

Nov. 17, 1936.

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2,061,405

SOLUBLE INK FOUNTAIN PEN

Filed Jan. 29, 1936

Fig. 1

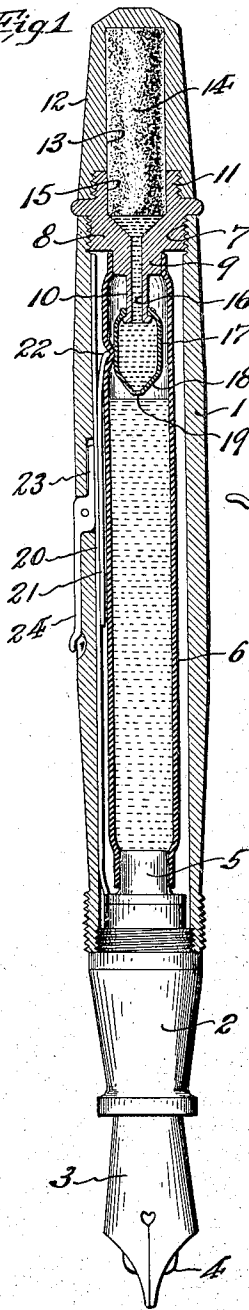


Fig. 2

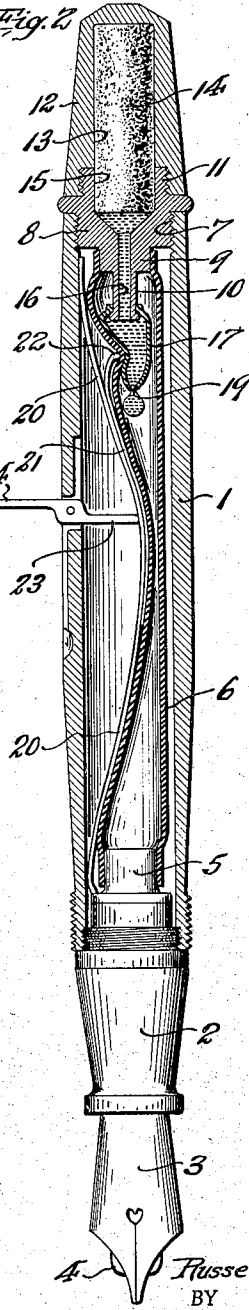
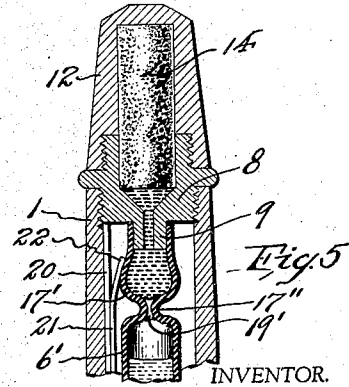
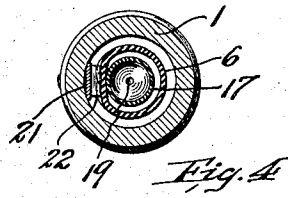
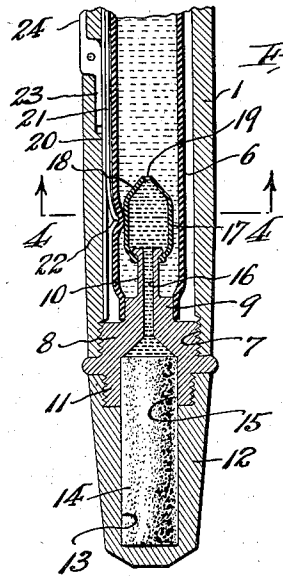


Fig. 3



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# UNITED STATES PATENT OFFICE

2,061,405

## SOLUBLE INK FOUNTAIN PEN

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Application January 29, 1936, Serial No. 61,283

7 Claims. (Cl. 120—42)

This invention relates to improvements in fountain pens of the kind wherein a soluble ink material is stored for mixture with water or other solvent with which the pen is filled from time to time, thereby to produce a writing fluid for supply to the pen nib when the pen is in use.

In pens of this general character difficulties are sometimes experienced in obtaining a writing fluid of uniform color concentration, since positive control is not exercised as to quantity of solid ink brought into solution with the water with which the pen is filled. By reason of this lack of positive control, a person using such pen frequently is likely to obtain a writing solution of less concentration and consequently of lighter color than one who uses the pen but seldom. This invention has for its object to overcome such difficulties, and to provide a soluble ink pen of such novel construction that a positive control of the soluble ink material is attained, whereby a substantially uniform quantity thereof is brought into intermixing contact with the water at each filling of the pen with the latter, to the end that a more uniform color concentration of the formed writing solution is assured irrespective of the frequency with which the pen is used.

Other objects of this invention, not at this time more particularly enumerated, will become evident 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 and part elevation of a pen made in accordance with this invention, showing the same filled and ready for use; Fig. 2 is a similar view, showing the operation of filling the pen while at the same time ejecting into the water reservoir a controlled quantity of soluble ink material for mixture with the intake water to form a writing fluid of uniform color concentration; Fig. 3 is a fragmentary longitudinal section of the pen as inverted, in which position a highly concentrated coloring mixture is formed in the mixing chamber from the soluble ink subject to ejection and use when filling the pen with water; and Fig. 4 is a transverse section, taken on line 4—4 in Fig. 3. Fig. 5 is a longitudinal sectional view showing a modified form of the novel pen structure.

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

Referring to said drawing, the reference character 1 indicates the main body or barrel of the pen, the same having detachably connected with its lower end a throat section 2 in which is mounted

a pen nib 3 together with the customary channeled feed bar 4 which leads the writing fluid from the pen interior to said nib 3. Extending from the upper or inner end of throat section 2 is a neck 5 of reduced diameter, over which is engaged and held the lower end of a collapsible elastic sac 6, the lower interior end of which communicates with said channeled feed bar 4. The sac 6 extends upwardly through the interior of the pen barrel 1, and provides a water and writing fluid reservoir.

The pen barrel is provided with an internally threaded open upper end 7, into which is threaded an end piece 8. End piece 8 is provided at its inner end with a neck 9 of reduced diameter, over which is engaged and held the upper end of said collapsible elastic sac 6. Extending downwardly into the upper interior of sac 6 from said neck 9 is a central extension member 10 of further reduced diameter. End piece 8 is provided at its outer end with an externally threaded neck 11 of reduced diameter. A detachable ink material holder or storage member 12 is arranged to screw upon said neck 11, to thereby operatively attach the same to pen barrel 1. The interior 13 of said holder or storage member 12 provides a chamber in which is carried the supply of soluble ink material 14. If desired, the upper portion of said end piece 8 is provided with an interior chamber 15 to align with and form an extension of the interior 13 of said holder or storage member 12 in which said soluble ink material 14 is contained. Extending axially downward from said chamber 15 through said end-piece 8, its neck 9 and extension member 10 is a passage or bore 16 open at the lower extremity of said extension member. Secured to the extremity of said extension member 10 is a collapsible hollow bulb or nipple 17, which is provided, preferably, with a tapered free end portion 18 having in its apex an aperture 19. This bulb or nipple 17 is made of elastic material, such as rubber, and the same is disposed within the upper interior portion of the water reservoir sac 6.

Suitable means is provided for compressing or collapsing the elastic reservoir sac 6, so that on expansion thereof, after such compression, water may be sucked up through the pen nib feed bar 4 to fill the interior of sac 6 therewith preparatory to use of the pen; the arrangement being such that this reservoir sac compressing or collapsing means is also effective to simultaneously collapse or pinch said bulb or nipple 17 so as to positively express or eject, through the aperture 19 of the latter, a highly concentrated modicum of ink or dye material into the interior of sac 6 ready to be immediately taken up or ab-

sorbed by the water entering sac 6, to thereby produce a writing fluid of desired color concentration. It will be obvious that the quantum of coloring matter thus positively ejected from bulb or nipple 17 may be governed, so that substantially equal or uniform amounts will be ejected each time the reservoir sac 6 is filled with water, by suitably predetermining the size of the bulb or nipple 17, or by suitably predetermining the amount or degree of pinch applied to said bulb or nipple, or both.

Illustrative of one means which may be employed for collapsing sac 6, and at the same time pinching the bulb or nipple 17, is the flexible or bowable spring plate 20 suitably arranged within barrel 1 to extend longitudinally along the sac 6, to and intermediate the ends of which spring plate 20 is secured to the shoe or contact piece 21 which bears against the sac side. The upper end of said shoe or contact piece 21 is disposed so as to be opposed to a point where the bulb or nipple 17 is located within sac 6, and said end of the shoe or contact piece 21 is preferably somewhat laterally offset, as at 22, toward the sac 6, so as to indent the side of the latter to bring the shoe or contact piece, when in initial inactive position (as shown in Fig. 1), quite close to the side of said bulb or nipple 17. Said spring plate 20 is subject to inward flexing or bowing to thrust said shoe or contact piece 21 inwardly against the side of sac 6, while also operatively pinching or squeezing bulb or nipple 17 (as shown in Fig. 2), by means of the compression arm 23 of an operating lever 24 which is pivotally mounted in connection with the pen barrel wall so as to be accessibly exposed at the outer surface of said pen barrel. It will be understood that any other suitable means for flexing or bowing said spring plate 20 may be employed in lieu of the pivoted compression arm and lever aforesaid.

It will be obvious that when the reservoir sac 6 is filled with water and the pen is inverted to the position shown in Fig. 3, water from the sac 6 will seep through the aperture 19 of bulb or nipple 17 so as to flow through passage 16 into interior of the ink material storage and mixing chamber and thus into contact with the soluble ink material 14, with the result that some of the latter will be dissolved to form a heavy or thick concentrated mixture of coloring matter capable of ejection from bulb or nipple 17 in the manner already above described. When the pen is turned to writing position this concentrated mixture of coloring matter will be retained in the interior of bulb or nipple 17 against gravitation outwardly therefrom through aperture 19, since said aperture is small enough to hold back the outward flow of the mixture by surface tension and atmospheric pressure. When, however, the bulb or nipple is pinched or squeezed during a water refilling operation, a modicum of the mixture will be ejected from bulb or nipple 17 through aperture 19 directly into the interior of sac 6 for intermingling with dyeing effect upon the water taken into the sac 6. When the pen is filled with water for the first time, it may be inverted and while so inverted the bulb or nipple may be squeezed or pinched to drive out air therefrom by manipulating the spring plate 20 and its contact piece 21 and then releasing the latter to allow the bulb or nipple to expand while the pen is still inverted. In such case water will be sucked into the bulb or nipple by the expanding action, and thereupon be brought into contact with the

soluble ink material to form an initial content of the concentrated coloring mixture. After this the pen may be wholly or partially emptied and refilled again so that ejection of some of the coloring mixture will form with the intaken water the initial supply of writing fluid in the sac 6. After such initial operation, the mere inversion of the pen will permit enough water to seep into bulb or nipple and ink material storage and mixing chamber to assure the maintenance of a supply of rich coloring mixture for ejection in controlled quantity each time the pen is subsequently refilled with water. When the soluble ink material 14 is exhausted, the holder 12 may be removed and a new supply of said material may be inserted.

In Fig. 5 there is shown a modification of the above described pen structure wherein the ink mixture control bulb and water sac are produced in a one-piece form. In this the reference character 6' indicates the main body of a collapsible hollow rubber element, the interior of which provides the water reservoir. Integrally formed with the upper end of said main body 6' is the bulb 17' which is provided with a restricted neck 17'' forming a relatively small aperture 19' affording the required communication between the interior of said bulb 17' and the interior of said main body 6'. The upper end of said bulb 17' is directly connected to the neck 9 of end piece 8, and in this case the extension 10 of said end piece 8 is omitted. The upper end of the shoe or contact piece 21 carried by spring plate 20 engages directly with the exterior side of bulb 17', and the lower portion of said shoe or contact piece operatively engages the side of the main body 6'. It will be obvious that the functional operations and method of manipulation of this modified form of the device is substantially the same as above described, and accomplishes the same desired results.

From the above description it will be obvious that a positive means is provided for more or less measuring and ejecting a modicum of coloring mixture or dye into the reservoir sac 6 each time the supply of water therein is removed, so that the water will be dyed each time a substantially uniform color of desired density, and consequently, whether the pen is frequently or infrequently used, the writing solution formed and available for use at all times will have the desired depth of color, and will not at one time be too pale or at another time too dark, heavy or thick.

We are aware that some changes could be made in the above described constructions, and that different embodiments of this invention could be made without departing from the scope thereof as defined in the following claims. It is therefore 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.

We claim:

1. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, a soluble ink storage means connected with the upper end of said barrel, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, a collapsible bulb having an aperture of relatively small cross sectional area communicating with the interior of said sac, means providing communication between the interior of said bulb and said soluble ink

storage means, and manipulatable means for simultaneously contracting said sac and squeezing said bulb for the purposes described.

2. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, a soluble ink storage means connected with the upper end of said barrel, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, a collapsible bulb having an aperture of relatively small cross sectional area communicating with the interior of said sac, means providing communication between the interior of said bulb and said soluble ink storage means, a flexible spring plate arranged between said reservoir sac and the barrel wall, a contact piece carried by said spring plate to engage said sac with contracting effect when said spring plate is flexed, a portion of said contact piece being also adapted in operation to squeeze said bulb, and means for flexing said spring plate.

3. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, an end piece having a passage therethrough connected with the upper end of said barrel, a soluble ink storage means with the interior of which the upper end of said end piece passage communicates, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, a collapsible bulb connected in communication with the lower end of said end piece passage, said bulb having an aperture of relatively small cross sectional area communicating with the interior of said reservoir sac, and manipulatable means for simultaneously contracting said sac and squeezing said bulb for the purposes described.

4. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, an end piece having a passage therethrough connected with the upper end of said barrel, a soluble ink storage means with the interior of which the upper end of said end piece passage communicates, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, a collapsible bulb connected in communication with the lower end of said end piece passage, said bulb having an aperture of relatively small cross sectional area communicating with the interior of said reservoir sac, a flexible spring plate arranged between said reservoir sac and the barrel wall, a contact piece carried by said spring plate to engage said sac with contracting effect when said spring plate is flexed, a portion of said contact piece being also adapted in operation to squeeze said bulb, and means for flexing said spring plate.

5. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, a soluble ink storage means connected with the upper end

of said barrel, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, a collapsible bulb within the upper end portion of said sac, said bulb having an aperture of relatively small cross sectional area communicating with the interior of said sac, means providing communication between the interior of said bulb and said soluble ink storage means, and manipulatable means for simultaneously contracting said sac and squeezing said bulb for the purposes described.

6. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, an end-piece connected with the upper end of said barrel, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, said end-piece having a neck at its interior side to which the upper end of said reservoir sac is engaged, said end-piece having an extension projecting into the upper interior of said reservoir sac, said end-piece and its extension having a continuous passage extending axially therethrough, a soluble ink storage means with the interior of which the upper end of said end-piece passage communicates, a collapsible bulb secured to the free end of said end-piece extension so as to lie within the interior of said reservoir sac, said bulb having at its free end an aperture of relatively small cross-sectional area communicating with the interior of said reservoir sac, and manipulatable means for simultaneously contracting said sac and squeezing said bulb for the purposes described.

7. In a fountain pen of the kind described, a barrel having a throat section at its lower end to carry a pen nib and feed bar therefor, an end-piece connected with the upper end of said barrel, a contractible and expansible water reservoir sac communicating at its lower end with said pen nib feed bar, said end-piece having a neck at its interior side to which the upper end of said reservoir sac is engaged, said end-piece having an extension projecting into the upper interior of said reservoir sac, said end-piece and its extension having a continuous passage extending axially therethrough, a soluble ink storage means with the interior of which the upper end of said end-piece passage communicates, a collapsible bulb secured to the free end of said end-piece extension so as to lie within the interior of said reservoir sac, said bulb having at its free end an aperture of relatively small cross-sectional area communicating with the interior of said reservoir sac, a flexible spring plate arranged between said reservoir sac and the barrel wall, a contact piece carried by said spring plate to engage said sac with contracting effect when said spring plate is flexed, a portion of said contact piece being also adapted in operation to squeeze said bulb, and means for flexing said spring plate.

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