N° 21,631 A.D. 1908

Date of Application, 13th Oct., 1908

Complete Specification Left, 13th Apr., 1909—Accepted, 13th Oct., 1909

PROVISIONAL SPECIFICATION.

Improvements in Reservoir Pens.

I, ALEXANDER MUNRO, of No. 49 Witton Road, Aston Manor, Birmingham, Inventor, do hereby declare the nature of this invention to be as follows:—

The invention relates to improvements in fountain pens (both in self filling pens and in non-self filling or ordinary fountain pens) which employ that type of inkfeed known as the tube feed.

I prefer the use of that shape of tube feed which leads the ink from the lower part of the reservoir chamber, and which, by a bend or curve on the tube, inclines towards the nib and delivers the ink on to the under surface of the nib near the nib point. The lower open end of the tube lies practically flat against the under surface of the nib, and, to enable it to do this, the lower end of the tube is cut off on the slant, being at an angle of 30 to 40 degrees or so.

In this invention, I make an outer tube enclosing an inner tube or section. The inner tube or section provides within itself, or within itself and in the small space between it and the outer tube, an air channel of comparatively large area and a capillary or ink channel. The shape and size of the inner tube or section serves to retain it in position, and to maintain the air and ink channels at their respective areas. The outer tube can be constructed of glass, metal, or other material of a strong or rigid nature, in addition to vulcanite or the materials hitherto used in tube feeds. This rigidity is most useful in keeping the tube from bending or sagging which fault causes the lower end of the tube to cease to touch the under surface of the nib and so prevents the pen from writing. It is also useful in permitting the tube to be made of a smaller diameter than would otherwise be possible.

In one form of construction of tube feed, I use an inner tube of vulcanite or other suitably soft material which has longitudinal grooves cut inside it. The vulcanite tube is enclosed in a metal tube for the whole of its length, or for that part of its length which particularly requires strengthening. The metal tube is enamelled to protect it from the action of the ink. This construction is useful in some cases, but the longitudinal grooves are somewhat difficult to make, and the following form of construction avoids the necessity of making grooves inside a tube.

In this case I much favour the use of glass for the outer tube. The glass tube may be supported at its inner end by means of an india rubber washer fixed in the lower part of the reservoir chamber as shown in my Patent Specification, No. 20,065, of year 1907. Fitting somewhat loosely within the glass tube is a tube of vulcanite or other suitable material having a bore of a diameter of say from a thirty secondth to a sixteenth part of an inch. The lower open end of the inner tube is also cut off on the slant, so that it is flush with the lower end of the outer tube. Such a tube feed is easily made, and is very efficient, while being less disposed to blot or spill ink than other inkfeeds which have two or more openings or have an opening all round the inkfeed to the extent of allowing ink to exude all round it. The annular space between the outer and inner tubes provides a capillary ink channel of large extent, which embouches on the nib as an oval ring. The hole through the inner tube pro-

[Price 8d.]

vides the air passage. At that part of the oval ring lying furthest away from the nib point a small part of both tubes may be cut away for an air entrance, but as a rule this is seldom necessary. If a copious supply of ink to the nib point is desired, a slit or saw cut is made on the wall of the inner tube and running longitudinally for a distance of say three sixteenths of an inch from the lower tip of the tube. Or the inner tube may be slit for all its length to produce the same result. If a slit is made only at the upper end of the inner tube, a less copious supply of ink is obtained. According to the size of the bore of the inner tube, and according to the slits made and their length and position, the ink supply may be varied to a large extent.

In lieu of the inner tube, a section may be used. The section may be a half or three quarters of such an inner tube as that already described, and it provides an air channel and an ink channel of much the same character as that already described. Or a rod of semi-circular section may be used which fits loosely into the outer tube. If the edges of the rod may be supposed to jam tightly into the tube and no ink channel is left, then in that case it would be necessary to cut a groove or grooves on the flat side of the rod to act as ink channels. A tube of octagonal shape on the outside, a V-shaped section, and many other forms similarly resting against opposite sides of the outer tube, provide the requisite channels. A bar extending the length of the tube and cutting the bore of the tube into two parts, is apt to be made too loose or too tight. If too tight, it does not leave sufficiently large ink channels between its edges and the tube. It may of course be made thick enough for this purpose, but owing to its bulk and the unnecessary second air channel it provides, it is the least desirable form to employ. For many reasons, the inner tube is the preferable form to employ.

Where a feed tube is desired for a self filling pen of the nature described in my Patent Specification, No. 20,065, of year 1907, the preceding construction is employed with the addition that the inner tube is continued to the upper part of the reservoir chamber.

Two or more forms of the inner tube or section may be used on different parts of one tube feed. Thus in a glass outer tube, a short length of the inner tube may have half of its section cut away, so that the user of the pen is able to see if there is any ink in the tube, and which usually means if there is any ink in the reservoir.

In order to prevent the inner tube or section from moving longitudinally in the outer tube, any simple means may be used. I find it convenient to prolong the tip of the inner tube and bend it over the edge of the outer tube, so that it runs parallel for a little distance with the under surface of the nib. It thus forms a sort of foot, which prevents the inner tube or section from slipping back within the outer tube.

In a fountain pen using a tube feed I also use the following construction. The nib is attached to an outer casing. The tube feed is attached to an inner casing, containing the reservoir chamber. The inner casing may be moved forward a short distance within the outer casing, and a spring returns it to its former position. When it is moved forward, the tube feed is also necessarily moved forward, which cleans and wets the actual writing point of the nib, making it ready for writing. The inner casing may be moved forward by any suitable means, such as by a stud attached to the inner casing and rising through a slot in the outer casing. The stud may have placed below it an india rubber tube, and at that particular part below the stud the india rubber forms the wall of the reservoir chamber. The action of pressing in the stud will therefore lessen the size of the reservoir chamber, and force a drop of ink through the tube feed on to the nib point. At the same time the stud may be moved forward, causing the tube feed to touch the actual writing point of the nib and wet it with ink. This property is occasionally useful when the pen has been out of use for some time. To obtain the spring, I employ a corru-

gated rubber ring which is compressed between the two casings when the inner casing is pushed forward, and the expansion of the rubber serves to return the inner casing and tube feed to the former position.

Dated the 12th day of October, 1908.

ALEXANDER MUNRO.

COMPLETE SPECIFICATION.

Improvements in Reservoir Pens.

I, ALEXANDER MUNRO, of No. 49 Witton Road, Aston Manor, Birmingham, Inventor, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to those fountain or reservoir pens which convey the ink from the reservoir to the nib point by means of a feed tube, and the object of the invention is to add to the usefulness and effectiveness of such pens. According to this invention I provide an improved method of construction for the feed tube, which in certain of its forms is easier to make than the feed tubes hitherto used, and which appears to me to be better for writing purposes. I also show how these and other of its forms admit of the feed tube being made of stronger and more rigid and durable materials than have hitherto been possible, although in this case, and according to the material employed, the difficulty of making the feed tube may in some cases be increased. I also provide in a pen with a feed tube an improved means whereby the feed tube may be moved forward a little where desired before beginning to write, so that the feed tube by moving forward may clear and wet the actual writing point of the nib, thus making the nib point ready for writing and ensuring that it will write.

On the accompanying drawings

Figures 1 to 12 show longitudinal and transverse sections of feed tubes according to the improved construction.

Figure 13 shows a longitudinal section of a pen with the improved means whereby the feed tube is moved forward for the purpose of clearing and wetting the nib point.

Referring to Figures 1 and 2, Figure 1 is a longitudinal section, and Figure 2 is a transverse section, of a feed tube whose upper end (1) lies open within the lower part of the reservoir chamber of the pen. The lower end (2) of the feed tube touches the under surface of the nib at a distance of one eighth of an inch or so from the nib point. The construction consists of an inner tube (3) fitting somewhat loosely within an outer tube (4). The bore of the inner tube forms the air channel for admission of air into the reservoir chamber when writing, and the annular space between the two tubes forms the capillary channel by which ink is conveyed from the reservoir to the under surface of the nib near the nib point. The lower opening of the capillary channel at (2) rests immediately on the nib after the manner shown in Figure 13.

Figures 3 and 4 illustrate a feed tube like that shown in Figures 1 and 2, but differing in this respect that the inner tube is longitudinally slit on that side of the tube which lies furthest away from the pen nib. Figure 3 is a plan of the feed tube, and it shows the oval shape of the lower opening. Figure 4 is a transverse section.

Figure 5 is a transverse section of a feed tube having the inner tube in this case replaced by a section (5) consisting of half a tube.

In Figure 6, in lieu of the inner tube, or in lieu of the half tube section as in Figure 5, a V shaped section (6) is used. In Figures 5 and 6 it will be seen that a space intervenes between the outer tube (4) and the contained section, and this space forms the capillary channel. The sections run the whole length of the feed tube after the manner of the inner tube (3) as shown in Figure 1.

In Figure 7 the contained section is a semi-circular rod (7). In this particular case, as shown in the drawing in Figure 7, the semi-circular rod is supposed to jam so tightly into the tube (4) that no intervening space is left between them, and grooves (8) are therefore cut in the rod to act as capillary channels. If the rod fitted somewhat loosely within the tube, the grooves might be dispensed with, but it is evident that when made they must add to the extent of the capillary channels.

In Figure 8 an inner tube (9) is again used, but in this case it is of hexagonal shape. The precise shape of the inner tube or section, it will be seen, may vary to a very great extent, and other shapes than those shown may be used. The essential principle of the construction from Figures 1 to 12 is that the inner tube or section provides within itself or within itself and in the space between it and the outer tube, an air channel of comparatively large area and one or more capillary or ink channels, and that the shape and size of the inner tube or section serves to retain it in position within the outer tube and to retain the air and capillary channels at their respective areas or at very nearly their respective areas. This distinction between my improved construction of the feed tube and many former feed tubes may to a large extent be said to be as follows. Where former feed tubes contained a wire or rod or bar, it was necessary that the wire or rod or bar should lie against one side of the tube, because when occupying a central position no capillary channel would be formed. Holding it in position to the side of the tube could only be effected by pressure extending from the end or ends of the tube. This way of holding is evidently much less effective and reliable than if it were strutted or supported from the opposite side of the tube, and that is virtually what I effect among other things. On the other hand, it should be borne in mind that a round tube loosely placed within another tube, as shown in Figure 2, cannot properly be said to be strutted or supported from the opposite side of the outer tube, except in the sense that it may alternately touch one side and then another and thus be supported. The wobble or deviation thus allowed should not exceed the one-fiftieth part of an inch, that being the scientific limit assigned for the distance apart for two surfaces between which the power of capillary attraction comes into play and causes an automatic and frictionless flow of ink.

In Figure 9 the contained section consists of a bar (10) which is supported in place by its corners resting or alternately resting on opposite sides of the tube (4). Where this bar is thin, as has already been used in former feed tubes, I do not claim it as being within my form of construction. Where the bar is thick, and the space between it and the tube affords some considerable extent of capillary space, then it comes within my form of construction, but on account of its providing an unnecessary air channel, and on account of the greater room it takes up and its lesser efficiency compared with the more compact and effective inner tube, it is the least desirable shape to employ for general purposes.

Figure 10 is a longitudinal section, and Figure 11 is a transverse section, of another form of feed tube, where for a special purpose the ink is denied access to the space between the two tubes. The outer tube (4) is made of strong or rigid material, such as metal enamelled to resist corrosion by ink. The inner tube (3) is made of vulcanite or other soft material in which are cut the grooves (8). The outer tube (4) may be continued in this particular case to the upper end (11) to strengthen the inner tube if desired. The

holes (11ª and 11ᵇ) and the use of this feed tube in a self filling pen can only be understood by a reference to Figure 3 in the drawing attached to my former Patent, No. 20,065 of year 1907.

Figure 12 is a feed tube similar to that shown in Figures 1 and 3, but having the inner tube prolonged to the upper part of the reservoir for the purpose of being used in a self filling pen as described in my former Patent, No. 20,065 of year 1907. Where in this case the inner tube is slit, the slit is not made beyond that portion covered by the outer tube.

The feed tubes as shown in Figures 1 to 12 all possess the common advantage that the outer tube may be made of strong and rigid material. In particular, the use of glass is most satisfactory as it does not bend or sag, which fault causes the lower end of a vulcanite tube to cease to touch the under surface of the nib and so prevents the nib from writing. I find also that a glass outer tube with a vulcanite inner tube produces an inkfeed that writes more fluently and with less liability to spill ink than any other kind of inkfeed I know of. This result may be due to the very large extent of capillary channel provided, or it may be due to the greater attractive and wetting power that glass possesses as compared with vulcanite, or it may be due to a combination of both the causes mentioned.

In Figure 13 I show how the feed tube may further be used to add to the usefulness of the pen by causing it to move forward to clear and wet the point of the nib. The nib (12) is attached to the outer casing (12ª). The inner casing (13) by means of the india rubber washer (14) holds the feed tube (15) pretty firmly in its place. When by means of the stud (16) the inner casing is moved forward a short distance, the feed tube (15) is also moved forward until its lower end touches the nib point. A concertina-shaped india rubber spring (17) is interposed between shoulders on the inner and outer casings and serves to throw back the inner casing and feed tube to the normal position. Underneath the stud (16), a hole is made on the wall of the inner casing, and over this hole is stretched a piece of india rubber tube (18). The stud may be pressed inwards at the same time that it is moved towards the nib point, which causes the wall of the rubber tube to be pressed inwards, thus lessening the size of the reservoir chamber (19) and forcing a drop of ink through the tube feed on to the nib point. This property is occasionally very useful and convenient, as when a pen has been out of use for some time and it is desired to write at once. In Figure 13 the general arrangement of the pen is that of the self filling pen shown in Figure 4 of the drawing attached to my Patent, No. 20,065, of year 1907.

I desire to point out the vital importance in a feed tube of having the capillary channel made continuous from its upper to its lower end. Former pens for instance have employed a tube within a tube, but in every such case that I can trace there has been a failure either in carrying the capillary channel upward into the reservoir or downward to near the nib point.

The shape of the air channel appears to be of little consequence. A round shape is usually easiest made, and its size may roughly be stated as from a thirty-second to a twelfth part of an inch in diameter. A slit or saw cut made on the wall of the inner tube and not exceeding one-fiftieth part of an inch in width produces a further capillary channel. One or more slits may be made for the whole or part of the length of the inner tube. A slit at the lower part of the tube has a greater effect in increasing the ink supply than at the upper end. According to the size of the bore of the inner tube and according to the slits made and their length and position, the ink supply may be increased and varied to a large extent.

The feed tubes shown in Figures 1 to 12 are meant to be supported at the inner end as shown in Figure 13, but any other suitable mode of support may be used. More than one form of construction may be used in one feed tube. Thus, a vulcanite inner tube within a glass outer tube may have half its section

cut away at the lower part to show if there is ink in the tube. The vulcanite tube when heated is easily bent into shape within the glass tube, and is a much easier way of making a feed tube than by cutting longitudinal grooves within a tube.

In Figure 12 both tubes are shown as finishing flush at the lower end. In Figure 1 the heel of the inner tube is shown as cut away for a short distance, which is sometimes an advantage particularly with a small air channel. The outer tube may in some cases be cut away at this point also.

I have already said that the shape and size of the inner tube or section in the feed tube serves to retain it in position within the outer tube. This is more particularly the case as against lateral movement within the outer tube, and whilst it usually does so also against longitudinal movement it may be strengthened against the latter in any simple way, such as by inserting a very small wooden plug between the two tubes, or by prolonging the inner tube beyond the edge of the lower opening of the outer tube and turning it over at an angle and allowing it to run parallel on the nib surface for a little way.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. In a reservoir pen, a feed tube consisting of an outer tube surrounding an inner tube or section, the outer tube not requiring to have its wall broken into or removed save where it opens near the nib point, and the shape and size of the inner tube or section sufficing to retain in position, and at their relative sizes, the comparatively large and uninterrupted air channel and the one or more capillary ink channels, the latter being continuous from the reservoir to where they embouch against the under side of the nib near the nib point, as and for the purposes set forth.

2. In a reservoir pen, a feed tube consisting of an outer tube, and of an inner tube fitting somewhat loosely within the outer tube, the inner tube having one or more slits made for the whole or for part of its length, or having part of its section cut away for part of its length, as may be required for the particular purpose desired, substantially as set forth.

3. In a self filling reservoir pen, a feed tube consisting of an outer tube extending from the lower part of the reservoir chamber to near the nib point, and of an inner tube or section contained within the outer tube, and from thence prolonged as a tube until it reaches the upper part of the reservoir chamber, substantially as set forth.

4. In a reservoir pen, an outer casing to which the nib is attached, and an inner casing to which the feed tube, constructed as claimed in Claims 1, 2, or 3 above is attached, the inner casing containing the reservoir and being capable of being moved forward by a stud or other means, as and for the purposes set forth.

5. In a self filling reservoir pen, the arrangement, construction, and combination of parts, substantially as herein set forth and illustrated in Figure 13.

Dated the 12th day of April, 1909.

ALEXANDER MUNRO.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1909.

Fig. 1.

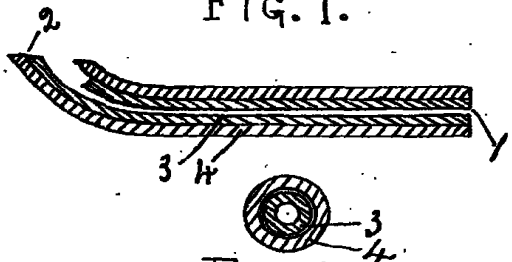


Fig. 2.

Fig. 3.

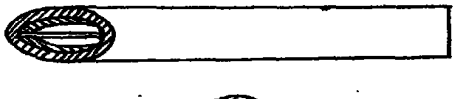


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

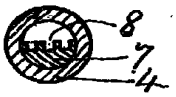


Fig. 8.

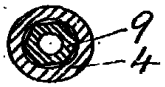


Fig. 9.

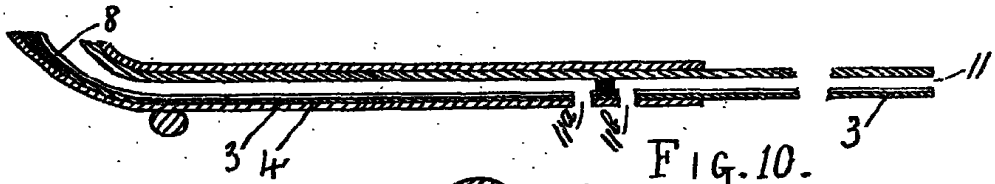


Fig. 10.

Fig. 11.

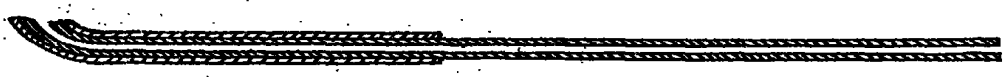
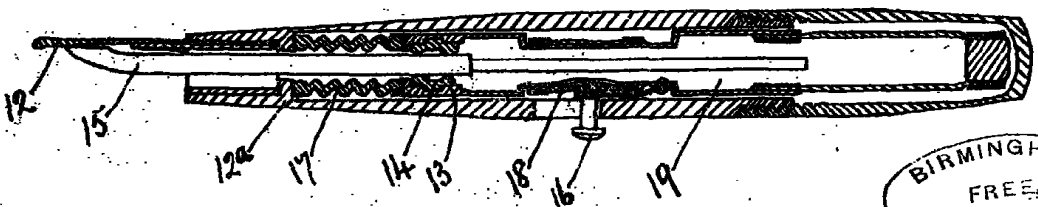


Fig. 12.

Fig. 13.



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