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INK FEED DEVICE FOR FOUNTAIN PENS

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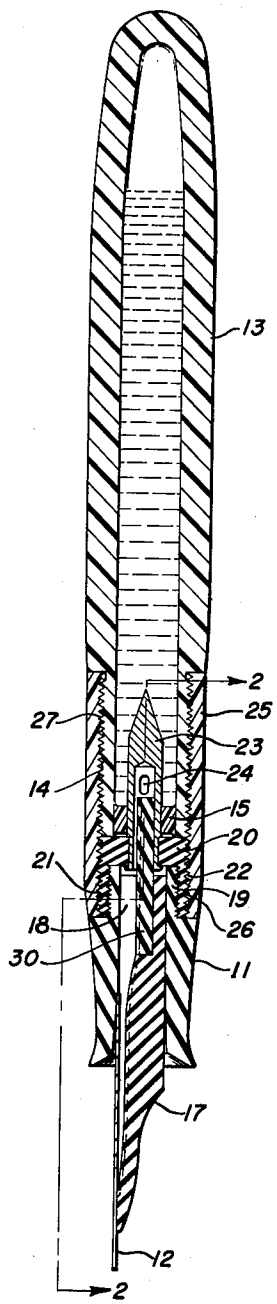


Fig. 1

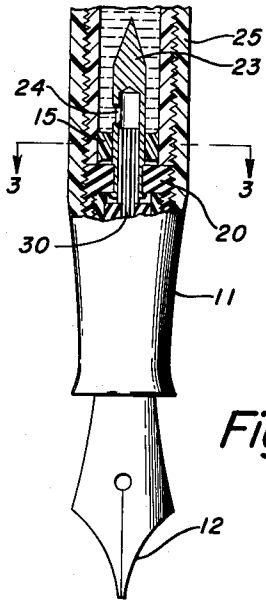


Fig. 2

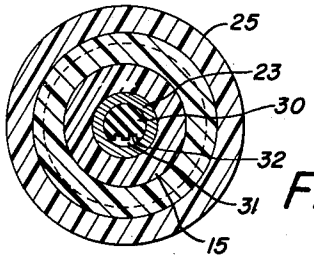


Fig. 3

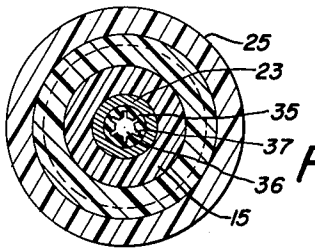


Fig. 4

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INK FEED DEVICE FOR FOUNTAIN PENS

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1 Claim. (Cl. 120—45.4)

This invention relates to an ink feed for fountain pens of the type having interchangeable ink containers constructed for puncturing of the exchangeable container, and relates more particularly to an improvement in the construction of a combined puncturing needle and ink feed device in replaceable cartridge fountain pens.

By the known fountain pen constructions of this type, the ink container is punctured when the container is pushed into the shaft of the fountain pen against the sharp point of a hollow puncturing needle, which hollow needle serves the function of an ink feed to the pin point. This arrangement in prior art constructions results in a very short time in the development of a low pressure area in the ink container, which low pressure area prevents the ink going into the hollow needle and to the pen point.

The object of this invention is to combine a hollow puncturing needle with an ink feed in such a manner that the ink is conducted from the ink container to the pen point, and air is fed in a counter direction into the ink container to relieve the vacuum and balance the pressure differential.

Another object of this invention is to provide a puncturing needle with the ink feed and air feed construction within the needle.

It is to be understood that the foregoing objects are directed to the basic physical properties of this invention, and that other objects and a fully understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings in which:

Figure 1 is a side vertical sectional view of a fountain pen made according to the teaching of this invention, illustrating the replaceable ink container body with the improved needle and ink feed construction of this invention extending through a puncturable membrane into the interior of the container body.

Figure 2 is a fragmentary front sectional view through the puncturing needle and associated ink distribution system;

Figure 3 is a sectional view taken along line 3—3 of Figure 2; and

Figure 4 is a sectional view of an alternate needle and ink feed construction.

Figure 1 of the drawing illustrates a practical fountain pen construction embodying the principles of this invention. In the illustrated type of pen the reference character **11** illustrates a pen holder with a conventional pen point **12** and feed bar **17** held in frictional engagement within the holder **11**. A replaceable ink cartridge **13** is engaged with the pen holder **11** to supply a body of ink for the pen. The ink cartridge **13** is provided with a puncturable membrane **15** at the entrance end thereof to hold the ink within the cartridge prior to mounting the cartridge and the holder **11** as a cooperating fountain pen.

The pen holder **11** is provided with a threaded flange **19**. A needle holder **20**, provided with a hollow tubular needle **23**, is threaded internally, as indicated by the reference character **21**, to engage the threaded flange **19**. The needle **23** has a feed hole **24** to receive ink.

The exterior surface of the holder **20** is threaded, as indicated by reference character **22**.

An adapter sleeve **25** is threaded at one end, as indicated by reference character **26**, to engage the exterior threads **22** on the holder **20**. The end of the replaceable ink cartridge **13** is threaded, as indicated by reference character **14** to engage in the opposite end of the adapter **25**, and engage interior threads **27** of the adapter.

As will be seen by referring to the drawing, whenever a new ink cartridge **13** is threaded into the adapter **25**, the membrane **15** will be pierced by the needle **23** and will seal around the needle **23**. However, the feed hole **24** will extend past the membrane **15** and allow ink to enter into the feed hole **24**.

As thus far described, the construction is not appreciably different from prior art construction wherein the needle serves also as an ink passageway to the nib and pen point. This construction is not satisfactory because it does not allow air to enter into the ink container to balance the vacuum created by the use of the pen, and therefore the ink flow is stopped. This difficulty is avoided by the present invention.

In order to provide for an even flow of ink, the present invention permits air to enter into the ink cartridge **13** to replace that ink which is used. A longitudinal filler body **30** extends through the needle **23**. This filler body substantially fills the hollow needle, except for a very small canal **31**. The filler body extends almost to the puncturing point of the needle as illustrated in Figure 2.

On the surface of the filler body **30** facing the canal **31**, as shown best in Figure 3 of the drawing, there is provided a longitudinal capillary feed path in the form of a plurality of capillary grooves **32**. The areas defined in the grooves **32** are of quite small cross-sectional area, considerably smaller in size than the area of the canal **31**. These grooves **32** form capillary canals which are sufficiently narrow that they can secure a uniform flow of ink to the pen. The canal **31** serves the purpose of conducting air to the interior of the ink cartridge **13**. If the canal **31** for any reason should be filled with ink, the ink feed will still function. When the pressure within the cartridge **13** becomes sufficiently low that no more ink leaves the cartridge, the ink in the canal **31** will draw into the capillary grooves **32** and will be led therefrom to the pen point. This process continues until an air passage through the canal **31** is again formed. When the air passage is opened the air pressure will be balanced within the cartridge by a flow of air through the opened canal **31**. Thereafter ink feed will proceed normally.

It has been found that the ink feed functions best when the filler body **30** is made of a material which has greater adhesion with the ink than the material of the hollow tubular needle **23**. Hard rubber, sometimes referred to as "ebonite," is a suitable material, but is not the only such material which has greater adhesion for ink than metal. Preferably the needle **23** is constructed of metal. The ink canals and the air canals do not initially have to constitute a continuous cavity as illustrated in Figure **3**, but may be separated from one another, such as by providing narrow holes of different dimensions in a solid block.

In Figure 4 of the invention there is illustrated an alternate construction wherein a canal **36** passes centrally through a filler body **35**, and a plurality of capillary grooves **37** are placed in radial fashion around the canal **36**.

An additional desirable feature of this invention has been discovered in that the longitudinal grooves **32** may be shifted out of proper registration with the cooperating nib structure **17** or with the hole **24**, or both, to restrict the flow of ink. Some inks are considerably more fluid

than others and this adjustment thereby provides for a regulation to suit the writing habits of the individual using the pen as well as the characteristics of the ink in the pen.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

A fountain pen construction, comprising, a permanent base assembly and a replaceable barrel ink supply member, said base assembly having in internally threaded sleeve adapter, an externally threaded needle holder to fit said internal thread of the sleeve adapter, a needle carried by said holder, said needle extending through said holder, said needle having a tubular bore opening in the end of the needle on one side of the holder and an opening in a side port on the other side of the holder, a needle point projecting beyond said side port, said holder threadably mounted in said sleeve adapter near one end thereof with the needle extending coaxially of the adapter toward the opposite end, said needle holder being internally threaded on at least the end opposite said needle point,

a pen point and feed bar holder having external threads engageable into said internal threads of said needle holder, a feed bar and pen point carried by said holder, an ink feed device to carry ink from said barrel to said feed bar and to admit air into said barrel in controlled amounts to meter ink output, said feed device comprising a filler body carried by said feed bar and insertable into said tubular bore in said needle, said filler body having a cross-sectional configuration filling all of said bore except an air bleed channel, the surfaces of said filler body along said channel having capillary size slots extending longitudinally thereof, and said barrel having an externally threaded end threadable into the said sleeve adapter opposite said pen and feed bar holder, said barrel having a puncturable member closing said barrel to retain an ink supply therein until pierced by said needle point.

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