater width than the width thereof, and a plurality of cuts extending longitudinally over the periphery of said feed bar connecting said comb cuts, said longitudinally extending cuts being of greater width and of less depth than the width and depth of said comb cuts.

9. A fountain pen including a feed bar having a shank portion adapted to be mounted within

the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely over at least a portion of the periphery of said feed bar within the end of the bore of the barrel, said comb cuts being in communication with said fissure and being of greater width than the width thereof, and a plurality of cuts extending longitudinally over the periphery of said feed bar for connecting said comb cuts, said cuts extending outside the end of said barrel for communication with the atmosphere.

10. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar outside the end of the barrel and communicating with said internal duct, and a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely over a portion of the periphery of said feed bar within the bore of the end of the barrel and outside thereof, said comb cuts being in communication with said fissure and being of greater width than the width thereof, and a plurality of cuts extending longitudinally over the periphery of said feed bar for connecting said comb cuts within the bore of the end of the barrel, said cuts extending outside the end of the barrel for communication with the atmosphere.

11. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, and a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct.

12. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end

thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, and comb cuts extending transversely from within the bore of the barrel outwardly over a major portion of the periphery of said feed bar in communication with said fissure.

13. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said fissure extending from said nib supporting surface transversely through and below said internal duct, comb cuts extending transversely from within the bore of the barrel outwardly over a major portion of the periphery of said feed bar in communication with said fissure, and a plurality of cuts extending longitudinally over the periphery of said feed bar connecting said comb cuts.

14. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending

longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, comb cuts extending transversely over a portion of the periphery of said feed bar within the bore of the end of the barrel and outside thereof, said comb cuts being in communication with said fissure and being of greater width than the width thereof, and a plurality of cuts extending longitudinally over the periphery of said feed bar for connecting said comb cuts within the bore of the end of the barrel, said cuts extending outside the end of the barrel for communication with the atmosphere.

15. A fountain pen including a feed bar having a shank portion adapted to be mounted within the end of the bore of the barrel thereof and a nib supporting portion extending beyond the end of the barrel, an internal duct extending longitudinally of said feed bar from one end thereof in communication with a writing fluid reservoir in the barrel to a point intermediate the ends thereof, a vent opening extending transversely of said feed bar and communicating with said internal duct, and a longitudinally extending fissure of capillary dimensions in said feed bar extending from the reservoir end thereof to a point adjacent the other end thereof for supplying writing fluid to the nib, said air vent being greater in diameter than the width of said fissure and said fissure extending from said nib supporting surface transversely through and below said internal duct.

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