

PATENT SPECIFICATION



Application Date: March 23, 1934. No. 9209/34.

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Specification Accepted: Sept. 23, 1935.

PROVISIONAL SPECIFICATION

No. 9209 A.D. 1934.

Improvements in or relating to Fountain Pens

We, MABIE TODD AND COMPANY, LIMITED, a Company organised under the laws of Great Britain and Northern Ireland, of 133—135, Oxford Street, London, W.1, and EDWARD STEPHEN SEARS, a British Subject, of 23, Oaklands Avenue, Oxhey, Hertfordshire, do hereby declare the nature of this invention to be as follows:—

10 This invention relates to fountain pens adapted to be charged with ink by a pump-like action of a plunger working in the barrel of the pen.

15 In a fountain pen made according to the present invention the operating mechanism comprises a plunger embracing and adapted to be reciprocated about one end of a tube constituting an air passage.

20 The inner end of the said tube may normally be disposed in the lower bored end of the plunger and the outer end of the said tube may be freely in communication with the atmosphere through the ink feeding mechanism.

25 The end of the barrel remote from the nib end may have a thick solid portion which may be bored centrally to receive the plunger. This solid end portion may terminate in an annular externally threaded neck adapted to be engaged by 30 an internal thread on a knurled knob to which the plunger is pinned.

35 The lower end of the plunger may be provided with a shoulder or flange to prevent the plunger being withdrawn from the pen barrel.

40 A fluid tight joint may be produced between the solid end of the barrel and the plunger by means of a packing plug of cork or other suitable material. This packing plug may be maintained in position by a screwed washer which engages a corresponding thread on the inside of the terminal neck of the barrel.

45 One form of fountain pen made according to the present invention, given by way of example, is as follows.

The pen comprises a barrel internally threaded at one end to receive the nib

[Price 1/-]

Price 4s 6d

section including the feed bar and nib. 50
The other end of the barrel is closed by a thick solid portion which is, however, bored centrally and longitudinally to receive a plunger in the form of a rod 55 which extends approximately half way down the barrel. The outer end of the said boring is enlarged to receive a fluid-tight packing plug of cork or other suitable material which is likewise bored 60 centrally in line with the boring in the solid end of the barrel. The plunger is pinned by a transverse pin to a knurled operating knob the lower end of which is recessed and provided with an internal screw thread to engage a corresponding 65 external thread on a necked extension of the solid end of the barrel. A fluid-tight joint is provided between the plunger and the boring in the solid end by the packing plug above referred to which is maintained in position by an externally 70 screwed washer placed on top of the plug and screwed into engagement with a corresponding internal thread on the necked extension. 75

The lower part of the plunger is bored and the lower end is flanged. The upper end of a tube disposed centrally in the barrel is accommodated in the bored lower end of the plunger and is disposed therein in such a way that an annulus of air is present between the upper end of the said tube and the inner wall of the bored end of the plunger. The lower end of the tube is carried in a recess in the top end of the feed bar carrying the nib. A passage extends throughout the feed bar coaxially with the passage formed by the inner diameter of the tube above referred to, hereinafter referred to as the air tube. 80 85 90

It will be evident from the above description that the upper end of the barrel is closed to the atmosphere whilst the lower end of the barrel is open to the atmosphere through the passage formed by the said air tube and the passage in the feed bar constituting a continuation of the air tube, the passage thus formed 95

being hereinafter referred to as the air passage.

In order to re-charge the pen with ink the knurled operating knob is unscrewed from the threaded neck at the end of the barrel, the nib section is placed in an ink bottle or the like and the plunger is reciprocated several times until no more air bubbles appear at which point the barrel will have been completely replenished with ink. In order to prevent leakage through the air channel the knurled knob should be screwed again into its original position before removing the pen from the ink.

The action of the re-charging mechanism is as follows. As the plunger is withdrawn to its full extent, that is when the shoulder formed on the lower end thereof contacts with the thickened end of the barrel, a partial vacuum is formed in the barrel so that ink will be drawn up into the barrel through the air passage. At the same time a certain quantity of ink enters the barrel via the usual ink channel in the feed bar and forms a fluid-tight seal of the nib end of the barrel. On depressing the plunger some of the air in the barrel will be forced out through

the air passage and on further outward movement of the plunger this air will be replaced by ink drawn in through the air passage. A few reciprocations of the plunger will therefore result in the air originally inside the barrel being displaced by ink until the ink level corresponding to a full charge is attained.

It will be noticed that the suction is not obtained by a tight fitting cork, rubber washers or the like. The action gradually creates a vacuum by forcing air down the tube and replacing it with liquid through the same tube.

The operating mechanism is simple to use and easy to manufacture and no readily perishable parts are employed. The barrel does not leak at the end remote from the nib during the filling operation. If the plunger is withdrawn after the maximum filling, or if pumping is continued after bubbles cease, surplus ink cannot enter the barrel, as no more air can be forced out.

Dated this 21st day of March, 1934.

MEWBURN, ELLIS & CO.,
70 & 72, Chancery Lane, London, W.C.2,
Chartered Patent Agents.

PROVISIONAL SPECIFICATION

No. 14843 A.D. 1934.

Improvements in Self-Filling Fountain Pens

We, EDWARD STEPHEN SEARS, of 23, Oaklands Avenue, Oxhey, Hertfordshire, a British Subject, and MABIE TODD & COMPANY LIMITED, of Swan House, 133 and 135, Oxford Street, London, W.1, a Company organised under the laws of Great Britain and Northern Ireland, do hereby declare the nature of this invention to be as follows:—

This invention relates to self-filling fountain pens and has for its object to provide a pen of this type wherein the use of a perishable rubber sac is eliminated and the construction of the pen generally simplified, whereby it is possible to produce a pen which shall be cheap to manufacture, easy to fill and highly efficient in use.

With these objects in view a pen made according to the present invention comprises a barrel portion, to one end of which is secured by screwing or otherwise the writing point section carrying the feed bar and writing point, the opposite end being plugged with a cork or other plug. The writing point section, and also the cork or other plug are an air and fluid-tight fit within the barrel. The plug is axially bored to form an air and

fluid-tight bearing for a plunger the outer end of which is provided with a knob adapted to be manually operated, whereby the said plunger may be readily reciprocated. The free end of the plunger is formed with a collar which acts as a stop to prevent its complete withdrawal from the barrel. The outer cylindrical surface of the feed bar is formed with a longitudinally disposed groove or slot for the passage of the writing fluid. A fixed tubular member of relatively small diameter extends from the lower end of the feed bar to within a short distance of the cork or other plug, the main portion of this tubular member being off-set from the axis of the barrel to allow the axially disposed plunger to reciprocate. The end of the tubular member communicates with an axially disposed bore in the feed bar and communicates with the groove or slot on the outer surface of the writing point section by means of an aperture approximately equal in diameter to the bore of the tubular member. That end of the barrel adjacent the knob is of reduced external diameter and screwed externally to engage a correspondingly internally screwed part of the knob.

The pen may be provided with a cap in the usual way to protect the point when not in use.

In operation the pen is held in the substantially vertical position and the writing point and writing point section immersed beneath the surface of the ink. An outward movement of the plunger by the manual operation of the knob reduces the air pressure within the interior of the barrel, whereupon ink passes from the ink receptacle through the writing point section by way of the longitudinal groove disposed on the outer surface of the feed bar and passes into the interior of the barrel. The plunger is then moved toward the writing point whereupon the air imprisoned in the upper part of the barrel passes by way of the tubular member to the axial bore and longitudinal groove in the feed bar and from thence passes through the ink, the ink within the barrel being retained by reason of the pressure of the ink within the receptacle. The reciprocating movement of the plunger is repeated several times until the ink is drawn within the barrel to the level of the top of the tubular member whereupon the knob is screwed on to the end of the barrel and thus retained in position, thereby preventing any inadvertent movement of the plunger tending to

interfere with the column of ink in the pen.

In practice we have found that with a barrel having a bore of $\frac{3}{8}$ inch a convenient size for the plunger would be about $\frac{3}{16}$ inch in diameter and the bore of the tubular member approximately $\frac{1}{32}$ inch in diameter, the communicating duct within the feed bar being $\frac{1}{32}$ inch in diameter. It will be obvious, however, that by increasing the length and/or diameter of the plunger the amount of ink drawn into the pen at each complete movement of the plunger will be varied accordingly, it being noted however that the smaller the diameter of the plunger the greater the ink space within the barrel, although in such case a relatively greater number of reciprocations of the plunger will be necessary to fill the barrel.

It will be further understood that the above dimensions and also the general construction of the parts hereinbefore described are given by way of illustration only and that various modifications may be made therein without departing from the spirit and scope of the invention.

Dated this 16th day of May, 1934.

MEWBURN, ELLIS & CO.,
70 & 72, Chancery Lane, London, W.C.2,
Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in Self-Filling Fountains Pens

We, EDWARD STEPHEN SEARS, of 23, Oaklands Avenue, Oxhey, Hertfordshire, a British Subject, and MABIE TODD & COMPANY LIMITED, of Swan House, 133 and 135, Oxford Street, London, W.1, a Company organised under the laws of Great Britain and Northern Ireland, 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:—

Our invention relates to self-filling fountain pens of the kind wherein the pen is adapted to be filled or replenished by the operation of a plunger mounted for reciprocation in the barrel of the pen.

It has hitherto been deemed essential in pens of this type that the plunger should be a substantially fluid-tight sliding fit in the barrel, if the pen was to be filled in a satisfactory manner, with a result that a certain amount of force was necessary in operating the plunger, tending to cause deformation or damage to the parts. When, on the other hand, the plunger was an easy fit within the

barrel, the efficiency of the pen as a self-filler was correspondingly reduced owing to a tendency of the ink to leak past the plunger.

The object of the present invention is to provide a pen whereby the above disadvantages are avoided, the construction generally simplified, the manufacture of such pens cheapened, and a highly efficient pen of the above type results.

With these objects in view the present invention consists in a self-filling fountain pen comprising a barrel portion, a writing point, and a plunger adapted to be reciprocated within the said barrel, characterised in that the diameter of that part of the plunger adapted to operate within the barrel is of less diameter than the internal diameter of that part of the barrel through which the said plunger is adapted to reciprocate, and wherein a packing member is provided for the plunger in fixed relation to the said barrel.

The plunger is adapted to operate in association with a fixed open-ended tubular member (hereinafter referred to

as the air tube) extending through the interior of the barrel and communicating with the writing point.

Other features of the invention will be apparent from the following description wherein two forms are described having reference to the accompanying drawings in which:—

Fig. 1 is a longitudinal section of one form which our invention may take, and Fig. 2 is also a longitudinal section of a modification.

Like reference numerals indicate corresponding parts in both figures.

Referring more particularly to Fig. 1 of the drawings, the pen comprises a barrel portion 1 to one end of which is secured by screwing or otherwise, and in a fluid tight manner, a writing point section 2 carrying a feed bar 3 and writing point 4. The opposite end of the barrel is formed with a packing box 5 adapted to receive an axially bored cork or other packing 6, through which a plunger 8 is adapted to reciprocate. The outer end of the box 5 is screwed internally to engage the correspondingly screwed closing ring 7. In this manner a fluid tight joint is effected between the plunger and the barrel. The plunger 8, the diameter of which is less than the internal diameter of the barrel, is adapted to be reciprocated within the barrel 1, by means of the manual operation of a knurled knob 10 to which latter the outer end of the plunger is secured.

The knob 10 is bored and internally screwed at 12 to engage the reduced and externally screwed end 11 of the barrel, and thus prevent the accidental withdrawal of the plunger when the pen is in use.

The inner end of the plunger 8 is formed with a collar 13 which acts as a stop to prevent the complete withdrawal of the plunger from the barrel. The plunger is axially bored at 14 to receive and to reciprocate freely over the free end of a fixed air tube 15 of relatively small diameter. The opposite end of the air tube 15 is rigidly secured by screwing or otherwise to an axially disposed bore 16 in the feed bar 3. The duct 17 in the air tube 15 communicates with a duct 18 in the feed bar and is in alignment therewith. The feed bar is also provided with an ink channel 19. The pen is further provided with a cap 21 adapted to be screwed to the barrel and thereby protect the writing point when not in use.

It will be evident from the above description that the upper end of the barrel is closed to the atmosphere whilst the lower end of the barrel is open to the atmosphere through the passage formed

by the said air tube and the passage in the feed bar constituting a continuation of the air tube.

Assuming that the operating knob 10 is screwed on to the collar 11 (this being its normal writing position), and it is desirable to charge the pen with ink, the knurled knob 10 is first unscrewed from the threaded collar 11 and the nib section inserted in the ink. The plunger 8 is then reciprocated several times by the knob 10 until no more air bubbles appear in the ink supply, at which point the barrel will have been completely filled with ink. As the plunger 8 is withdrawn, preferably to its full extent, a partial vacuum is formed in the barrel 1 so that the ink will be drawn up into the barrel through the duct 17. At the same time a certain quantity of ink enters the barrel 1 by way of the usual ink channel 19 in the feed bar and forms a fluid tight seal at the writing point end of the barrel. On projecting the plunger some of the air in the barrel 1 will be forced out through the air passage 17 and on a further outward movement of the plunger this air will be replaced by ink drawn in through the air passage 17. A few reciprocations of the plunger 8 will result in the air originally inside the barrel 1 being displaced by ink until the level corresponding to the full charge is attained.

In order to prevent leakage through the air channel or inadvertent movement of the plunger, the knurled knob should be screwed again into its original position before removing the pen from the ink.

It will be noted that the suction is not obtained by a tight fitting plunger fitted with a packing of cork, rubber washers or the like. The reciprocation of the plunger 8 gradually creates a vacuum by forcing air down the duct 17 in the tube 15 and replacing it by fluid drawn through the same tube.

The operating mechanism is simple to use and easy to manufacture and no readily perishable parts are employed. The barrel does not leak at the end remote from the nib during the filling operation. If the plunger is withdrawn after the maximum filling, or if pumping is continued after bubbles cease, surplus ink cannot enter the barrel, as no more air can be forced out.

The modified arrangement shown in Figure 2 follows generally that shown in Fig. 1. In the modification, however, the main portion of the air tube 15a is off-set from the axis of the barrel, whereby the plunger 8a having the diameter of that part adapted to operate within the barrel of less diameter than the internal diameter of the barrel, may be recipro-

cated in side by side relation to the said air tube. The air tube 15a extends from one end of the feed bar 3a to within a short distance of the base of the packing box 5a. The end of the air tube 15a communicates with an axially disposed bore 16a in the feed bar and communicates with the ink groove 20a on the outer surface of the writing point section 3a by means of a duct 18a approximately equal to the diameter of the bore 17a of the air tube.

In the particular example shown, the cork plug or other packing member 6a is coned and pressed into contact with the walls of the packing box 5a by means of the screwed disc 7a. Either forms of packing may be used in either of the pens shown in Figs. 1 or 2.

The other details of construction correspond to those shown in Fig. 1 and are correspondingly indicated.

In the operation of the arrangement shown in Fig. 2 the pen is held in a substantially vertical position and the writing point section 3a and writing point 4 immersed beneath the surface of the ink. An outward movement of the plunger 8a by the manual operation of the knob 10 reduces the air pressure within the interior of the barrel 1, whereupon ink passes from the ink receptacle through the ink groove 20a in the outer surface of the feed bar and from thence to the interior of the barrel 1. The plunger 8a is then moved toward the writing point 4 whereupon the air compressed in the barrel passed by way of the duct 17a in the air tube 15a to the axial bore duct 18a, and longitudinal groove 20a in the feed bar 3 and from thence passes through the ink, the ink within the barrel being retained by reason of the pressure of the ink within the receptacle. The reciprocating movement of the plunger 8a is repeated several times until the ink is drawn within the barrel 1 to the level of the top of the air tube 15a, whereupon the knob 10 is screwed on to the end of the barrel 1 and thus retained in position, thereby preventing any inadvertent movement of the plunger tending to interfere with the column of ink in the pen.

In practice we have found that with both forms a barrel having a bore of $3/8$ inch, a convenient size for the plunger would be about $3/16$ inch in diameter and the bore of the tubular member approximately $1/32$ inch in diameter, the communicating duct within the feed bar being $1/32$ inch in diameter. It will be obvious, however, that by increasing the length and/or diameter of the plunger the amount of ink drawn into the pen at each complete movement of the plunger will be varied accordingly, it being noted how-

ever that the smaller the diameter of the plunger the greater the ink space within the barrel, although in such case a relatively greater number of reciprocations of the plunger will be necessary to fill the barrel.

It will be further understood that the above dimensions and also the general construction of the parts hereinbefore described are given by way of illustration only and that various modifications may be made therein within the scope of the appended claims.

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

1. A self-filling fountain pen comprising a barrel portion, a writing point, and a plunger adapted to be reciprocated within the said barrel, characterised in that the diameter of that part of the plunger adapted to operate within the barrel is of less diameter than the internal diameter of that part of the barrel through which the said plunger is adapted to reciprocate, and wherein a packing member is provided for the plunger in fixed relation to the said barrel.

2. A fountain pen according to claim 1 having in association a longitudinally disposed tubular member adapted for the passage of writing fluid from the nib section to the interior of the barrel.

3. A fountain pen according to claim 2 wherein the plunger is adapted during its reciprocations to extend beyond the free end of the longitudinally disposed tubular member.

4. A fountain pen according to claim 2 characterised in that the longitudinally disposed tubular member is axially disposed relative to the barrel.

5. A fountain pen according to claims 2 or 3 characterised in that the longitudinally disposed tubular member is off-set from the axis of the barrel.

6. A fountain pen according to claim 5 wherein the interior of the longitudinally disposed tubular member communicates with the ink groove in the feed bar.

7. A fountain pen according to claims 2 and 4 wherein the plunger is bored to pass over the free end of the tubular member when the said plunger is in its extreme inward position.

8. A fountain pen according to the preceding claims having provided means to prevent any inadvertent movement of the plunger.

9. A fountain pen constructed, arranged and adapted to operate substantially as described with reference to Fig. 1 or Fig. 130

2 of the drawing.

Dated this 5th day of September, 1934.

MEWBURN, ELLIS & CO.,
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Chartered Patent Agents.

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[This Drawing is a reproduction of the Original on a reduced scale.]

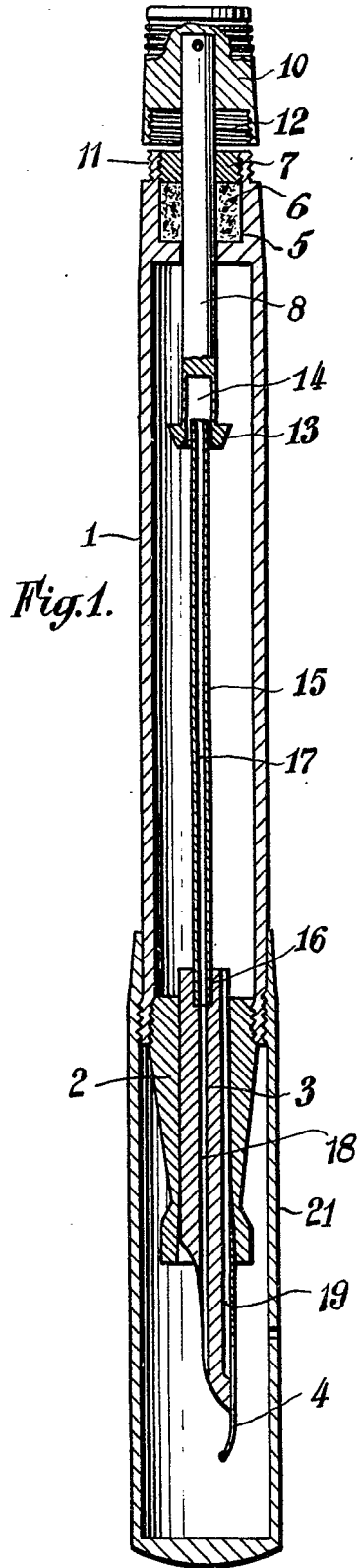


Fig. 1.

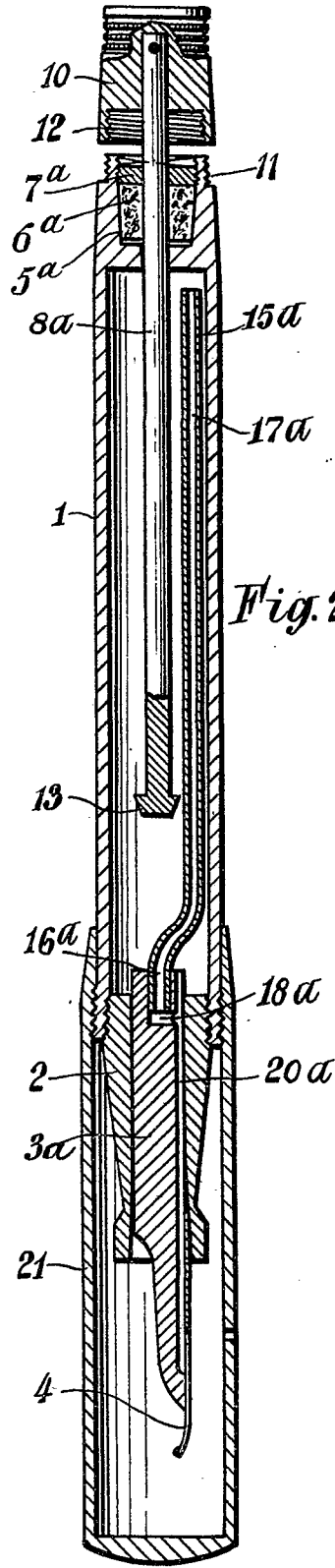


Fig. 2.