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COMPLETE SPECIFICATION

Improvements in and relating to Fountain Pens

5 We, W. A. SHEAFFER PEN COMPANY, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 301, Avenue "H", City of Fort Madison, State of Iowa, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to an improved fountain pen or to an improved writing unit suitable to form part of a fountain pen.

15 In fountain pens as usually constructed the pen nib and feed bar are frictionally or otherwise supported at the forward end of the barrel which, for ease in manufacture and assembly, generally is divided into two parts—
20 a rearward barrel portion, and a forward barrel portion commonly called the gripping section. A number of well-known arrangements are used commercially for assembling the nib and feed bar with the gripping section, such as
25 a wedge fit of the shank of the nib and feed bar within the open forward end of the gripping section. Another well-known arrangement includes a "hood" or "shell" type gripping section which envelops and frictionally supports a substantial portion of the pen nib and the feed bar, with merely the writing tip portion of
30 the pen nib extending beyond the shell in writing position.

35 Regardless of the particular arrangement used, however, the assembly of the parts requires meticulous care to ensure proper alignment of the pen nib and feed bar to give the desired writing characteristics and in spite of precautions taken by the manufacturers, a certain percentage of finished pens or the writing
40 unit portions thereof are found to be unsatisfactory when sold to the ultimate user because of mis-alignment of the pen nib and

feed bar resulting in unsatisfactory fluid flow or other objectionable characteristics.

45 Further, in some instances, the parts may be forced out of alignment should the pen nib or feed bar be subjected inadvertently to a sharp blow or other unusual side pressure. Since the average user is not qualified to re-align the nib and feed, any accident of this type almost invariably necessitates the return of
50 the pen to the manufacturer or a firm specializing in pen repair service. Such returns are not only inconvenient to the users but also involve some considerable cost.

55 Another difficulty experienced during the manufacture of the conventional pens is a high percentage of breakage of either the gripping section or the feed bar. This is a result of stress created by the necessity of tightly wedging the parts together so that they will withstand the usual writing pressure without becoming mis-aligned. This is particularly true of the construction in which the
60 pen nib and feed bar are wedged together within the open forward end of the gripping section.

65 This factor of stress is of important significance in the art as it prevents the use of certain plastic materials which have certain desirable characteristics such as dimensional stability and stain resistance, but rather low resistance to internal stress.

70 The above problems have long been recognized in the art, and a number of suggestions have been made for their solution. As an example, one well known construction employs a pen nib having a tubular shank portion mounted at the forward end of the barrel or the gripping section or writing unit portion and adapted to act as a reinforcement thereof. While this prior construction has enjoyed wide commercial usage because of its ability
75 to reinforce the forward end of the barrel or gripping section or writing unit, the need for skilled manual assembly of the nib and related

[Price 4s. 6d.]

parts and the subsequent adjustment of the feed bar relative to the nib are not eliminated.

The present invention substantially eliminates the above problems and materially reduces the expense heretofore associated with the assembly of what might be termed the "writing assembly" of a fountain pen. This improvement is accomplished by inlaying a part of the pen nib in the external surface of the forward barrel portion, gripping section or shell of the writing unit during the moulding thereof. The moulding is preferably accomplished in a mould which will produce a finished casting so that after removal from the mould it is merely necessary to insert the feed bar to complete the writing assembly.

Further, many retail dealers are not able to carry a complete stock of fountain pens having a full point selection in every colour and model, and for this reason the feature of interchangeability of the writing unit as between colours and models is very desirable. Fountain pens and writing units manufactured according to the present invention are admirably suited to provide this advantage of interchangeability since they are quite rugged in construction and the parts can be interchanged and otherwise handled without danger of adversely affecting the setting of the pen nib and/or feed bar.

The present invention accordingly consists in a fountain pen comprising a barrel having an end part, a reservoir within said barrel, and a nib comprising a body portion and a writing tip portion extending from one end of said body portion, said nib being mounted on the barrel with the whole or the major part of the body portion of the nib inlaid in a recess in the external surface of the said end part and of a depth extending part way only through the thickness thereof, the writing tip extending from an open end of said recess intersecting the free end of the barrel end part.

A sealant material may be applied between juxtaposed surfaces of the said end extremity of the barrel and the body portion of the nib.

The invention further consists in a writing unit for a fountain pen as defined above, and comprising a shell, a pen nib inlaid in the exterior surface of the forward end of said shell and a feed bar positioned within said shell and a coupling ~~current~~ applied within the rear end of said shell and retaining the feed bar against axial movement in the shell.

The invention still further consists in a method of manufacturing a fountain pen or a writing unit for a fountain pen as defined above said method comprising the steps of forming a pen nib with a body portion and a writing tip portion, coating at least the under or inner side of the body portion of the nib with a sealant material, mounting said prepared nib in a mould cavity with the outer

surface of the body portion of the nib in contact with the surface of the cavity, introducing a plastics material in fluid or semi-fluid condition into said mould cavity and into contact with the under or inner side and the edges of the body portion of the nib, permitting the plastics material to solidify and removing the unit comprising the moulded plastics material and the nib from the mould cavity, the moulded plastic material constituting the fountain pen barrel or a part thereof. The invention is illustrated by way of example in the accompanying drawings in which:—

Figure 1 is a side elevational view of a fountain pen embodying this invention and illustrating a pen nib inlaid in the external surface of the gripping section;

Figure 2 is a view in elevation of the forward portion of the pen shown in Figure 1 looking from the left in that figure;

Figure 3 is a view in sectional elevation of a part of the pen of Figure 1 showing the arrangement of parts as conditioned for writing or storage;

Figure 4 is a sectional view on an enlarged scale of the gripping section and pen nib taken on the line 4—4 of Figure 2;

Figure 5 is a sectional view on an enlarged scale of the gripping section and pen nib taken on the line 5—5 of Figure 2;

Figure 6 is a sectional view on an enlarged scale of the gripping section and pen nib taken on the line 6—6 of Figure 2; and

Figure 7 is an enlarged face view in the flat of a pen nib of this embodiment.

Referring to the drawings and more particularly to Figures 1 to 2 thereof, the fountain pen therein illustrated includes a barrel 10 of a substantially rigid plastic material having good dimensional stability and a lustrous and long wearing surface which is preferably resistant to staining by writing fluid. While the barrel 10 may be of a one piece construction, for convenience in manufacture and assembly the embodiment shown includes a rearward barrel portion 11 and forward barrel portion 12 secured together in axial abutting alignment by a threaded coupling 13 as illustrated in Figure 3. The forward barrel portion 12 hereinafter termed the gripping section, is a generally cylindrical shell like member having an outer surface which is gradually reduced in circumference toward its forward end extremity.

A pen nib 14 comprising a body portion and a writing tip portion and of arcuate cross section is mounted with the whole or part of the body portion inlaid in a recess in the external surface of the end part of the barrel of a depth extending part way only through the thickness thereof and with the writing tip portion extending forwardly from an open end of said recess intersecting the forward end extremity of the barrel. In normal use, por-

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5 tions of the pen nib 14 are subjected to continuous contact with writing fluid, and for this reason the nib is preferably fabricated from a non-corrodible material such as an alloy containing a substantial amount of gold and/or other non-reactive elements well-known in the art.

10 The shape or configuration of the pen nib 14 may be varied widely to complement the design and balance of the pen. In the illustrated embodiment, the pen nib 14 is substantially diamond shaped, with an elongated rearwardly extending body portion 15 and a somewhat shorter writing tip portion 16. The

15 writing tip 16 includes the usual "heart pierce" 17 which is in communication with a forwardly extending fluid passage 18 of capillary dimensions. The body portion 15 of the pen nib 14 includes an irregular diamond shaped cut-out 20 19 which apart from being decorative is of assistance in anchorage of the nib 14 against lateral displacement relative to the gripping section 12 by virtue of the ability of plastic material to extend thereinto.

25 The pen nib 14 is manufactured in a manner readily understood by those skilled in the art, being stamped from flat stock and subjected to a series of forming operations. Thereafter it may be tipped with the usual tipping material, slit to form the fluid passage 18, smoothed and otherwise finished and prepared for a moulding operation.

30 Various arrangements may be used in order to insure against inadvertent parting of the pen nib 14 and the gripping section 12 and it is at present preferred to employ a plurality of integral lugs 20, 20a, 21 and 21a disposed at the outer edges of the body portion 15 of the nib. The lugs are bent downwardly relative to the plane of the body portion 15 from the position shown in Fig. 7 so as to be capable of being embedded within the wall of the gripping section 12 in the manner illustrated in Figures 4 and 6. As indicated, the rearward lugs 21 and 21a are of such length that they do not extend into the bore 22 of the gripping section 12, whilst the forward lugs 20 and 20a penetrate completely through the gripping section 12 and form diametrically opposed, generally parallel flat surfaces 29 and 29a for a purpose to be described hereinafter.

50 It has been found that the nib 14 is held very securely on the gripping section 12 by the lugs 20, 20a, 21 and 21a, and the engagement of material in the opening 19. However, it may be desirable to form the outer edge of the body portion 15 of the nib 14 downwardly to penetrate into the gripping section 12 in the manner shown in Figure 5. This will further ensure against the possibility of inadvertent separation of the pen nib 15 and gripping section 12 under normal usage.

65 This invention is readily adaptable for use with various types of fountain pens and is not

limited as to any one type of pen or of reservoir included therein. However, for illustrative purposes there is shown in Figure 3 a fluid reservoir 23 and forwardly extending filling tube 24 of the kind adapted to reciprocate as a unit relative to the barrel upon rotation of a rearwardly disposed barrel cap 25, which is threadedly engaged with the longitudinally movable reservoir 23 by means of a telescoping cylinder. The reservoir 23 and the filling tube 24 are capable of reciprocation to move the forward open end of the filling tube 24 to a position (not shown) beyond the tip of the pen nib 14 during a filling operation and to a position rearwardly of the nib as shown in Figure 3 for normal writing and storage.

A feed bar 26 is mounted within the bore 22 of the gripping section 12, the feed bar having an axially and radially directed capillary fissure 27 on one side which provides communication for writing fluid to the fluid passage 18 in the pen nib 14 from a capillary space between the exterior of the filling tube 24 and the interior of the feed bar 26 the said capillary space being fed from the reservoir 23 by way of the filler tube 24 all in the manner fully described in our earlier Patent No. 730,295. The feed bar 26 is further provided with a plurality of annular comb cuts or chambers 28 which are capillary in nature and adapted to releasably retain any fluid which may be forced from the reservoir 23 as a result of an increase of pressure therein due to an atmospheric temperature increase or an ambient pressure decrease. As shown in Figure 3, the capillary fissure 27 intersects each of the comb cuts 28, which may also communicate directly with the atmosphere through the forward open end of the gripping section 12.

As shown in Figure 1 of the drawing, the forward end of the feed bar 26 is formed with diametrically opposed flat areas 26a which are slidably received by the parallel surfaces 29 and 29a formed within the gripping section 12 by the lugs 20 and 20a (Fig. 6) as described hereinabove. Thus, upon inserting the feed bar 26 through the rearward end of the gripping section 12 during the assembling operation, the feed bar is automatically aligned relative to the pen nib 14 and a continuous flow of fluid from the capillary fissure 27 to the fluid passage 18 is assured. Abutting the rearward end of the feed bar 26 is a seal gasket 30 (Fig. 3) which has a central aperture adapted to slidably and sealably engage the filling tube 24 and which consists of a resilient plastic or rubber material of a type non-reactive with writing fluid. Overlying the gasket 30 is a rigid washer 31 which is retained in position against a shoulder 32 in the gripping section 12 by the forward end of the threaded coupling part 13.

The feed bar 26 is provided with an en-

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larged rearward portion 33 which forms an offset adapted to abut a second shoulder 34 intermediate the ends of the gripping section 12. Thus, the feed bar is positively held in proper position within the gripping section and restrained against either longitudinal or radial movement therein.

A fountain pen as herein described may be provided with a cap adapted to envelop the forward end of the pen barrel and pen point to prevent evaporation of writing fluid therefrom when the instrument is not in writing use. While the invention is not limited to one particular kind of pen, the illustrated embodiment is adapted to receive a slip cap (not shown), which does not require a threaded connection with the barrel. For this purpose, there is provided a ring 35 which is loosely mounted within a recess 36 at the open rearward end of the gripping section 12 and retained therein by the coupling 13. The ring 36 is formed with a plurality of projections 37 which extend outwards through corresponding apertures 38 in the gripping section 12 to a position slightly beyond the surface of the barrel 11 for yieldingly engaging the internal surface of the cap.

It has been noted that most plastics have a tendency to shrink slightly during the cooling period following the moulding operation. Accordingly, depending upon the type of material chosen for use in moulding the gripping section 12 of the improved pen, there may occur a very minute space between juxtaposed surfaces of the body portion 15 of the nib 14 and the gripping section 12. To insure against the possibility of the movement of writing fluid through this minute space it is sometimes desirable to employ a non-shrinking sealing means 39 between adjacent surfaces of the nib and gripping section. This is most easily accomplished by applying a sealing material to the body portion 15 of the nib 14 prior to its being moulded into the material of the gripping section 12. It will be understood that in actual use, the sealing material is proportionately thinner than it is shown in Figures 4, 5 and 6 of the drawing, ranging in the neighbourhood of .002"—.003".

The sealing material 39 may be applied to the body portion 15 and integral lugs of the nib in any one of a number of ways, such as by dipping the nib into a supply of the sealant or by spraying sealant on to the nib. While various sealants may be employed, a proprietary adhesive formulated from an acetone solution of cyclized rubber has been found to be very satisfactory.

In the process of coating the nib 14 an excess of sealant will normally be present on the exposed surfaces of the nib following the moulding operation. To remove this excess of sealant a solvent such as acetone, carbon tetrachloride or denatured ethyl alcohol may be employed. The particular solvent used to re-

move the sealant must be such as will not adversely affect the plastic used in moulding the gripping section 12.

As previously pointed out, the moulding of the gripping section 12 with inlaid nib 14 is preferably accomplished in a moulding die adapted to produce a "finished" casting. By utilizing such a die, the gripping section and pen nib assembly does not require any subsequent finishing operations and is ready for assembly with the feed bar 26 and other above described associated parts to complete the writing unit.

The moulding of the gripping section and pen nib is accomplished in a die comprising a cavity and a core pin or punch adapted to enter the cavity during the actual moulding operation. The core pin is adapted to receive the pen nib 14, which is frictionally retained thereon by means of the downwardly directed lugs 20, 20a, 21 and 21a. With the nib on the core pin the latter is moved into the cavity to position the outer surface of the pen nib 14 against the inner surface of the cavity. The cavity preferably includes a restricted aperture adapted to pass the writing tip portion 16 of the pen nib 14 so that the plastic material is prevented from contacting that portion of the pen nib. The plastic material heated to a semi-fluid state is forced into the cavity under pressure such as to ensure intimate contact between the plastic and the underside and edges of the body portion 15 and the integral lugs of the nib. After the plastic material has been allowed to solidify, the mould or die may be opened and the gripping section 12 and pen nib 14 removed therefrom as a unit. A solvent of the kind indicated above may then be applied to the exposed portions of the pen nib 14 in order to remove ~~therefrom~~ any residual or excess of sealant material.

The drawing does not include an illustration of the die used in moulding the gripping section inasmuch as such dies are well-known in the art of moulding and an illustration and description thereof is believed to be unnecessary for a proper understanding of the present invention.

WHAT WE CLAIM IS:—

1. A fountain pen comprising a barrel having an end part, a reservoir within said barrel, and a nib comprising a body portion and a writing tip portion extending from one end of said body portion, said nib being mounted on the barrel with the whole or the major part of the body portion of the nib inlaid in a recess in the external surface of the said end part and of a depth extending part way only through the thickness thereof, the writing tip of the nib extending from an open end of said recess intersecting the free end of the barrel end part.

2. A fountain pen as claimed in Claim 1 wherein a sealant material is applied between

larged rearward portion 33 which forms an offset adapted to abut a second shoulder 34 intermediate the ends of the gripping section 12. Thus, the feed bar is positively held in proper position within the gripping section and restrained against either longitudinal or radial movement therein.

A fountain pen as herein described may be provided with a cap adapted to envelop the forward end of the pen barrel and pen point to prevent evaporation of writing fluid therefrom when the instrument is not in writing use. While the invention is not limited to one particular kind of pen, the illustrated embodiment is adapted to receive a slip cap (not shown), which does not require a threaded connection with the barrel. For this purpose, there is provided a ring 35 which is loosely mounted within a recess 36 at the open rearward end of the gripping section 12 and retained therein by the coupling 13. The ring 36 is formed with a plurality of projections 37 which extend outwards through corresponding apertures 38 in the gripping section 12 to a position slightly beyond the surface of the barrel 11 for yieldingly engaging the internal surface of the cap.

It has been noted that most plastics have a tendency to shrink slightly during the cooling period following the moulding operation. Accordingly, depending upon the type of material chosen for use in moulding the gripping section 12 of the improved pen, there may occur a very minute space between juxtaposed surfaces of the body portion 15 of the nib 14 and the gripping section 12. To insure against the possibility of the movement of writing fluid through this minute space it is sometimes desirable to employ a non-shrinking sealing means 39 between adjacent surfaces of the nib and gripping section. This is most easily accomplished by applying a sealing material to the body portion 15 of the nib 14 prior to its being moulded into the material of the gripping section 12. It will be understood that in actual use, the sealing material is proportionately thinner than it is shown in Figures 4, 5 and 6 of the drawing, ranging in the neighbourhood of .002"—.003".

The sealing material 39 may be applied to the body portion 15 and integral lugs of the nib in any one of a number of ways, such as by dipping the nib into a supply of the sealant or by spraying sealant on to the nib. While various sealants may be employed, a proprietary adhesive formulated from an acetone solution of cyclized rubber has been found to be very satisfactory.

In the process of coating the nib 14 an excess of sealant will normally be present on the exposed surfaces of the nib following the moulding operation. To remove this excess of sealant a solvent such as acetone, carbon tetrachloride or denatured ethyl alcohol may be employed. The particular solvent used to re-

move the sealant must be such as will not adversely affect the plastic used in moulding the gripping section 12.

As previously pointed out, the moulding of the gripping section 12 with inlaid nib 14 is preferably accomplished in a moulding die adapted to produce a "finished" casting. By utilizing such a die, the gripping section and pen nib assembly does not require any subsequent finishing operations and is ready for assembly with the feed bar 26 and other above described associated parts to complete the writing unit.

The moulding of the gripping section and pen nib is accomplished in a die comprising a cavity and a core pin or punch adapted to enter the cavity during the actual moulding operation. The core pin is adapted to receive the pen nib 14, which is frictionally retained thereon by means of the downwardly directed lugs 20, 20a, 21 and 21a. With the nib on the core pin the latter is moved into the cavity to position the outer surface of the pen nib 14 against the inner surface of the cavity. The cavity preferably includes a restricted aperture adapted to pass the writing tip portion 16 of the pen nib 14 so that the plastic material is prevented from contacting that portion of the pen nib. The plastic material heated to a semi-fluid state is forced into the cavity under pressure such as to ensure intimate contact between the plastic and the underside and edges of the body portion 15 and the integral lugs of the nib. After the plastic material has been allowed to solidify, the mould or die may be opened and the gripping section 12 and pen nib 14 removed therefrom as a unit. A solvent of the kind indicated above may then be applied to the exposed portions of the pen nib 14 in order to remove therefrom any residual or excess of sealant material.

The drawing does not include an illustration of the die used in moulding the gripping section inasmuch as such dies are well-known in the art of moulding and an illustration and description thereof is believed to be unnecessary for a proper understanding of the present invention.

WHAT WE CLAIM IS:—

1. A fountain pen comprising a barrel having an end part, a reservoir within said barrel, and a nib comprising a body portion and a writing tip portion extending from one end of said body portion, said nib being mounted on the barrel with the whole or the major part of the body portion of the nib inlaid in a recess in the external surface of the said end part and of a depth extending part way only through the thickness thereof, the writing tip of the nib extending from an open end of said recess intersecting the free end of the barrel end part.

2. A fountain pen as claimed in Claim 1 wherein a sealant material is applied between



juxtaposed surfaces of the said end part of the barrel and the body portion of the nib.

3. A fountain pen as claimed in Claim 1 wherein said barrel includes a rearward barrel portion and a forward barrel portion or shell axially aligned with one another, the said barrel end part constituting part of the forward barrel portion.

4. A fountain pen as claimed in Claim 3 wherein the forward barrel portion is jointed to the rearward barrel portion.

5. A fountain pen as claimed in Claim 3 or 4 wherein a reservoir is provided in the rearward barrel portion and the nib is provided with a passage forming part of the conduit for fluid from the reservoir to the writing tip of the nib.

6. A fountain pen as claimed in any one of Claims 1 to 5 and having a feed bar positioned within said barrel between said reservoir, and said nib and forming part of the conduit for flow of fluid from the reservoir to the writing tip of the nib.

7. A fountain pen as claimed in any one of the preceding claims wherein the barrel is a moulding of plastics material and a plurality of lugs integral with the pen nib are embedded in the wall of the barrel.

8. A fountain pen as claimed in Claim 2 wherein the sealant material comprises a cyclized rubber.

9. A fountain pen as claimed in Claim 6 wherein the feed bar is held against axial movement in the barrel by a coupling element within the barrel and at the end of said feed bar remote from the writing tip portion of the nib.

10. A writing unit for a fountain pen as claimed in Claim 6 or Claim 9 and comprising a shell, a pen nib inlaid in the exterior surface of the forward end of said shell and a feed bar positioned within said shell and a coupling element applied within the rear end of said shell and retaining the feed bar against axial movement in the shell.

11. A writing unit as claimed in Claim 10 wherein lugs on the pen nib are embedded in the material of the wall of the shell.

12. A writing unit as claimed in Claim 10 or 11 wherein the coupling element is provided with a screw-threaded end piece extending rearwards of the rear end of said shell.

13. A method of manufacturing a fountain pen or a writing unit for a fountain pen as claimed in any one of the preceding claims comprising the steps of forming a pen nib with a body portion and a writing tip portion, coating at least the under or inner side of the body portion of the nib with a sealant material, mounting said prepared nib in a mould cavity with the outer surface of the body portion of the nib in contact with the surface of the cavity, introducing a plastics material in fluid or semi-fluid condition into said mould cavity and into contact with the under or inner side and the edges of the body portion of the nib, permitting the plastics material to solidify and removing the unit comprising the moulded plastics material and the nib from the mould cavity, the moulded plastics material constituting the fountain pen barrel or a part thereof.

14. A method as claimed in Claim 13 and including the step of applying a solvent to remove sealant material from parts of the nib of the removed unit not covered by moulded plastics material.

15. A method as claimed in Claim 13 wherein the prepared nib is mounted in the mould cavity with the writing tip of the nib extending through a restricted aperture in a wall of the mould cavity.

16. A writing unit for a fountain pen as claimed in Claim 10 wherein said coupling extends rearwardly of the shell for threaded engagement with the forward end of a separate rear portion of the barrel of a fountain pen, the pen nib having a body portion of which the whole or a major portion is inlaid in the external surface of the forward end of said shell and having a writing tip portion communicating with said feed bar and extending forwardly of said shell and lugs integral with the body portion of the pen nib and extending through the shell to restrain the feed bar against axial rotation.

17. A fountain pen substantially as herein described with reference to the accompanying drawings.

18. A method of manufacturing a fountain pen substantially as hereinbefore described.

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