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SOLUBLE INK FOUNTAIN PEN

Russell B. Kingman, Orange, N. J.

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3 Claims. (Cl. 120—42)

This invention relates to improvements in fountain pens of the kind in which the writing fluid is formed by bringing a solvent such as water in contact with a mass of soluble ink material, preferably in the form of a solid cake, the writing fluid thus formed being thereupon served to the pen nib during writing operations; and the invention has reference, more particularly, to this kind of pen so constructed and arranged that the water is brought into contact with the soluble ink material when the pen is in the inverted position in which it is ordinarily carried when not in use, that is with the pen nib up-pointed.

This invention has for its principal object to provide a fountain pen of the kind mentioned wherein the top end of the pen barrel is provided with a soluble ink storage compartment and a water reservoir intermediate said storage compartment and the pen nib and its feed means, together with a means interconnecting said storage compartment and water reservoir constructed to provide a mixing chamber adapted to hold partially dissolved ink material which from time to time, as the water supply is renewed, will be readily completely dissolved and intermingled with the water, preferably to the saturation point of the latter, to form refilling charges of liquid writing fluid.

Another object of the invention is to provide a pen of the kind mentioned wherein the water intake end of the mixing chamber is constructed to assure unobstructed entrance of the water thereinto when the pen is inverted.

Other objects of this invention, not at this time more particularly enumerated, will become apparent in the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawing, in which:—

Fig. 1 is a vertical longitudinal section through a pen constructed in accordance with this invention, the removable cap for enclosing the pen nib when the pen is not in use being omitted;

Fig. 2 is a transverse section, taken on line 2—2 in Fig. 1; Fig. 3 is a transverse section, taken on line 3—3 in Fig. 1; and Fig. 4 is a fragmentary vertical section showing the pen inverted to effect admixture of ink material and water in the mixing chamber.

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

Referring to the drawing, the reference character 1 indicates the main body or barrel of the pen, the same being preferably internally screw threaded, as at 2, at its lower end to receive the externally threaded butt portion 3 of a throat section 4, to thereby operatively couple the latter to said barrel. Extending from the inner

free end of said butt portion 3 is a spud 5 of reduced diameter, over which is engaged and held the lower end of a flexible elastic sac 6, which is adapted to extend upwardly through the interior of the main body or barrel 1 to serve as a reservoir or container for water with which the pen is charged preparatory to use, and which is adapted to take up soluble ink material for the conversion thereof into a writing fluid. Said throat section 4 is provided with the usual axial bore 7, which extends therethrough and through the butt portion 3 and spud 5, and in which is engaged and held a feed bar 8 and pen nib 9 in the usual manner. Said feed bar 8 is provided with a channel or duct 10 which communicates with the interior of the sac 6, and which extends from the latter to the back of the pen nib 9 for feeding writing fluid thereto.

The upper end of the main body or barrel 1 is open, and is preferably counterbored downwardly from its open end to a slightly enlarged internal diameter to form an annular shoulder 11 spaced downwardly from said open upper end. Inserted in said enlarged upper end portion of the main body or barrel interior, so as to abut said shoulder 11 is a plug 12 suitably secured in place by cement or any desired means of mechanical fastening. This plug 12 partitions off from the main portion of the main body or barrel interior an upwardly open storage compartment 13 in which is inserted and stored a cake of ink material 14. Owing to the described form and arrangement of storage compartment 13 the same is of exceedingly generous capacity, and consequently is adapted to hold a solid cylindrical mass of ink material of considerable size, and therefore calculated to supply at one filling a mass of soluble ink material sufficient to last over a very long period of pen use involving many renewals or refilling of the water reservoir. Adjacent to its upper open end the walls of said storage compartment are internally threaded, as at 15, to receive a removable closure member or end piece 16 for closing said storage compartment after the same has been charged with the soluble ink mass 14. At its inner or underside, the plug 12 is provided with a dependent neck 17 of reduced diameter, over which is engaged and held the upper end of said flexible elastic sac 6 which forms the refillable water reservoir. The main body or barrel 1 may be provided with any suitable and well-known self filling means (not shown) for contracting and expanding the sac 6 for renewing by suction the supply of water therein; and while such form of refillable water reservoir is preferable it will nevertheless be understood that any other desired form of water reservoir and filling means may be utilized if desired.

Extending longitudinally through the plug 12 and its neck 17, preferably in alignment with its

longitudinal axis, is a through passage the interior of which constitutes a mixing chamber 18, communicating at its upper end with the interior of the ink material storage compartment 13, and at its lower end with the interior of the water reservoir constituted by the sac 6. The mixing chamber is of relatively narrow width compared to the diameter of the water reservoir and that of the ink material compartment between which said chamber extends, and said chamber is of substantial length so as to permit of retention in its upper portion of partially dissolved ink material ready for contact with the water solvent which, under proper conditions, enters the lower portion of said chamber from the reservoir. In ordinary size pens the diameter of the mixing chamber approximates one-eighth of an inch and its length is preferably about three to four times its diameter. Such approximate dimensions have been formed to provide a mixing chamber which permits of adequate union of the water solvent with the ink material. Preferably the ink material employed is of a character which is little affected by the water solvent once a charge of the latter has been saturated therewith to form the desired writing fluid.

In the use and operation of the pen, when the reservoir has been charged with a supply of water solvent, and the pen is inverted or turned from its normal writing position, as e. g. so as to occupy the position shown in Fig. 4 in which it is ordinarily carried in the user's pocket, the water solvent will initially flow through the mixing chamber into contact with the soluble ink material, thereby softening portions thereof adjacent to the mixing chamber and thereupon taking up into solution sufficient thereof to saturate the water solvent and convert the same into a suitable writing fluid. When the pen is turned to writing position, the writing fluid discharges from the lower end of the mixing chamber, while at the same time drawing down into the upper end portion of the latter a modicum of moist and pasty ink material 20 which is held therein by capillary attraction (see Fig. 1). The intermittent use of the pen, involving alternative positioning of the same in writing and inverted positions, allows the saturated ink solution to enter the lower end of the mixing chamber, and thus to contact with the modicum of moist and pasty ink material, thereby retaining the same in such desired condition. When a given supply of thus formed ink solution is exhausted in use, the pen reservoir may again be recharged or refilled with water solvent, whereupon, when the pen is inverted the water enters the mixing chamber into contact with the moist and pasty ink material which is quickly taken up into solution while at the same time a renewed formation of moist and pasty ink material is formed and drawn into the upper end of the mixing chamber. These processes are repeated over and over again until the supply of soluble ink material is exhausted, whereupon such supply may be renewed by introducing a new cake of ink material into the storage compartment therefor.

In some cases it has been noted that upon inversion of the pen to the position shown in Fig. 4, trapped air within the mixing chamber may obstruct entrance of the water thereinto, an air bubble forming at the mouth of the mixing chamber. To avoid this condition and to assure displacement of the air or breaking of the air bubble, the internal sides of the lower or water end of the mixing chamber are formed to provide one

or more channels of fissures 19 which extend upwardly and longitudinally from the lower open end of said chamber for a distance preferably from a third to one-half the length thereof. These channels or fissures 19 allow trapped air to escape from the chamber interior and to be readily displaced by entering water, whereby the latter may easily and quickly gain desired contact with the soluble ink material.

It will be obvious that some changes may be made in the described constructions, and somewhat different embodiments of this invention could be made without departing from the scope thereof as defined in the following claims; consequently 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 fountain pen of the kind described, a barrel provided with a throat section at its lower end to carry a pen nib and feed bar therefor, said barrel including a water reservoir communicating at its lower end with said feed bar, said barrel having a soluble ink compartment at its upper end, and means intermediate said compartment and reservoir to provide an intercommunicating mixing chamber opening upwardly and directly into said compartment and downwardly and directly into said reservoir, and said mixing chamber means having a fissure extending from its lower open end upwardly for a portion of its length, said fissure being laterally open to the interior of the mixing chamber.

2. In a fountain pen of the kind described, a barrel provided with a throat section at its lower end to carry a pen nib and feed bar therefor, means within said barrel above said throat section and communicating with said pen nib feed bar adapted to provide a water reservoir, a plug within the upper end of said barrel, said plug having an axial bore therethrough adapted to provide a mixing chamber, means at the lower end of said plug for connecting said water reservoir in communicating relation to the lower end of said mixing chamber, and means above said plug adapted to provide a soluble ink storage compartment in communication with the upper end of said mixing chamber, and said plug having at least one fissure contiguous and open to its mixing chamber bore and extending upwardly therein from the lower end of the latter for a part of its length.

3. In a fountain pen of the kind described, a barrel provided with a throat section at its lower end to carry a pen nib and feed bar therefor, means within said barrel above said throat section and communicating with said pen nib feed bar adapted to provide a water reservoir, a plug within the upper end of said barrel, said plug having an axial bore therethrough adapted to provide a mixing chamber, means at the lower end of said plug for connecting said water reservoir in communicating relation to the lower end of said mixing chamber, and means above said plug adapted to provide a soluble ink storage compartment in communication with the upper end of said mixing chamber, said mixing chamber being of relatively narrow width and having a length approximating three times its width, and said plug having at least one fissure contiguous and open to its mixing chamber bore and extending upwardly therein from the lower end of the latter for a part of its length.

RUSSELL B. KINGMAN. 75