

July 27, 1943.

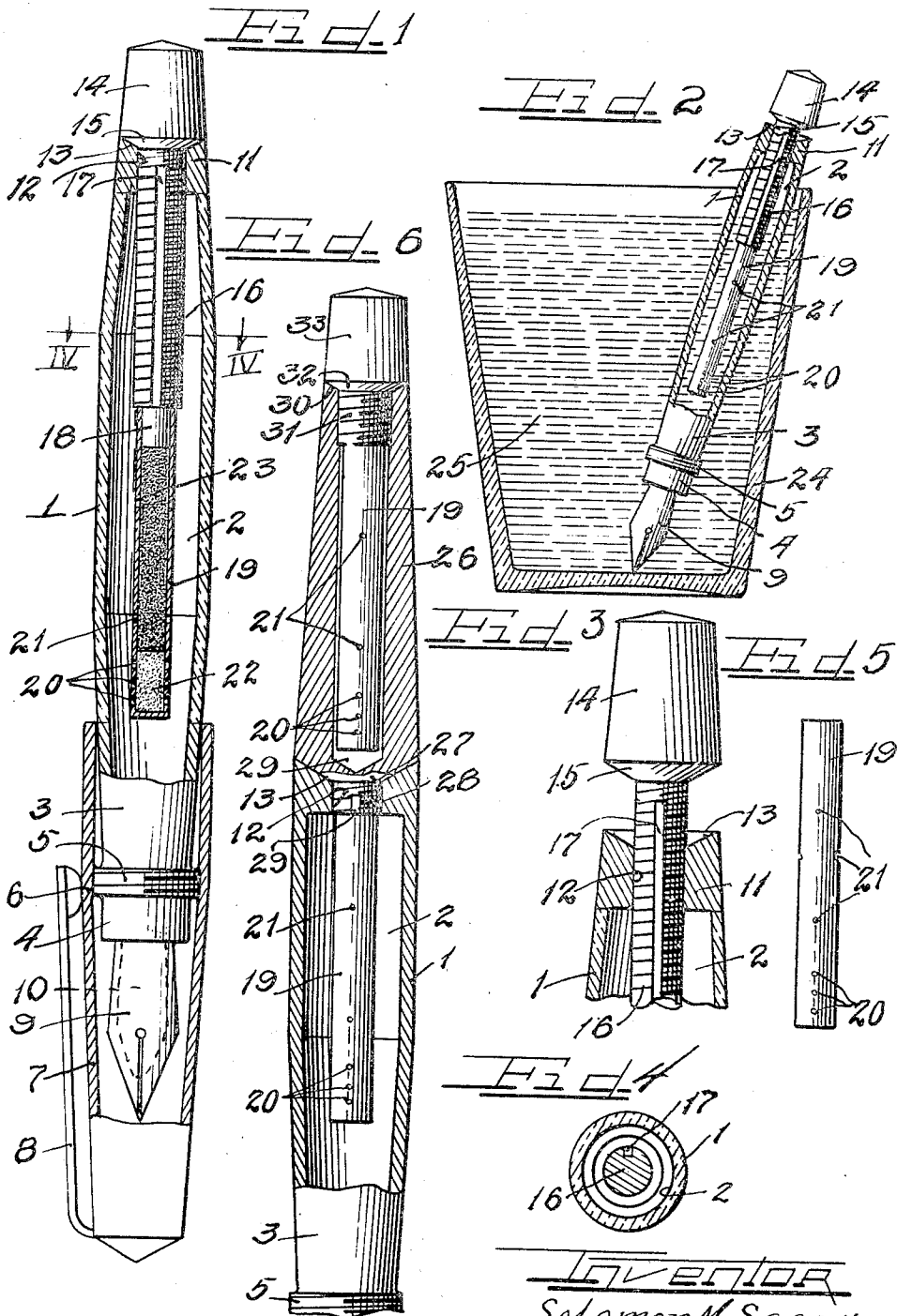
S. M. SAGER

2,325,550

FOUNTAIN PEN

Filed June 4, 1942

2 Sheets-Sheet 1



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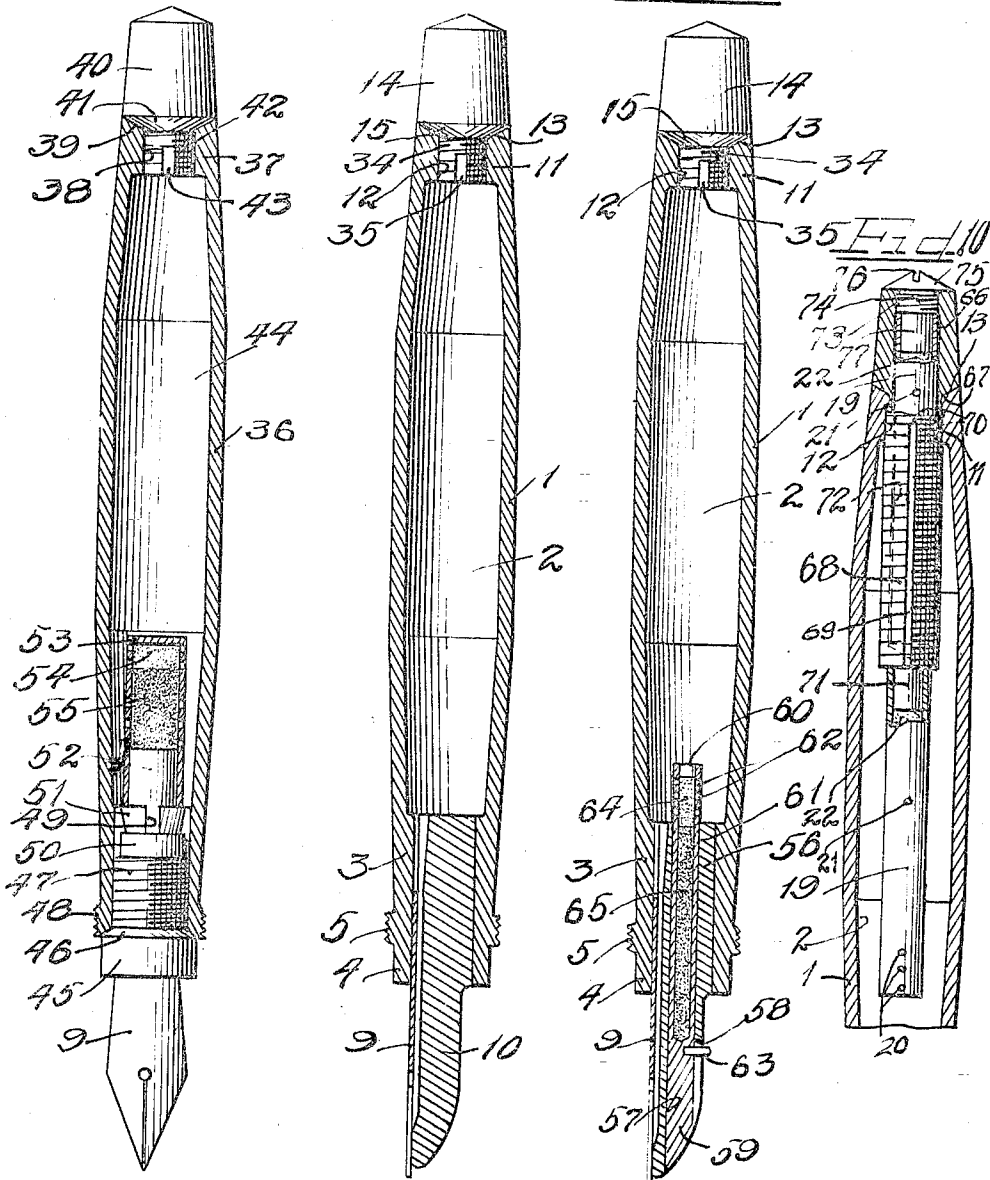
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2 Sheets-Sheet 2

Fig. 8

Fig. 7

Fig. 9



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UNITED STATES PATENT OFFICE

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FOUNTAIN PEN

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Application June 4, 1942, Serial No. 445,703

10 Claims. (Cl. 120—42)

This invention pertains to fountain pens and more particularly to an improved and simplified form of pen adapted to be filled with a liquid by the action of atmospheric pressure by means of an air control mechanism operable when the pen is inserted in liquid to first permit atmospheric filling of the pen and then operable to trap the entered charge in the pen before the pen is removed from the liquid. It will thus be noted that the invention relates to a fountain pen wherein the ordinary manually operable types of filling mechanisms such as lever-operated rubber sacks, pump mechanisms or plunger means are all replaced by a simple air control valve means which simply has to be opened and closed when the pen is projected into a supply of liquid to cause filling of the pen in an amount proportional to the degree of submergence of the pen in the liquid.

It is an object of this invention to provide improved and simplified forms of fountain pens wherein the filling of the pen is accomplished by means of atmospheric pressure.

It is also an object of this invention to provide an improved and simplified form of fountain pen containing a dry ink charge and adapted to be filled with a liquid by the action of atmospheric pressure by the simple operation of an air control valve means when the pen is projected into a supply of the liquid.

It is a further object of this invention to provide an improved type of fountain pen adapted to carry a dry ink containing cartridge and having an air control valve means adapted to be opened when the pen is projected into a supply of water to permit atmospheric pressure filling of the pen with the water and further adapted when closed to trap the entered charge of water in the pen to permit the water in the pen to dissolve the dry ink to form a supply of writing fluid in the pen.

It is furthermore an object of this invention to provide a fountain pen which merely uses an air control valve means for accomplishing the filling and trapping of a charge of liquid in the pen, said liquid being either a prepared fluid ink or a liquid such as water which coats with and dissolves a dry ink in the pen when the pen is of a type which carries a dry ink containing cartridge.

Another object of the invention is to provide a fountain pen including an air control means which is operable to permit filling of a pen with a liquid by means of atmospheric pressure when the pen is inserted into a supply of liquid a dis-

5 tance determining the degree of filling of the pen with the filling method being accomplished by merely opening and then closing the valve control means.

8 Still another object of the invention is the provision of a fountain pen constructed to carry an apertured dry ink containing cartridge the dry ink of which is adapted to be taken into solution as needed by a liquid admitted into the pen by the action of atmospheric pressure by opening and then closing an air-escape control mechanism forming part of the fountain pen and operable when the pen is projected into a liquid.

10 Still another object of the invention is the provision of an improved and simplified form of fountain pen including a barrel having a feed bar and pen point engaged in one end thereof while the opposite open end thereof is equipped with an air control valve cap unit formed to carry a reserve dry ink cartridge therein and a service dry ink cartridge on the exterior thereof for projection into the pen barrel, said valve cap unit adapted to be operated so that the opening and closing thereof governs the atmospheric pressure filling of the pen with a liquid when the pen is projected into a supply of the liquid.

15 It is also an object of this invention to provide a water and dry ink type of fountain pen for admitting a charge of water into the pen by atmospheric pressure and including an apertured cartridge containing a plurality of different charges of dry ink having different degrees of solubility in the water so that the charges may be consecutively consumed in the order of their degree of solubility in water.

20 It is an important object of this invention to provide an improved and simplified form of fountain pen in which a dry ink carrying cartridge may be carried by an air control valve mechanism, by the fountain pen section or by the fountain pen feed bar so that the charge of dry ink in the cartridge is accessible to be taken into solution by a charge of water adapted to first be admitted into the pen by the action of atmospheric pressure and then adapted to be trapped in the pen by the operation of the air control valve means.

25 A further important object of the invention is to provide a fountain pen which may be filled with either ink or water or any other liquid by the action of atmospheric pressure when the pen is partially submerged and when an air passage control valve in the exposed end of the pen is first opened and then closed.

30 Other and further important objects of this

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invention will be apparent from the disclosures in the specification and the accompanying drawings.

The invention (in preferred forms) is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is an enlarged elevational and partially sectional view of an improved fountain pen embodying the principles of this invention.

Figure 2 is a sectional view of a container or glass substantially filled with water and showing the writing end of the fountain pen with the main cap removed, projecting into the glass of water to permit filling of the pen by the action of atmospheric pressure an amount equal to the submergence of the pen in the water when the control valve is opened.

Figure 3 is an enlarged fragmentary elevational view of the upper end of the pen illustrating the passaged air control valve means engaged through the valve seat end of the pen barrel.

Figure 4 is a transverse detail section taken on line IV—IV of Figure 1.

Figure 5 is an elevational view of a dry ink carrying cartridge removed from the pen.

Figure 6 is a fragmentary sectional and elevational view of a modified form of the pen wherein the barrel closure head or cap is provided with a dry ink carrying cartridge for insertion into the pen barrel and with a reserve dry ink carrying cartridge in a chamber of the barrel head.

Figure 7 is a longitudinal sectional view of a modified form of fountain pen with the air control valve head shown in elevation and in closed position and illustrating a pen in which it is not necessary to provide a dry ink cartridge if it is desired to fill the pen by projecting the writing end thereof in a supply of ink when the air control means is opened.

Figure 8 is an enlarged longitudinal sectional view partly in elevation of another modified form of fountain pen wherein a dry ink cartridge is carried on the inner end of a removable section for the fountain pen.

Figure 9 is a longitudinal sectional view, partly in elevation, of another modified form of fountain pen wherein a combination plug and dry ink cartridge is removably inserted longitudinally in the feed bar of the pen.

Figure 10 is an enlarged fragmentary elevational and sectional view of the upper end of a modified form of pen wherein the barrel closure head or cap and the threaded stem thereof are both chambered to serve as a reserve dry ink magazine for carrying an extra dry ink cartridge on a closure head or knob for the chamber, and wherein the threaded stem also carries a dry ink service cartridge on the end thereof for insertion into the ink forming chamber of the pen barrel to provide a reserve dry ink magazine type pen with a full length barrel.

As shown in the drawings:

Referring to Figures 1 to 5, inclusive, an improved type of fountain pen is disclosed which includes a pen barrel or body 1 which is constructed of an opaque material, a transparent material or a combination of both with the transparent material preferably being used intermediate the ends of the pen to afford a view of the interior ink chamber 2 in order that the amount of ink or liquid within the barrel chamber 2 may be readily ascertained. The lower end of the barrel or body 1 is tapered to form an integral section 3 the outer end of which ter-

minates in an extension sleeve or collar 4 which serves as an ink guard member. Integrally formed around the lower portion of the fountain pen barrel between the section 3 and the ink guard sleeve or collar 4 is a threaded ring flange 5 which is adapted to be removably engaged by a threaded portion 6 provided on the interior of a main fountain pen cap 7. The main fountain pen cap 7 is provided to cover the writing end of the fountain pen when the pen is not in use and may be removed and engaged on the upper end of the pen barrel when it is desired to use the pen. The main cap 7 is provided with a retaining tip for holding a pen clip 8 in position on the cap.

Projecting through the ink guard 4 and tightly into the section 3 of the fountain pen barrel is a pen point or nib 9 and a feed bar 10.

The upper end of the fountain pen barrel or body 1 is formed with an end wall 11 which is provided with an axial threaded opening or passage 12 which communicates with the ink chamber 2 at its inner end and having its outer end communicating with or ending in a valve seat 13 formed in the outer end of the end wall 11 of the fountain pen barrel.

The upper end of the fountain pen barrel is adapted to be completed and closed by means of an auxiliary cap or head 14 the inner end of which is formed to provide a valve 15 adapted to be tightly seated in the valve seat 13 to close the upper end of the fountain pen barrel with an airtight seal. Integrally formed on the inner or valve-end of the auxiliary cap or head 14 is a threaded stem or shank 16 which is threaded through the threaded opening 12 in the end wall 11 of the barrel and projects into the ink chamber 2. The threaded shank 16 is provided with a longitudinally disposed air groove or passage 17. The air groove or passage 17 serves as an escape for air coming from the interior of the fountain pen barrel when the control valve at the upper end of the fountain pen barrel is opened.

Integrally formed on the inner end of the closure stem 16 is an extension or plug 18 on which the open end of a dry ink carrying unit is adapted to be removably engaged.

The dry ink carrying unit comprises a cartridge or shell 19 open at one end and closed at the opposite end. The cartridge or shell 19 may be formed of any suitable material and is provided with a plurality of openings or apertures 20 at the closed end of the cartridge and with a plurality of widely spaced apertures 21 in the intermediate portion of the cartridge, as clearly illustrated in Figure 5. The cartridge 19 is charged with dry ink. In the form of cartridge illustrated in section in Figure 1 the cartridge or shell 19 is of a multiple type containing a primary charge 22 of dry ink which is relatively small and is engaged in the closed end of the cartridge in the vicinity of the closely associated apertures 20. The cartridge also contains a secondary or major charge 23 of dry ink which contacts the primary charge 22 at one end and extends through the major portion of the cartridge leaving a recess at the open end of the cartridge to permit the cartridge to be secured on the plug 18 as shown in Figure 1.

The primary charge 22 of dry ink in the cartridge consists of a quantity or supply of highly soluble dehydrated dry ink the particles of which are bound together by a suitable soluble binder so that the primary charge 22 is composed of material which is practically 100 per cent soluble

and adapted to be readily dissolved by water admitted into the barrel 7 to form a quick supply of writing fluid which is almost instantaneously available for writing purposes when the fountain pen is filled with water as hereinafter more fully described. The major or secondary charge 23 of dry ink is substantially larger than the primary charge and consists of dry ink or dehydrated ink particles which are secured together by a suitable soluble binder and subjected to greater pressure to produce a dry ink charge which is more slowly soluble when subjected to the action of water. A dry ink cartridge is thus provided with double or multiple charges of dry ink to provide a primary or priming charge which when subjected to the action of water will produce a quick charge of writing ink thereby permitting the dry ink charge of slower solubility to be subsequently absorbed after the primary charge has been used up. It is to be understood that while the multiple type of dry ink cartridge has dry ink charges made accessible to the action of water by means of the apertures in the cartridge that the dry ink charges are not entirely dissolved at once but are gradually dissolved depending upon the rate at which the dry ink can be carried in solution by the water.

After a quantity of ink has been produced in the fountain pen successive charges of water may be taken into the pen to produce additional quantities of ink before the contents of the dry ink cartridge is completely consumed. The quantity of dry ink carried by a single cartridge has been devised to produce substantially an ounce of writing fluid or an amount equivalent to the quantity which is usually provided in the ordinary bottle of ink usually purchased for filling fountain pens.

While a multiple type of dry ink cartridge has been illustrated and described it will of course be understood that an apertured cartridge may be provided with but a single charge of dry ink if so desired.

Attention is called to the improved method whereby the fountain pen of this invention may be filled without requiring the mechanical operation of filling mechanisms, by simply employing the action of atmospheric pressure. The improved method merely consists of using a container or glass 24 and filling the same with a quantity of water 25. With the fountain pen valve 15 in closed position as illustrated in Figure 1 and with the main cap 7 removed from the writing end of the pen, the pen point end of the pen is projected downwardly into the water 25 to a depth which will determine the amount of filling of the pen barrel 1. With the writing end of the pen projected into the water as illustrated in Figure 2 the auxiliary cap or head 14 is rotated thereby opening the air control valve 15 and simultaneously exposing or opening one end of the air passage 17 in the stem 16. By opening the control valve the action of atmospheric pressure on the top surface of the water 25 will cause the water to be forced upwardly into the ink chamber 2 of the fountain pen barrel 1 until the level of the water in the chamber 2 registers with the level of the water in the glass 24. It will thus be noted that the further the pen is projected into the water the greater the degree of filling of the ink chamber 2 of the pen barrel. After the water has been forced upwardly by atmospheric pressure into the pen barrel, the auxiliary cap or head 14 is again turned to cause the valve 15 to seat tightly against the valve seat 13 thereby shutting off the air escape passage 17 and trapping the charge of water within the chamber 2 of the

pen barrel. The filled pen may now be removed from the glass or from the liquid into which it has been projected and it is then only necessary to wipe the water from the exterior of the previously submerged portion of the fountain pen.

With the pen filled by means of the action of atmospheric pressure with a charge of water, the charge of water contained in the pen will pass through the apertures 20 of the cartridge 19 as well as through the apertures 21. Since the primary dry ink charge 22 is quickly soluble the water passing through the apertures 20 will immediately act on the primary drying charge 22 to dissolve a quantity of the same to produce a quick charge of writing fluid in the fountain pen ink chamber 2. This produces what might be termed a priming or initial charge of ink fluid in which the primary charge 22 is first taken into solution by the water within the fountain pen after which the slower dissolving secondary dry ink charge 23 is taken into solution. The single charge of water in the fountain pen will of course only take into solution a predetermined amount of the dry ink to produce a given quantity of writing fluid which when used up may be replenished by again inserting the pen in the container of water to admit an additional charge of water by the action of atmospheric pressure into the fountain pen. This process may be repeated until the entire charge of dry ink within the cartridge in the fountain pen barrel is used up.

To replace the empty cartridge 19 within the fountain pen barrel it is only necessary to turn the secondary cap or head 14 until the stem 13 is completely removed from the barrel thereby permitting the empty cartridge to be removed from the stem plug 12 to be replaced by a filled dry ink carrying cartridge.

It will thus be seen that an improved simplified method of filling a fountain pen is made possible with the use of the improved pen, hereinbefore described, by the mere use of an air control valve mechanism in the upper end of the pen with the assistance of atmospheric pressure when the pen is inserted into a quantity of water and the valve mechanism is opened as described.

Referring to Figure 6 a magazine desk set type of combination water and dry ink fountain pen is illustrated in which the body and writing end of the pen is substantially the same as that illustrated and described in connection with Figures 1 to 5, inclusive, except that the length of the auxiliary cap or head is increased and chambered to form a magazine for carrying a reserve dry ink cartridge.

In the modified form of pen illustrated in Figure 6 a magazine type of secondary cap or head unit is provided for coaction with the valve seat end of the fountain pen barrel 1. The secondary cap or head unit comprises a secondary cap or head 26 with the inner end of said head shaped to form a valve 27 for coaction with the valve seat 13 of the pen barrel. Integrally formed on the valve end of the head 26 is a threaded stem 28 provided with an air passage 29. The threaded stem 23 is threaded through the threaded passage 12 in the end wall 11 of the pen barrel and is provided on the end with a plug similar to the plug 18 of Figure 1 to carry a removable dry ink carrying cartridge 19 to hold the same axially supported within the ink chamber 2 of the pen.

In order that a reserve supply of dry ink may be carried by the fountain pen the secondary cap or head 26 is provided with a dry ink cartridge carrying recess or chamber 29 to form a reserve

magazine for carrying an extra dry ink cartridge. The outer end of the secondary cap or head 26 is provided with a threaded passage and with a valve seat 30. Threaded into the threaded passage is a threaded stem 31 which is formed on the valve end 32 of a closure head or plug 33 which when in place forms a finished end for the fountain pen body. The inner end of the threaded stem 31 is provided with a plug portion similar to the portion 18 of Figure 1 to form a support for the open end of a reserve dry ink carrying cartridge 19, which is adapted to be positioned within the magazine chamber 29 so that when the cartridge in the fountain pen chamber 2 is empty the reserve dry ink carrying cartridge may be substituted in its place.

The modified form of fountain pen illustrated in Figure 6 is adapted to be filled by the same simple method described in connection with the pen shown in Figures 1 to 5, inclusive.

Referring to Figure 7 a modified form of atmospheric pressure filling fountain pen is illustrated in which the dry ink carrying cartridge is omitted to provide a fountain pen which may be directly projected into a supply of fluid ink after which the air control valve unit is opened to permit a supply of ink to be forced into the fountain pen barrel by the action of atmospheric pressure to a height corresponding to the distance of submergence of the pen in the liquid ink. After the pen has been filled with a charge of writing ink the air control valve unit is closed before the pen is removed from the ink supply to trap the entered charge of ink within the pen after which the pen is removed from the ink supply and the exterior of the submerged portion of the pen may be simply wiped off leaving the pen ready for use.

The modified form of fountain pen illustrated in Figure 7 is similar to the construction of the pen illustrated in Figures 1 to 5 and the like parts are indicated by corresponding reference numerals. In this modified form of the pen the only difference is that the long threaded stem 16 is replaced by a short threaded stem 34 which is provided with an air escape passage 35.

While the modified form of fountain pen illustrated in Figure 7 is adapted for use without a dry ink carrying cartridge so that the fountain pen may be filled with a liquid ink instead of making an ink in the fountain pen barrel by the use of water and dry ink, it will be understood that the type of pen illustrated in Figure 1 may also be projected into liquid ink and filled with a supply thereof in case the dry ink carrying cartridge has the dry ink supply thereof used up and another dry ink cartridge is not handy or available at the time that the pen requires re-filling.

Figure 8 illustrates another modified form of combination water and dry ink fountain pen adapted to be filled by the action of atmospheric pressure through the medium of opening and closing a valve control unit when the pen is submerged in a liquid such as water.

The form of pen shown in Figure 8 comprises a barrel or body 36 which may be constructed of an opaque material or of a combination opaque material and transparent material. The barrel 36 at its upper end is closed by means of an end wall 37 provided with a threaded opening or passage 38 the outer end of which terminates at a valve seat 39. Adjustably engaged in the end wall 37 of the fountain pen barrel is an air control valve unit comprising a secondary cap or head 40 the inner end of which is formed to

provide a valve 41 which when the head is in closed position is adapted to seat on the valve seat 39 to close the upper end of the fountain pen barrel. Integrally formed on the valve portion 41 of the head 40 is a threaded stem 42 which is provided with an air passage or groove 43 to permit escape of the air from the ink chamber 44 of the fountain pen barrel 36 when the valve 41 is in open position.

The bottom or opposite end of the barrel 36 is provided with a threaded collar or flange 48 for permitting a main closure cap for the writing end of the pen to be threaded onto the barrel.

Removably engaged in the lower or exteriorly threaded end of the barrel 36 is a fountain pen section unit comprising a guard 45 formed with a valve 46 and with a threaded shank 47 to permit the section to be removably threaded into an interiorly threaded portion of the barrel 36 to permit the valve 46 of the guard 45 to seat against the valve seat formed in the lower end of the barrel, to provide an air-tight fit between the guard 45 and the pen barrel.

Engaged in the pen guard 45 is a pen point or nib 9 and a feed bar 10. The ink feed grooves of the feed bar are positioned to register with an ink outlet groove or slot 49 which connects up with a portion 50 formed at the inner end of the threaded shank 47 of the section. The ink outlet groove or slot 49 is formed in a tapered collar 51 which is integrally formed around a base portion of a head or plug 52 integrally formed on the inner end of the pen section or guard 45.

Removably engaged on the section plug 52 and projecting into the chamber 44 of the barrel 36, is the open end of an apertured ink cartridge 53 containing a primary charge of dry ink 54 and a secondary charge of dry ink 55 to be respectively dissolved by a charge of water in the chamber 44. The pen is adapted to be filled with a charge of water by the action of atmospheric pressure, when the control valve 41 is opened by operation of the head 40 and when the writing end of the pen is projected into a container of water similar to the arrangement illustrated in Figure 2 of the drawings. By referring to Figure 8 it will be noted that the base collar 51 of the pen section serves as a stop for the open end of the ink carrying cartridge when the cartridge is engaged on the supporting plug 52.

Referring to Figure 9 of the drawings another modified form of combination water and dry ink type of fountain pen is illustrated. It comprises a pen body and an air control valve unit similar to that illustrated and described in connection with the pen shown in Figure 7 and corresponding parts of the pen body and the valve unit are correspondingly numbered.

In the modified form of fountain pen disclosed in Figure 9 a dry ink cartridge carrying feed bar unit together with a pen point or nib 9 is engaged in the lower section end of the body or barrel of the fountain pen. The ink carrying feed bar unit comprises a feed bar 56 provided with a longitudinal passage 57 and with a notch 58 in one side of the outer end portion thereof. Frictionally engaged longitudinally in the feed bar slot 57 is a combination feed bar plug and dry ink carrying cartridge unit comprising a plug portion 59 the inner end of which is recessed to provide a dry ink chamber 60 to form a dry ink carrying cartridge or shell 61 having a plurality of apertures 62 provided around the inner

end portion thereof where the cartridge projects into the ink chamber of the fountain pen barrel. Engaged radially in the outer portion of the plug 59 is a pin 63 which when the plug is properly inserted in the feed bar 56 will seat in the inner end of the notch 58. The chamber 60 of the combination plug and dry ink carrying cartridge is filled with a primary charge of dry ink 64 and a secondary charge of dry ink 65 which is more slowly dissolvable than the primary charge of dry ink 64.

It will be noted that the modified form of fountain pen illustrated in Figure 9 is similar to the type of pen illustrated in Figure 7 the only difference being in that the standard type of feed bar 10 of Figure 7 is replaced by the cartridge carrying type of feed bar 56. The fountain pen illustrated in Figure 9 is adapted to be filled with a charge of water by the action of atmospheric pressure when the writing end of the pen is inserted into a container of water and the valve control mechanism at the upper end of the pen is operated as hereinbefore described to first admit a charge of water into the fountain pen barrel and then trap the entered charge by closing the valve control mechanism.

Figure 10 illustrates a modified magazine type of combination water and dry ink fountain pen wherein both the auxiliary cap or head and the threaded stem thereof are formed with a reserve dry ink chamber, which may be closed by means of slotted tip or button on the inner end of which a reserve dry ink cartridge is carried to project into the reserve chamber.

In this modified form of the fountain pen the body of the pen is the same as that illustrated in Figure 1 and corresponding parts are numbered accordingly.

The valve seat end of the pen barrel 1, is adapted to be closed by means of a combination barrel closure magazine unit comprising an auxiliary head or cap 66 the inner end of which is formed to provide a valve 67 adapted to tightly seat in the barrel valve seat 13 to close the upper end of the pen barrel with an air-tight seal. Integrally formed on the inner or valve end of the cap or head 66 is a threaded stem or shank 68 which is threaded through the opening 12 in the barrel end wall 11 to project into the ink chamber 2. The threaded stem 68 is provided with a longitudinal air groove or passage 69 which extends from the bottom of the stem 68 to a point 70 a short distance below the upper end of the threaded portion of the stem. The air groove or passage 69 serves as an escape for air from the ink chamber 2 when the control valve 67 is opened an amount sufficient to bring the upper end of the groove 69 up to the valve seat 13.

Integrally formed on the inner end of the closure stem 68 is an extension or plug 71 on which the open end of a dry ink cartridge 19 is engaged to project into the ink forming chamber 2 of the pen barrel. The cartridge 19 is shown as carrying a single charge for dry ink 22.

For the purpose of carrying a reserve supply of dry ink the cap or head 66 is formed as a magazine by providing a dry ink reserve chamber 72 which extends through the cap or head 66 downwardly into the stem 68. The upper end of the chamber 72 is threaded at 73 to receive the threaded shank 74 of closure tip or button 75 which provides a finished end for the fountain pen valve head or cap 66. The tip or button 75 is formed with a diametrical slot or groove 76 to receive the edge of a coin or any suitable

tool or device to remove the tip 75 or secure the same in place.

Integrally formed on the inner end of the tip shank 74 is a projection or plug 77 for receiving the upper end of a reserve dry ink carrying cartridge 19 engaged thereon within the magazine chamber 72. This arrangement permits the carrying of an extra supply of dry ink, without interfering with the length or capacity of the fountain pen barrel. If desired a dry ink cartridge 19 may be used carrying only a single charge of dry ink 22 or 23 as preferred, instead of a double charge as shown in Figure 1.

While the fountain pens have been illustrated and described as using dry ink carrying cartridges of either a single or multiple charge type, it will of course be understood that the cartridges may be replaced, if desired, by dry ink pellets which may be deposited in the ink forming chamber 2 of the pen barrel 1 through the upper end of the barrel by merely removing the upper cap or head and its threaded stem.

It will thus be noted that an improved type of fountain pen has been devised wherein the filling of the pen is not dependent upon the manual operation of filling mechanisms which are completely omitted since the pen is adapted to be filled by the action of atmospheric pressure when the writing end of the pen is submerged in a liquid and a control valve mechanism is first opened to permit atmospheric pressure filling of the pen with the liquid after which it is only necessary to close the valve mechanism to trap the charge of liquid in the pen.

The construction of the pen is such that by the omission of mechanical filling mechanisms, the liquid chamber of the pen is of substantially maximum capacity. The degree of filling of the liquid chamber is controlled by the distance that the writing end of the fountain pen is inserted into a supply liquid permitting the liquid to flow upwardly into the pen by the action of atmospheric pressure until the level of the liquid in the pen is in register with the level of the liquid into which the pen is projected. The pen is of such a simple construction that the filling and the trapping of a charge of liquid in the pen is merely controlled by the opening and closing of an air escape control valve mechanism preferably positioned at the upper end of the pen barrel opposite the writing end of the pen.

It will of course be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and, it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. In a water carrying type of fountain pen, a dry ink unit for insertion therein, and comprising a shell having apertures therein, a primary charge of highly soluble dry ink in said shell, and a secondary charge of slower dissolving dry ink in the shell to be taken into solution by the water in the pen after the primary charge of dry ink has been consumed for the making of a writing fluid in the pen.

2. The combination with a water and dry ink type of fountain pen, of a dry ink unit for use therein and comprising an apertured shell, and a plurality of charges of dry ink engaged therein each having a different degree of solubility for successive use in the pen for absorption by the water to produce a writing fluid for the pen.

3. In a water and dry ink type of fountain pen, including a dry ink unit comprising a shell having a plurality of closely associated apertures and widely spaced apertures in different portions thereof, and dry ink charges of different degrees of solubility carried in the shell with the dry ink of greater solubility positioned adjacent the closely spaced apertures and with the dry ink of slower solubility positioned for access by the widely spaced apertures.

4. A fountain pen adapted to be filled with a liquid by inserting the writing end of the pen into the liquid a distance depending upon the height to which the pen barrel is to be filled, allowing the liquid to flow upwardly into the barrel by the action of atmospheric pressure and simultaneously venting the air in the barrel through an outlet in the other end of the barrel, and trapping liquid in the barrel by closing the air outlet, said pen comprising a barrel, writing means at one end thereof, an opening at the other end thereof and a valve seat formed on the periphery of said opening, a threaded plug projecting into said barrel and through said opening and having means cooperable with the inner face of the barrel to form a passage for the escape of air when the pen is being filled with liquid, a valve formed on said plug for seating on said valve seat to close said opening and shut off said air passage and trap the liquid in the barrel, and means on the internally projecting end of said plug to hold a supply of dry ink to be dissolved by said liquid.

5. A fountain pen adapted to be filled with liquid such as water for dissolving dry ink in a cartridge in the pen barrel to form liquid ink by inserting the writing end of the pen into liquid to a depth determining the height to which the barrel is to be filled, allowing the liquid to flow upwardly into the barrel by the action of atmospheric pressure and simultaneously allowing escape of air from the barrel through an outlet in the other end of the barrel, and trapping the entered liquid in the barrel by closing the air outlet, said pen comprising an elongated pen barrel, a dry ink cartridge in said barrel, a writing assembly at the lower end of the barrel communicating with the interior of the barrel, and means for controlling the escape of air from the barrel and for trapping liquid in the barrel, said means comprising an elongated plug with an upper portion threaded in and of substantially the same diameter as the interior of the upper end of the barrel to provide a closure therefor and with a lower portion having a cut-away portion cooperable with the inner face of the barrel to form a vent passage to vent air from the barrel when the upper portion of the plug is withdrawn from the barrel.

6. A fountain pen adapted to be filled with liquid such as water for dissolving dry ink in the pen barrel to form liquid ink by inserting the lower end of the pen into liquid to a depth determining the height to which the pen barrel is to be filled, allowing the liquid to flow upwardly into the barrel by the action of atmospheric pressure and simultaneously allowing escape of air from the barrel through an outlet in the upper end of the barrel, and trapping the entered liquid in the barrel by closing the air outlet, said pen comprising an elongated barrel, a writing assembly at the lower end of the barrel communicating with the interior of the barrel, means for controlling the escape of air from the barrel and for trapping liquid in the barrel, said means

comprising an elongated plug with an upper portion threaded in and of substantially the same diameter as the interior of the upper end of the barrel to provide a closure therefor and with a lower portion having a cut-away portion cooperable with the inner face of the barrel to form a vent passage to vent air from the barrel when the upper portion of the plug is withdrawn from the barrel, and an extension on said plug cooperating with the upper end of the barrel to provide a seal therefor when the upper portion of said plug is within the barrel.

7. In combination, in a dry ink type fountain pen adapted for filling by action of atmospheric pressure when inserted in a liquid point downward with air venting means at the upper end open and for trapping liquid therein by closing of the air venting means, a pen barrel, writing means at one end of and having fluid communication with said barrel, means within the barrel to hold dry ink in the barrel, a supply of dry ink to be dissolved by liquid entering the barrel, and venting means at the other end of the barrel to allow egress of air from the barrel during filling of the pen, said means comprising an opening in said other end of the barrel forming a valve seat, a manually operable valve member to seat on said valve seat, a threaded extension of said valve member projecting through said opening and into the barrel and having vent means thereon terminating short of the valve member and cooperable with the inner face of the barrel to provide passage for air from the barrel, said extension and valve member being rotatably and longitudinally movable relative to the barrel to shut off air passage and to close said opening in the barrel, respectively.

8. A fountain pen adapted to be filled with liquid for dissolving dry ink in the pen barrel by inserting the lower end of the pen into liquid to a depth determining the height to which the barrel may be filled, allowing liquid to flow upwardly into the barrel by the action of atmospheric pressure and simultaneously venting air from the barrel through the upper end of the barrel, and trapping liquid in the barrel by closing the upper end of the barrel, said pen comprising a barrel, writing means at the lower end of and communicating with the barrel, means to hold dry ink in the barrel, and air vent control means at the upper end of the barrel comprising a plug threaded in the barrel to provide a closure therefor and having a lower portion provided with a depressed section in its surface cooperable with the inner face of the barrel to provide a passage for air out of the barrel when said plug is positioned to bring the upper edge of said depressed section substantially to or outside the upper end of the barrel, and a closure valve seating on the upper end of the barrel to seal the same when the plug is positioned substantially wholly within the barrel, said plug and said valve being movable longitudinally relative to the barrel.

9. A fountain pen comprising a barrel communicating with writing means at its lower end and being provided at its upper end with air vent control means, said means comprising a plug having an upper section formed to seat on the edge of the barrel at its upper end in sealing relation therewith, a threaded intermediate section of a size to substantially close the interior of the upper end of the barrel, and a threaded lower section with passage means formed there- with cooperable with the inner face of the barrel

to provide air vent means for the barrel when the intermediate section is substantially withdrawn from the barrel, said upper section engaging said edge when the intermediate section is substantially within the barrel.

10. A dry ink type fountain pen adapted to be filled by the action of atmospheric pressure when inserted in liquid point downward and in venting condition, and to trap liquid therein upon the closing of a vent, said pen comprising a barrel with writing means at its lower end and an opening at its upper end adapted to be both closed and sealed by vent closing means comprising a valve member for sealing engagement with a beveled

5 seat at the upper peripheral edge of the barrel to seal said opening when a threaded member depending from said valve member is positioned substantially wholly within the barrel, said threaded member extending through said opening and having its upper portion threadedly co-operable with an interior portion of the barrel to close the upper end of the barrel, and having its lower portion formed with passage means co-operable with the interior of the barrel to provide a vent for air in the barrel when said upper portion is substantially outside of the barrel.

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