

PATENT SPECIFICATION

375,458

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COMPLETE SPECIFICATION.



Improvements in and connected with Self-filling Fountain Pens.

We, GEORGE STEWART VIVIAN, of 237, Norbury Crescent, Norbury, London, S.W.16, British Subject, and T. B. FORD LIMITED, of Snakeley Paper Mill, Loudwater, High Wycombe, Buckinghamshire, a British Company, 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 present invention relates to self-filling fountain pens in which a piston or plunger is reciprocated in the reservoir of the pen to effect a filling operation, the ink being drawn into the reservoir on the up stroke of the piston or plunger. In some such self-filling fountain pens a loose non-return valve member permits passage of ink through the piston when the piston is being returned to its normal position and closes a passage in the piston on the suction stroke, and in others the piston is constructed to accommodate a valve which involves a somewhat intricate or delicate construction. In others the effecting of adequate air venting at the appropriate moments provides an air vent passage which is liable to cause leakage of the ink along such passage, or in others the air vent passage is so restricted that it becomes choked. The object of our present invention is to provide an improved and novel construction of self-filling fountain pen of the reciprocating piston or plunger type and in which these objections do not arise.

It has heretofore been proposed to provide a tubular passage which may serve as an air vent extending from the feed bar of the pen to a point near the top of the reservoir of the pen and to close said air vent automatically at the completion of a filling operation which entails the reciprocation of a hollow or tubular piston rod carrying a piston which draws ink into the space above it through the tubular passage.

According to our present invention a self-filling fountain pen of the type specified has its piston sliding against the inside wall of the reservoir or pen body and adapted when raised to draw ink into

the reservoir, a reciprocating piston actuating member, an air vent passage extending from the nib receiving end of the pen to a point in juxtaposition to the upper end of the reservoir of the pen and means whereby during a single pull of the said actuating member said air vent is opened and the piston is raised and ink drawn into the reservoir beneath the piston, the air vent being opened in advance of the upward movement of the piston so as to provide an air escape passage above the piston, and means during downward movement of the said actuating member to transfer ink from the space beneath the piston to the space above the piston.

An embodiment of our invention briefly comprises a reservoir with a gland at its upper end sealing an axially slidable tubular piston rod connected to a pair of piston operating abutments and has a lost motion connection with one of them, the other one of which normally engages the upper side of a piston and is adapted to press the piston downwards after it has been retracted and the first of which is adapted to be drawn by retraction of said rod against the lower face of the piston to close an ink passage therein and to move the piston upwards to effect a charging stroke, the said lower abutment constituting a one-way valve and having movable with it a member adapted to isolate the reservoir from the ink outflow passage of the nib end of the pen during the movement of the valve from its normal open position to the stage when it engages and closes the ink passage in the piston, an air vent tube extending from an opening in the lower end or feed bar of the pen to a point near the upper end of the reservoir and being located at its upper end concentrically within but annularly spaced from the tubular piston rod, said tubular piston rod normally sealing the upper end of said vent tube and containing an air vent opening adapted when the tubular piston rod is raised so as to uncover the upper end of said vent tube to establish communication with the interior of the reservoir and the air vent in the space

[Price 1/-]

above the retracting piston.

Our present invention will be more clearly understood by reference to the accompanying three sheets of drawings illustrating embodiments thereof as applied to the type of self-filling fountain pen in which the reservoir is a tubular body removably accommodated within an outer sheath or casing, and wherein:—

Fig. 1 is a section through the outer sheath or casing showing the reservoir enclosed therein and the nib covered by a cap which can be removed and fitted over the upper end of the pen.

Fig. 2 is in common with the remaining Figs. 3 to 7 a section through the reservoir and filling mechanism and it shows the normal positions of the various parts.

Fig. 3 shows the first stage of a filling operation in which the reservoir is isolated from the ink outlet in advance of retracting the piston.

Fig. 4 shows the piston about to be retracted, and

Fig. 5 shows the piston retracted.

Figs. 6 shows initial stages of the return of the various parts of the mechanism to their normal positions, and

Fig. 7 shows the piston about to be returned to its normal position.

Fig. 8 is a sectional elevation view in which the pen is formed with a one piece cap and sheath.

Fig. 9 is a sectional elevation showing a modified form of outer sheath.

Figs. 10, 11 and 12 are sectional elevation views of an alternative form of our invention showing various stages and allowing for greater axial movement of the piston.

Referring to the drawings the reservoir 1 is preferably a transparent tube so that the amount of ink therein can be readily ascertained. It is closed at its lower end by a vulcanite or other suitable tubular member 2 which accommodates the feed bar 3 and nib 4, the ink flow passage being indicated by the reference numeral 5. The upper end of the reservoir is closed by a gland 6 through which is guided a piston rod 7 which as shown in Fig. 2 is tubular from a rubber or cork sealing disc 8 downwards. The tubular portion 7a of the piston rod slides over but with an annular clearance from a tube 9 which is a fixture inside the reservoir and extends from a lateral opening 9a in the feed bar 3 to a point near the top of the reservoir where it is normally sealed by being engaged by the rubber or cork disc 8. When it is required to release the piston rod 7, this can be effected by rotating the cap 10 threaded on to the gland 6 and fixed to

the upper end of the rod 7.

When it is required to charge the reservoir with ink the cap 10 is completely unscrewed from the gland 6 and a pull applied to it to retract the rod 7 which at the appropriate moment draws a piston 11 upwards along the interior of the reservoir and draws ink into the reservoir through the passage 5, the space above the piston 11 communicating with the atmosphere through the tube 9.

The raising of the piston is effected by engaging it with a valve 12 which normally occupies the position shown in Fig. 2 so that ink is free to flow through the piston and a passage 13 to the nib 4. The tube 9 acts as a guide rod for a sleeve 14 on which is formed the valve 12 and an enlargement 15 adapted to close the passage 13 upon first slight movement of the piston rod 7 outwards so that no ink can flow out of the reservoir pending the period which elapses before the valve 12 seats against the piston 11. The engagement of the enlargement 15 in the passage 13 can if desired be adapted to be effected before the piston rod cap 10 is completely unscrewed from the gland 6 thereby providing an effective seal against leakage of ink when the pen is not in use.

The valve carrying sleeve 14 is continued upwards beyond the valve into a larger diameter portion which is slotted longitudinally as indicated at 14a, the slotting meeting the dual purpose of allowing ink to flow through a central opening 14a of the piston and providing a somewhat resilient frictional slidably engagement with the lower end of a tubular slotted coupling member 16 constituting a fixed part of the lower end of the piston rod, so that when the piston rod is first drawn upwards the friction between the parts 14 and 16 will draw the enlargement 15 into the passage 13 and the valve 12 against the piston 11. Continued upward movement of the rod 7 will cause the part 16 to now slide upwards over the sleeve 14 until a diametrical pin 14b at the upper end of the sleeve is engaged by the lower end of the member 16 as shown in Fig. 4 when the previous frictional resistance of the piston to movement is overcome and the piston positively drawn upwards by the valve 12 ink being drawn into the reservoir and air displaced from above the piston through the vent tube 9. When the piston rod has been pulled out until the upper end of the part 16 abuts against the gland 6 as shown in Fig. 5 the sequence of operations is reversed by pushing the piston rod home resulting in the sleeve 14 being returned until its

enlargement 15 closes the passage 13 so that no ink can be forced out through the passage 5 when subsequently the piston is engaged by the lower end of the part 5 16 and pushed back to its normal position.

When the enlargement 15 abuts against the feed bar 3 the part 16 then slides over the upper end of the sleeve 14 and the cap 10 is screwed home.

10 The invention is particularly suitable for transparent reservoirs because the piston can be actuated until the ink reaches the desired height in the reservoir. Should it be required to air vent

15 the pen when in use to accelerate the discharge of ink the rubber or cork member 8 can be raised slightly from the upper end of the tube 9, and a vent 17 in the tubular part of the piston rod will enable

20 the air to assist in discharging the ink. It will be understood that the vent tube prevents the reservoir from being over-charged with ink so as to risk leakage through the gland 6 during a filling

25 operation.

The reservoir is preferably detachably accommodated in an outer sheath, in accordance with our co-pending Patent Application No. 10,119/1931 Serial No.

30 375,457. As shown in Fig. 1 this can be a vulcanite or other suitable tube 18 slid over the reservoir so as to abut against the cap 10 and to expose the nib receiving part 2, a cap 19 being threaded

35 on to the part 2 by threaded parts 20 and 21, and adapted to be pushed over the upper end of the sheath 18. However, if desired the cap 19, and sheath 18 can be integral parts as shown in Fig.

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In Figs. 10, 11 and 12 we have shown a somewhat simplified form of our invention in which greater ink capacity is obtained and a greater stroke is given

45 to the piston by reducing the lost motion. The vent tube 9 is still incorporated and passes through the piston 11 and a sleeve 23 into the tubular piston rod 7 which accommodates the sealing device 8 and

50 has one or more air vent apertures 17 to provide for an easy flow of air through the annular space in the piston rod 7 surrounding the vent tube 9. The open lower end of the rod 7 is threaded or

55 otherwise fixed to the upper end of the sleeve 23 and this sleeve slides easily through the piston 11 a distance determined by the space between a flanged abutment 24 and a valve member 12 on

60 its lower end so that soon after the upper end of the vent tube 9 is uncovered the valve 12 is drawn against the lower side of the piston 11 as shown in Fig. 11, sealing its central aperture 11a which is

65 normally opened, as shown in Fig. 10,

by the slots 23a in the sleeve 23 and then drawing the piston upwards for the remaining pull on the piston rod, any air above the piston being displaced through the vent tube 9. Upon completion of the retracting stroke of the piston rod, the rod is pushed inwards and the flange 24 abuts against the piston moving it back to its normal position and allowing ink to flow through the piston and slots 23a to the space above the piston. This cycle of operations is continued until it is seen through the transparent reservoir 1 that the reservoir is charged to the required extent.

The head 10 of the piston rod is threaded on to the gland 6, and in this embodiment this head is threaded externally as at 10a to provide a method of retaining the covering sheath 18 over the reservoir as described in our co-pending Patent Application No. 10,119 of 1931 (Serial No. 375,457) the sheath being screwed at one end on to the threaded part 10a as shown in Fig. 9, and formed at its other end with a thread 18a on to which is screwed a cap 19 as distinct from screwing the cap on to the reservoir as in the previously described embodiment. When the pen is in use the cap 19 is pushed over the head 10 and upper end of the sheath 18 which abuts against said head. The lower end of the sheath 18 is tapered inwards as indicated at 18b to conform with the normal configuration of pen.

85 It will be seen that this embodiment obviates the enlargement 15 and the sleeve 16.

In order to enable the various parts to be readily distinguished we have exaggerated some of the dimensions in the drawings. For example the space 22 which normally accommodates the enlargement 15 of the sleeve 14 is only slightly longer axially than the axial dimension of the said enlargement so that a very slight movement is only required to move the said enlargement into the passage 13. Likewise the amount of movement required to bring the valve 12 into contact with the piston 11 is much shorter than shown in the drawings.

90 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) In a self-filling fountain pen of the type set forth a piston sliding against the inside wall of the reservoir or pen body and adapted when raised to draw ink into the reservoir, a reciprocating piston actuating member, an air vent passage extending from the nib receiving

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end of the pen to a point in juxtaposition to the upper end of the reservoir of the pen and means whereby during a single pull of the said actuating member said air vent is opened and the piston is raised and ink drawn into the reservoir beneath the piston, the air vent being opened in advance of the upward movement of the piston so as to provide an air escape passage above the piston, and means during downward movement of the said actuating member to transfer ink from the space beneath the piston to the space above the piston.

(2) A fountain pen according to claim 1 wherein said vent passage extends concentrically within a tubular piston rod formed with a sealing abutment normally engaged with the open upper end of said passage, the said passage comprising a tube extending from an air opening in the lower end of the reservoir.

(3) A fountain pen according to claim 2 wherein said piston rod has a lost motion connection with a valve carrying member slidable over said tube and normally spaced from the lower end of the piston, said valve carrying member being slidable through the piston and having a lost motion connection to the lower or inner end of the piston rod, whereby the valve is drawn against said piston after a predetermined movement of the piston rod outwards and the piston retracted to draw ink into the space beneath the piston after the expiration of said lost motion.

(4) A fountain pen according to claim 3 wherein said valve carrying member is adapted to close an ink outflow passage between the reservoir and the nib upon a slight initial outward movement of the piston rod.

(5) A fountain pen according to claim 3 or 4 wherein said valve carrying member is a sleeve slidable axially in the reservoir and through the piston, the said valve being formed on it between its ends, the sleeve being apertured longitudinally above the valve to provide an ink passage through the piston, the portion of the sleeve above the piston having a frictional and lost motion connection with the lower end of the piston rod, the arrangement being that when the said valve is drawn into engagement with the piston, the friction of the piston will hold the sleeve against further axial movement until the piston rod has been drawn outwards sufficiently to overcome said lost motion whereupon the piston is raised to draw ink into the reservoir.

(6) A fountain pen according to claims 4 and 5 wherein the said sleeve is formed at its lower end with an enlargement

adapted upon a slight initial outward movement of the piston rod to be drawn into and to close said ink outflow passage, and upon engagement of the valve with the piston to be drawn upwards clear of said passage.

(7) A fountain pen according to claim 2 or 3 wherein the piston rod is tubular for a portion of its length to accommodate the upper end of said air vent passage or tube, and is formed at the upper end of its tubular portion with a rubber or other suitable sealing member adapted to be seated against the upper end of said vent passage or tube when the piston rod is fully home.

(8) A fountain pen according to claim 7 wherein the upper end of the piston rod is fixed to a cap threaded on to the upper end of the reservoir whereby a partial unscrewing of said cap separates said sealing member from the said passage or tube and admits air to the reservoir.

(9) A self-filling fountain pen of the type set forth comprising a transparent reservoir, a gland closing its upper end, an axially slidable tubular piston rod slidable through said gland, said piston rod being connected to a pair of piston operating abutments and having a lost motion connection with one of them, the other normally engaging the upper side of a piston slidable as a tight fit in the reservoir, said abutment engaging the upper side of the piston being adapted to press the piston downwards after the piston has been operated to draw ink into the reservoir, and the first abutment being adapted to be drawn by retraction of said rod against the lower face of the piston to close an ink passage therein and to move the piston upwards to effect a charging stroke, the said lower abutment constituting a one-way valve and having movable with it a member adapted to isolate the reservoir from the ink flow passage of the nib end of the pen during the movement of the valve from its normal open position to the stage when it engages and closes the ink passage in the piston, an air vent tube extending from an opening in the lower end or feed bar of the pen to a point near the upper end of the reservoir and being located at its upper end concentrically within but annularly spaced from the tubular piston rod, said tubular piston rod normally sealing the upper end of said vent tube and containing an air vent opening adapted when the tubular piston rod is raised so as to uncover the upper end of said vent tube to establish communication with the interior of the reservoir and the air vent in the space above the retracting piston.

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(10) A fountain pen according to claim 1 or 2 wherein the piston rod or actuating member is secured relatively immovably to a sleeve slidable through the piston and formed with an abutment adapted to engage the upper side of the piston and with a valve at its lower end normally spaced from the piston and adapted to be drawn against the piston to close an aperture therein and to carry the piston upwards to effect a suction action to charge the reservoir with ink.

(11) A fountain pen according to claim 10 wherein said sleeve is slidable relative to the piston pending the engagement of either said abutment or valve with the piston and is apertured to normally permit ink to flow through the piston.

(12) A self-filling fountain pen having a transparent reservoir wherein a vent tube extends from a passage in the nib retaining member or feed bar directly into the reservoir and through a sleeve into a hollow piston rod, the said sleeve and piston rod moving as a single unit coaxially relative to said tube and the said sleeve being formed with an abutment

between its ends and a valve at its lower end, said valve being adapted to be drawn against the piston to seal a passage therein so that ink is sucked into the reservoir, and the said abutment being adapted to be pushed against the piston to return it to its normal position, one or more openings in said sleeve to allow ink to flow through the piston, and a sealing device inside the piston rod normally closing the upper end of the said vent tube.

(13) A fountain pen according to any of the preceding claims wherein a sheath is slid over the reservoir and threaded at its upper end on to the upper end of the reservoir, the lower end of the sheath having a cap threaded on to it.

(14) A self-filling fountain pen substantially as described with reference to the accompanying drawings.

Dated this 2nd day of April, 1931.

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Fig. 4.

4b

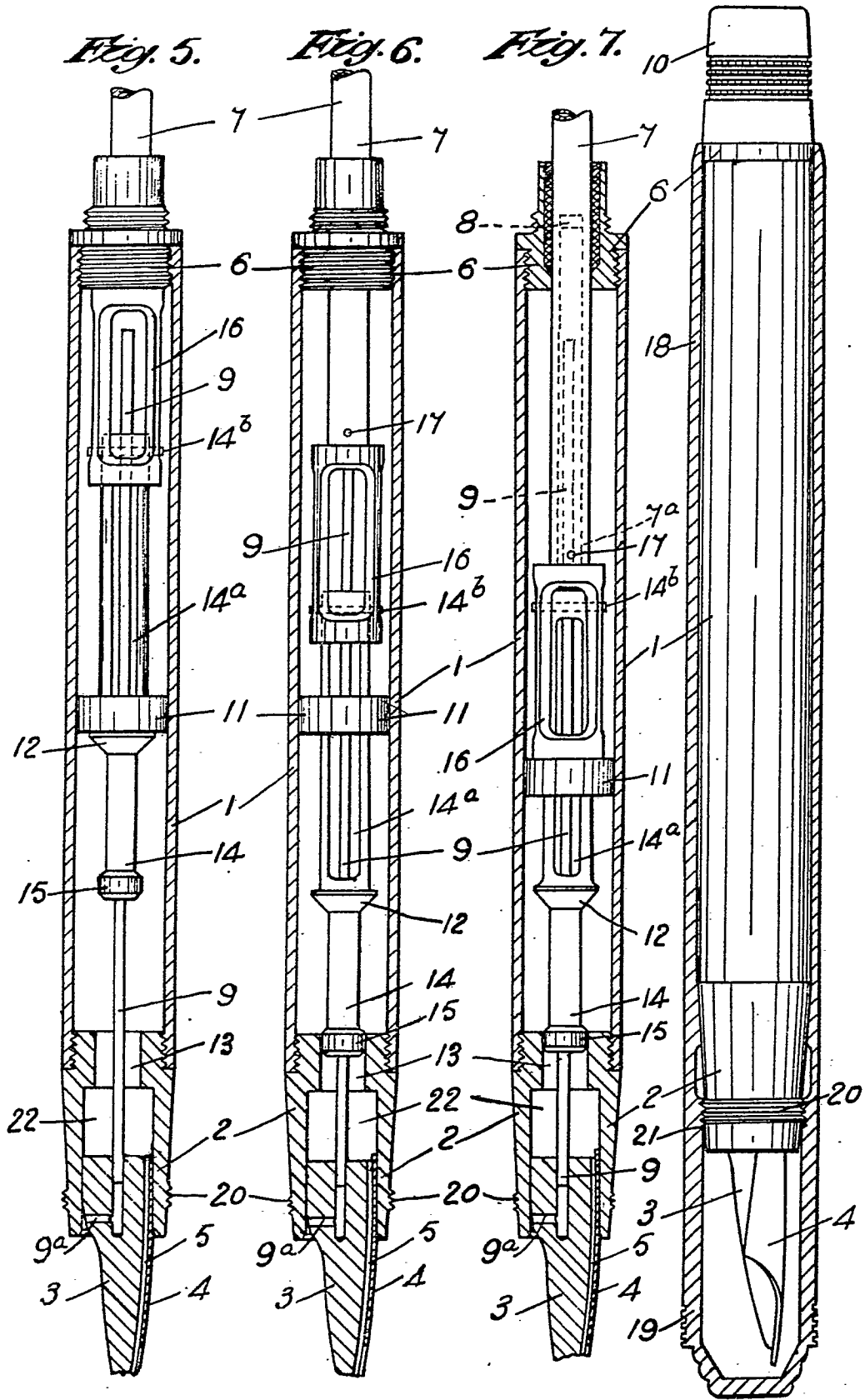
14a

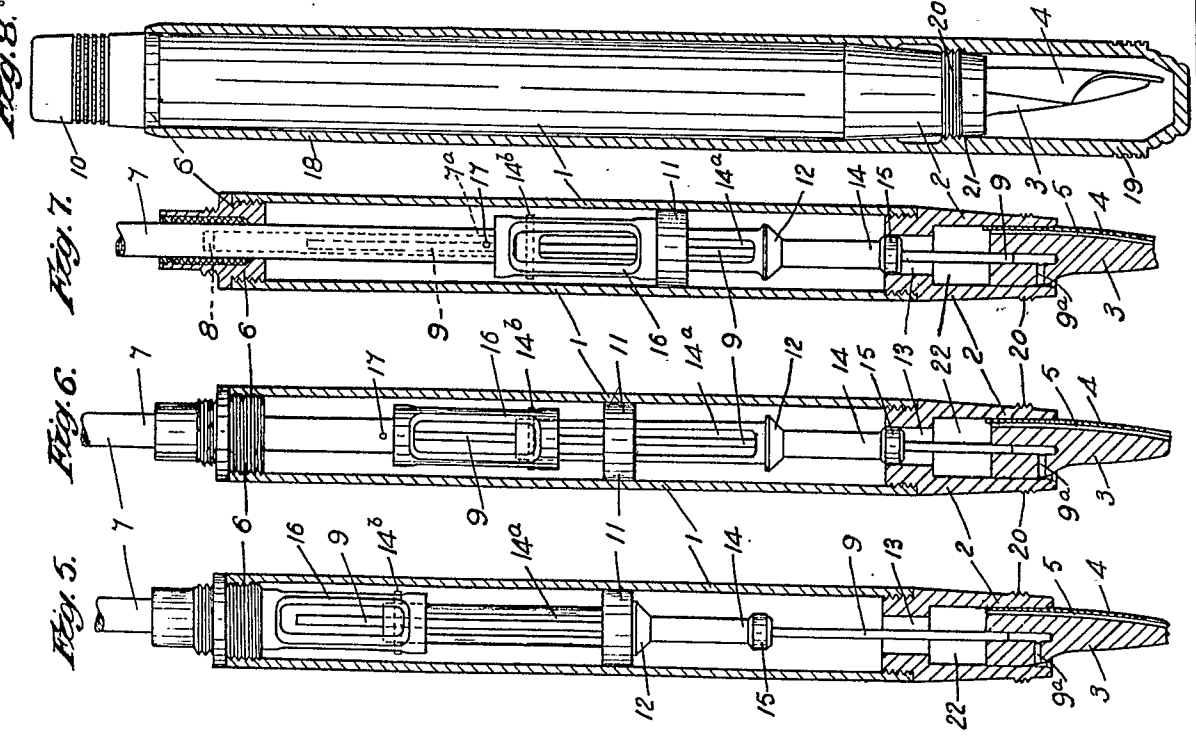
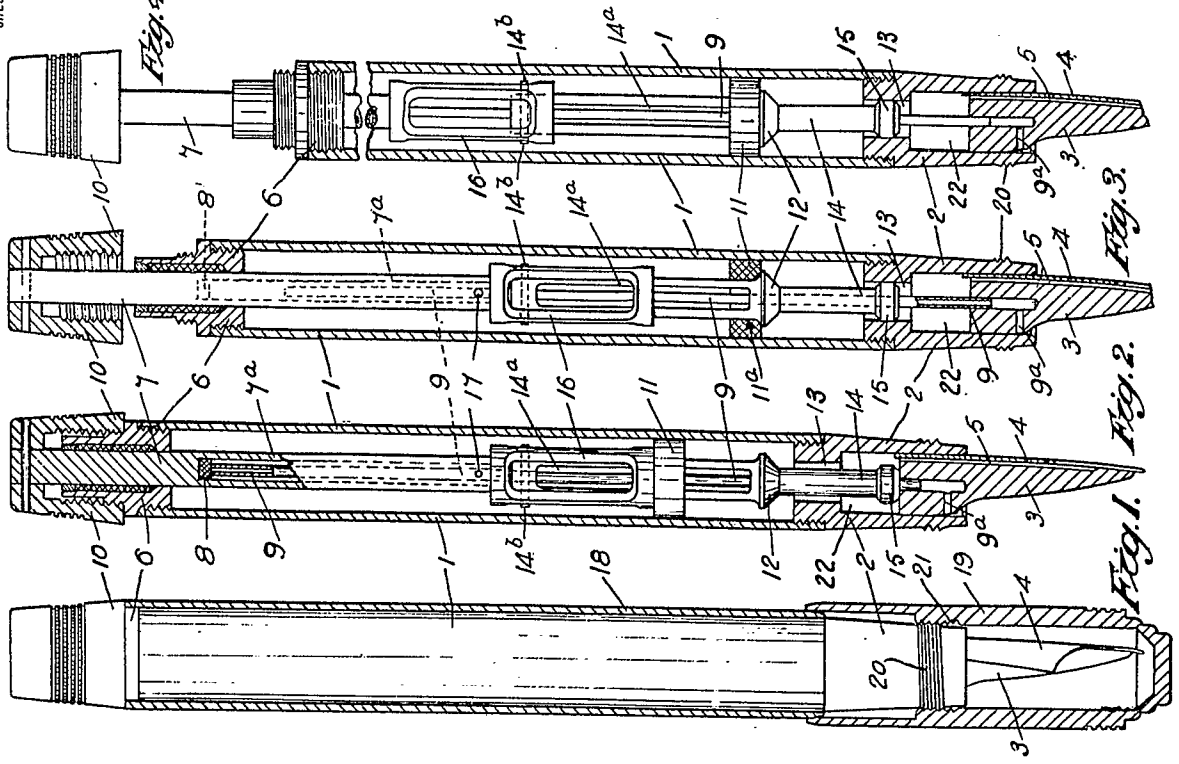
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