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SOLUBLE INK FOUNTAIN PEN

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This invention relates to improvements in that class of fountain pens in which the writing fluid is formed by flowing water in contact with an initially dry but soluble ink material; the resultant writing fluid being thereupon fed to the pen nib.

This invention has for its principal object to provide, in a fountain pen of the kind above mentioned, a novel means for carrying a plurality of individual soluble ink masses so arranged and related to the water supply means of the pen as to be capable, by a simple manipulation of the carrying means, of being successively brought into service position, thus providing a large reserve supply of soluble ink which is easily and quickly available as needed without necessity for direct handling of the soluble ink masses or elements.

With this main object in view, the invention comprises, in combination with the barrel and water feed means of the pen, a rotatable ink carrying means having a series of pockets or chambers adapted to be charged with soluble ink material; said pockets or chambers being selectively, and preferably successively, brought into communication with the water feed means, whereby all but one of the ink charges are held out of service but nevertheless subject to being brought into service, as needed, by a step by step rotation of the carrying means. This novel carrying means may be variously constructed and arranged. For example, it may be so made and assembled in the pen structure as to itself be capable of quick removal from the latter when the ink charges thereof are all consumed, and thereupon recharged for replacement or replaced by an entirely new ink charged carrying means, or it may be formed and arranged to constitute a permanent element of the pen structure, with its pockets or chambers capable of being accessibly disposed for recharging the same with ink material as often as the supply of the latter is entirely exhausted therefrom.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detail description of the invention.

Illustrative embodiments of the invention are shown in the accompanying drawing, in which:—

Fig. 1 is an elevational view of a soluble ink fountain pen according to this invention, the removable cap thereof being in normal closed relation thereto, but broken away to show the pen nib and the rotatable ink carrying means; Fig. 2 is a fragmentary longitudinal vertical section of the same with the cap removed, said section being taken on line 2—2 in Fig. 1 and being drawn on a somewhat enlarged scale; Fig. 3 is a transverse section, taken on line 3—3 in Fig. 2; Fig. 4 is a vertical section of a modified form of rotatable ink carrying means, and Fig. 5 is a horizontal cross-section of the same, taken on line 5—5 in Fig. 4; Fig. 6 is a sectional view similar to that shown in Fig. 2 but illustrating a modified form of pen structure and ink carrying means, and Fig. 7 is a transverse section therethrough, taken on line 7—7 in Fig. 6; and Fig. 8 is an enlarged fragmentary sectional view showing a form of yieldable detent means cooperative with the rotatable ink carrying means.

Similar characters of reference are employed in the hereinabove described views, to indicate corresponding parts.

Referring to the drawing, the reference character 10 indicates the main body or barrel of the pen, the same being usually externally screw threaded at its lower end to receive and hold the removal nib enclosing cap 11. In one illustrative arrangement for the pen structure according to this invention, a throat member 12 having an axial bore 13 is connected with the lower open end of the barrel 10 by a coupling stub 14, the latter being frictionally or otherwise secured to the barrel. Preferably said throat member 12 is provided below said coupling stub 14 with an annular laterally extending stop-shoulder or flange 15 which abuts the lower extremity of said barrel 10. In connection with its inner upper end, said throat member 12 is provided with a neck-piece 16 of reduced diameter to which is secured the usual rubber sac 17 adapted to be filled with water, and which is actuated for filling purposes by the usual

filling lever means 18 accessible at the exterior side of the barrel 10. Secured within and extending through the bore 13 of said throat member 12 is a feed-bar 19, the lower end of which projects outwardly from the lower free end of said throat member and contiguous to a pen nib 20 secured in and also outwardly projecting from said throat member in the usual manner. Exteriorly engaged around said throat member below the barrel 10, so as to be capable of rotative movement on said throat member 12 and about the longitudinal axis thereof, is an ink carrying member 21, preferably in the form of an annular cylindrical body, the bore of which closely fits to and around the external surface of said throat member. To retain said ink carrying member 21 in operative assembled relation to said throat member 12, the lower end portion of the latter is externally screw threaded to receive a keeper collar 22 which, when in place abuts the lower end of said ink carrying member 21, thereby retaining the same in operative relation to the pen structure. If desired, packing washers 23 of soft rubber or other suitable material may be engaged between the respective ends of the ink carrying member and the stop-shoulder or flange 15 and the keeper collar 22. Said ink carrying member 21 is provided with a series of individually separate longitudinal pockets or chambers 24, preferably closed at their bottom ends and open at their top ends. Said pockets or chambers 24 are spaced around the body of said carrying member in an annular row. While six such pockets or chambers are shown in the drawing, it will be obvious that this number may be increased capable of being formed and individually isolated in the carrying member, or the number thereof may be decreased if desired. Formed in the internal side of the carrying member, respectively in communication with each pocket or chamber 24, along approximately the length thereof, are outlet openings 25 of any desirable form, but preferably of the slot-like form shown. The pockets or chambers 24 are filled with any desired form of dry soluble ink material A; such, for example, as ink powder, soluble ink cakes, sticks or pellets, or soluble ink paste.

Provided in the wall of said throat member 12, in a fixed location at one side thereof, is a port 26 affording communication there-through to the bore 13 thereof in which is fixed the feed-bar 19. The feed-bar 19 is provided with an upper feed channel section 27 extending downwardly from the water sac 17 into communication with the upper end of said port 26, and with a lower feed channel section 28 extending from a point of communication with the lower end of said port 26 downwardly to the inner face of the pen nib 20.

In the use of the form of soluble ink pen as

above described, the ink carrying member 21 is turned to register the outlet opening 25 of one of its pockets or chambers 24 with the port 26, and the water sac 17 having been filled with water, the pen is thereupon ready for use. When writing with the pen, the water supplied from the sac 17 flows downwardly through the upper feed channel section 27, and thence through the registered port 26 and outlet opening 25 into contact with the soluble ink material contained in the communicating pocket or chamber, the outlets of all the other pockets or chambers being shut off by the solid portions of the contiguous throat member wall, as will be obvious from an inspection of Fig. 3 of the drawing. As the water contacts with the dry ink material A, the latter goes into solution with the former, thereby producing a writing fluid which flows through the lower feed channel section 28 of the feed bar 19 to supply the pen nib 20, so that the latter discharges the same during the writing operation. When the ink material A of the first pocket or chamber is consumed, a new supply may be brought into registration with the water supplying channels, by merely turning the carrying means on the throat member to bring the outlet 25 of the next pocket into registration with the port 26 and thus into communication with the water supplying channel of the feed bar, these operations being repeated, step by step, until the soluble ink material of the last pocket or chamber has been consumed. The arrangement of the carrying member 21 is preferably such that it fits tightly enough upon and around the throat member as to offer some frictional resistance to turning movement, thereby maintaining the same in a given selected operative ink supplying position, while nevertheless being capable of turning under sufficient manipulative force or pressure. If desired, however, a mechanical detent means may be provided for yieldably holding said carrying member 21 in selected positions to which it is adjusted. Illustrative of one such form of detent means, there is shown in Fig. 8 a spring pressed ball detent 29 which may selectively engage the open ends of the ink pockets or chambers 24 to hold the carrying means against accidental or undesired rotative movement. It will be understood, that other forms or variations of the detent means may be employed. In order to assist the user in readily and quickly ascertaining the operative position of given ink supplying pockets or chambers of the carrying member relative to the water feed channels of the pen structure upon manipulation of the carrying member, the latter is provided on its outer surface with indicating marks corresponding to the positions of said pockets or chambers, and also, if desired, indicia identifying individual

pockets or chambers one from another; and a stationary part of the pen, such as the exterior surface of the stop shoulder or flange 15, is provided with an indicating mark corresponding to the position of the water feed channels, all as shown especially in Fig. 1 of the drawing. By registering a selected pocket or chamber indicating mark with the stationary water feed channel indicating mark, upon rotation of the carrying member, the user of the pen is visibly assured that a desired pocket is brought into service position.

In the form of pen structure as above described, the carrying member 21 may be utilized as a permanent part of the pen, subject to removal for recharging after the total supply of ink material carried thereby is exhausted; or it may be made and used as a refill element, whereby when one such carrying means is applied to the pen, used and exhausted, it may be taken off and thrown away, and then replaced by a new charged carrying means.

Referring now to Figs. 4 and 5 of the drawing, there is shown therein a modified construction of carrying means which can be assembled with the pen structure, and which is subject to being quickly and easily recharged after the pockets thereof have been emptied by use. In this form, the ink carrying means comprises a cylindrical body 30 having around its external circumference a series of spaced apart outwardly open channels or pockets 31. Externally slidable over the body 30 is a cover sleeve 32 which serves as a removable cover to close the exterior sides of said channels or pockets 31 after the same are charged with the ink material. Formed in the internal side of the carrying member, respectively in communication with each pocket or chamber 31, along approximately the length thereof, are outlet openings 33 of any desirable form, but preferably of the slot-like form shown.

Referring now to Figs. 6 and 7 of the drawing, there is shown therein another form of pen structure having the novel rotatable ink carrying means according to this invention. In this arrangement, a feed bar 34 is connected at its upper end with the lower end of a barrel 35 by a coupling member 36. This coupling member 36 is provided with the internal neck-piece 37 to which is secured the water sac 38. Connected with and upon the lower free end of said feed-bar 34 is a throat member 39 by which the pen nib 40 is held contiguous to and in operative relation to the lower end of said feed-bar 34. Mounted to turn on and about the feed-bar 34, between said coupling member 36 and said throat member 39, is the rotatable ink carrying member 41. This ink carrying member is also in the form of an annular cylindrical body, the bore of which closely fits to and around the external surface of said feed bar.

Said ink carrying member 41 is provided with a series of individually separate longitudinal pockets or chambers 42, preferably closed at their upper ends and open at their bottom ends. Said pockets or chambers are spaced around the body of said carrying member in an annular row. Formed in the internal side of the carrying member, respectively in communication with each pocket or chamber 42, along approximately the length thereof, are outlet openings 43 of any desired form, but preferably of the slot-like form shown. The feed-bar 34 is provided with a feed channel 44 extending longitudinally downward along one side thereof from the water sac 38 to the inner face of the pen nib 40. By turning said carrying member on the feed-bar, the outlet opening 43 of a desired pocket or chamber 42 may be registered with said feed channel 44 so as to communicate therewith. Formed in the external side of said throat member 39 is a grooved guideway 45 with which the bottom open ends of the pockets or chambers 42 of the carrying member 41 may be selectively aligned. As thus formed and arranged the carrying member 41 is adapted to removably or replaceably receive either uncased soluble ink stick or cased ink material, i. e., ink material packed into a tubular metal casing having suitable lateral discharge means, thereby providing a removable ink cartridge. This latter type of ink cartridge is shown in Figs. 6 and 7, and comprises a tubular metal casing 46, the lower end of which is closed and shaped to provide a hook-like finger-piece 47. The casing 46 is packed with soluble ink material A, and is further provided along its inner side with discharge openings of desired form, such, for example as the perforations 48. By aligning a given pocket or chamber 42 with the grooved guideway 45 of the throat member 39, an ink cartridge or stick may be slid into place in the pocket. By registering the outlet opening of a given pocket or chamber 42 in communication with the feed channel 44 of the feed bar 34, the ink stick or cartridge is exposed to the flow of water descending said feed channel from the water sac, whereby the ink material is dissolved to form the writing fluid which is thereupon delivered to the pen nib 40. Step by step turning of the carrying member 41 will successively bring the several ink material charged pockets thereof into service until all the ink material is consumed, substantially in the same manner as already above described. When all the ink material is used, the ink carrying member may be easily and quickly recharged, by withdrawing the empty cartridges as the several pockets or chambers are successively aligned with the grooved guideway 45, and thereupon inserting new cartridges in place of those thus removed.

As many changes could be made in the above described constructions and many apparently different embodiments of this invention could be made without departing from the scope thereof as defined in the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. In a soluble ink fountain pen having means to supply a solvent to the pen nib, a movable ink carrying means having a series of chambers charged with soluble ink material adapted to be selectively positioned in communication with the solvent supply means.
2. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having a channel to lead the solvent from said reservoir to the pen nib, a rotatively manipulatable ink carrying means having a series of chambers charged with soluble ink material adapted, by step by step rotation of said carrying means, to be successively positioned in communication with said feed-bar channel.
3. In a soluble ink fountain pen, a solvent reservoir, a solvent feed means leading from said reservoir to the pen nib, and a manipulatable means between said reservoir and pen nib and rotatable about said solvent feed means adapted to successively expose bodies of soluble ink subject to the action of the solvent moving through said feed means from said reservoir to said pen nib.
4. In a soluble ink fountain pen, a solvent reservoir, a solvent feed means leading from said reservoir to the pen nib, a manipulatable means between said reservoir and pen nib and rotatable about said solvent feed means adapted to successively expose bodies of soluble ink subject to the action of the solvent moving through said feed means from said reservoir to said pen nib, and means to detachably retain said manipulatable means in place.
5. In a soluble ink fountain pen, a solvent reservoir, a feed bar having means to lead the solvent from said reservoir to the pen nib, a manipulatable ink carrying means between said reservoir and pen nib, said carrying means being rotatable relative to said feed-bar, said carrying means having a series of chambers charged with soluble ink material, said chambers being adapted by step by step rotation of said carrying means to be successively brought into communication with said feed-bar, and means to indicate the operative position of individual chambers relative to said feed-bar.
6. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having means to lead the solvent from said reservoir to the pen nib, a manipulatable ink carrying means between

said reservoir and pen nib, said carrying means being rotatable relative to said feed-bar, said carrying means having a series of chambers charged with soluble ink material, said chambers being adapted by step by step rotation of said carrying means to be successively brought into communication with said feed-bar, means to indicate the operative position of individual chambers relative to said feed-bar, and means to detachably retain said carrying means in operative assembled relation to the pen structure.

7. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having a channel to lead the solvent from said reservoir to the pen nib, a rotatively manipulatable ink carrying means between said reservoir and pen nib, said carrying means having a series of chambers to hold soluble ink material, said carrying means having outlet openings in its inner wall respectively communicating with said chambers, and said outlet openings being adapted to be selectively positioned in communication with said feed-bar channel by rotative movement of said carrying means.

8. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having a channel to lead the solvent from said reservoir to the pen nib, a rotatively manipulatable ink carrying means between said reservoir and pen nib, said carrying means having a series of chambers to hold soluble ink material, said carrying means having outlet openings in its inner wall respectively communicating with said chambers, said outlet openings being adapted to be selectively positioned in communication with said feed-bar channel by rotative movement of said carrying means, and external means to indicate the operative position of individual chambers relative to said feed-bar channel.

9. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having a channel to lead the solvent from said reservoir to the pen nib, a rotatively manipulatable ink carrying means between said reservoir and pen nib, said carrying means having a series of chambers to hold soluble ink material, said carrying means having outlet openings in its inner wall respectively communicating with said chambers, said outlet openings being adapted to be selectively positioned in communication with said feed-bar channel by rotative movement of said carrying means, and means to detachably retain said carrying means in operative assembled relation to the pen structure.

10. In a soluble ink fountain pen, a solvent reservoir, a feed-bar having a channel to lead the solvent from said reservoir to the pen nib, a rotatively manipulatable ink carrying means between said reservoir and pen nib, said carrying means having a series of chambers to hold soluble ink material, said carrying means having outlet openings

in its inner wall respectively communicating with said chambers, said outlet openings being adapted to be selectively positioned in communication with said feed-bar channel by rotative movement of said carrying means, and externally open means to give access to said chambers for recharging the same with ink material.

11. In a soluble ink fountain pen, a solvent reservoir, a channeled feed-bar, a throat member, a pen nib in said throat member with which the lower end of said feed-bar communicates, a rotatively manipulatable ink carrying means concentric to said feed-bar between said solvent reservoir and pen nib, said carrying means having a series of chambers to hold soluble ink material, said carrying means having outlet openings in its inner wall leading respectively from said chambers, said outlet openings being adapted to be selectively positioned in communication with said feed-bar channel by rotative movement of said carrying means, and external means to indicate the operative position of individual chambers relative to said feed-bar channel.

12. In a soluble ink fountain pen, a feed means adapted to deliver solvent by gravity flow to the pen nib, and a manipulatable carrying means rotatable about the flow path of said solvent, said carrying means being adapted to support a plurality of soluble ink bodies subject, upon rotation of said carrying means, to selective exposure to contact with the flowing solvent.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 4th day of February, 1933.

RUSSELL B. KINGMAN.

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