Aug. 29, 1967 F. W. ROLLER, SR 3,338,216

WRITING INSTRUMENT

Filed Jan. 11, 1966

FIG. 1.

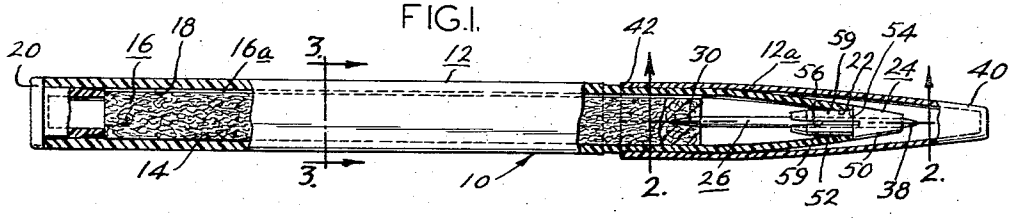


FIG. 2.

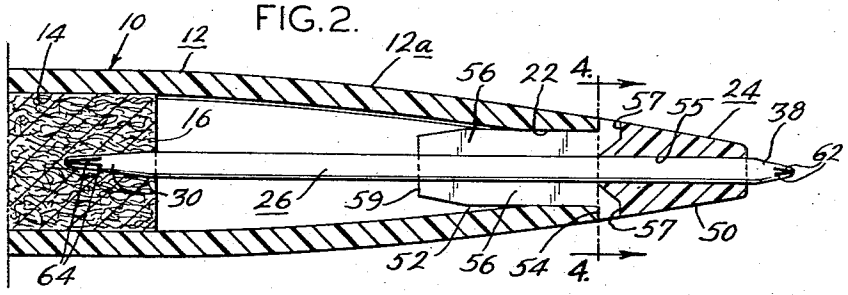


FIG. 3.

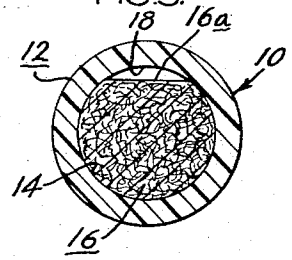


FIG. 4.

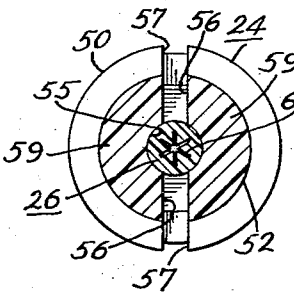


FIG. 5.

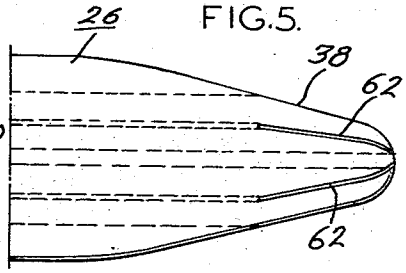


FIG. 6.

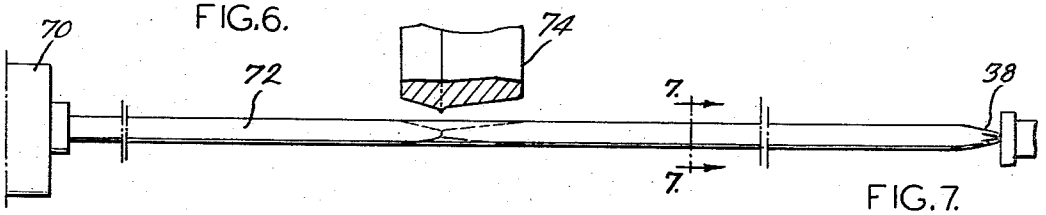


FIG. 7.

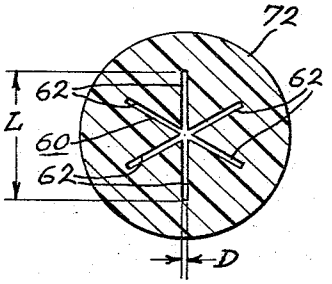
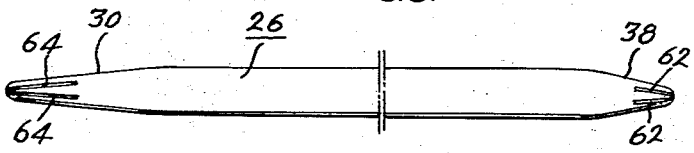


FIG. 8.



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ATTYS.

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WRITING INSTRUMENT

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7 Claims. (Cl. 120—45.6)

ABSTRACT OF THE DISCLOSURE

A nib for a writing instrument including an elongated hollow casing the interior of which defines an ink reservoir, a filler of ink absorbent material housed in the ink reservoir and a nib holder for mounting a nib at one end of the casing which is spaced from the filler. The nib is an elongated member made of a flexible, resilient material such as Delrin and has a star-shaped opening disposed centrally thereof and extending the entire length of the nib. One end of the nib defines a writing tip and is disposed exteriorly of the casing and the opposite end of the nib is adapted to engage in the filler to draw ink therefrom, the star-shaped opening having a plurality of legs of a size to permit the flow of ink therethrough by capillary action.

The present invention relates to writing instruments generally of the type including an ink reservoir, a nib holder adapted to support a writing nib at one end of the reservoir positioned to receive ink by capillary action from an ink carrier housed in the reservoir. More specifically, the present invention relates to a new and improved type of nib for use in a writing instrument of this type.

An object of the present invention is to provide a writing instrument including a new and improved type of nib which is economical to make and which is very effective for the purposes intended.

Another object of the present invention is to provide a nib for a writing instrument characterized by novel features of construction and arrangement which produces a very fine line, insures continuous flow of ink and wherein there is substantially no danger of leakage.

These and other features of the present invention and various features and details of a writing instrument made in accordance with the present invention are hereinafter more fully set forth with reference to the accompanying drawing, wherein:

FIG. 1 is a side elevational view of a writing instrument in accordance with the present invention partly in section so that the internal construction thereof may be seen more readily;

FIG. 2 is an enlarged sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is an enlarged sectional view through the casing of the instrument taken on line 3—3 of FIG. 1;

FIG. 4 is an enlarged sectional view taken on lines 4—4 of FIG. 2 through the tip of the writing instrument;

FIG. 5 is an enlarged fragmentary view of the tip of the nib;

FIG. 6 is a schematic illustration of a method for making a nib in accordance with the present invention;

FIG. 7 is an enlarged sectional view taken through the body of the nib along line 7—7 of FIG. 6; and

FIG. 8 is an enlarged view of the nib per se.

Referring now to the drawing and particularly to FIG. 1, there is shown a writing instrument generally designated by the numeral **10**. The writing instrument **10** includes an elongated hollow barrel or casing **12** open at both axial ends and which forms an ink reservoir **14** and an elongated ink carrier or filter **16** housed in the reservoir **14**. The ink carrier **16** is preferably made of a material such as felt capable of storing a large quantity of ink and as illustrated in FIG. 3, is of generally circular cross section having a longitudinally extending flat side edge portion **16***a* to define a longitudinally extending vent channel **18** between the flat on the reservoir and the inner peripheral surface of the barrel or casing **12**.

The back end of the barrel **12** is closed by a plug **20** held in place by a press fit. The front end of the barrel diverges inwardly to define a restricted opening **22** at its forward end to receive a nib holder **24** which in turn supports a writing nib **26**. As illustrated, the writing nib **26** is supported in a manner so that its inner terminal end **30** engages in one end face of the ink carrier **16** and its writing tip **38** projects beyond the nib holder. By this arrangement, ink flows by capillary action from the inner terminal end **30** of the nib **26** to the writing tip **38** as will be explained in more detail hereinafter.

The writing instrument may include a cap **40** which frictionally engages over the tapered front end portion **12***a* of the barrel **12** to cover the writing tip **38** when the instrument is not in use and which is easily detached from the barrel when it is desired to use the writing instrument. The cap abuts a shoulder **42** on the barrel so that when it is applied over the nib the cap is spaced from and does not press against the writing tip **38**.

The nib holder **24** as best illustrated in FIGS. 1, 2 and 4 comprises a forward section **50** which is generally cone-shaped and a generally cylindrical rear section **52** of smaller cross section than the largest cross sectional dimension of the cone to define a shoulder **54** at the juncture of the front and rear sections. The nib holder is provided with a central opening **55** of circular cross section. The rear section which is of a size to resiliently engage in the opening **22** in the front of the barrel, is provided with axially extending, diametrically opposed slots **56** defining axial air passages communicating with the interior of the barrel, the slots **56** extending forwardly into a portion of the cone-shaped forward section **50** to define radial air passageways **57**. By this construction, the rear section of the nib holder is divided into a pair of opposed flexible wing segments **59**.

A suitable material for the barrel **12**, cap **40**, plug **20**, and nib holder **24** is a flexible resilient plastic material for example, nylon or propylene.

Now in assembling the writing instrument of the present invention, the ink carrier **16** is placed inside of the reservoir **14** of the barrel from the rear axial end thereof. The rear plug **20** is then pressed into place in the rear axial end of the barrel. Thereafter, a suitable supply of ink may be deposited in the opening **22** in the front of the barrel to saturate the carrier. The nib **26** is then positioned inside of the nib holder with the writing tip **38** projecting slightly beyond the front end of the holder. The pilot portion or rear section of the nib holder **24** is then engaged in the opening **22** in the front of the barrel, the wings **59** having a cross section to provide a snug press fit with the barrel. It is noted that when the nib holder is inserted, the wings **59** press against the nib **26** to hold it in a firm position in the holder. When the nib holder is completely assembled, the rear terminal end **30** of the nib presses into the front face of the ink reservoir to insure good transfer of ink from the filler to the writing tip. The writing instrument is now ready for use, the air passageways providing the desired venting of the inside of the barrel.

Considering now more specifically the details of construction of the nib **26**, the nib is preferably made from a resilient, flexible material which is impervious to various types of writing fluids that may be used in the writing instrument. A suitable material for the nib has been found to be an extruded thermoplastic resin, such as that sold

by the E. I. du Pont de Nemours and Company under the trade name "Delrin." The nib is generally of circular cross section as shown in FIG. 7 and has a star-shaped opening **60** disposed centrally thereof and running the entire length of the nib to permit flow of ink therethrough by capillary action. Further as illustrated, the writing tip is conical and preferably tapers at an included angle of about 30°. The rear terminal end **30** of the nib is also cone-shaped having a rounded end portion. However, it has been found that for optimum transfer of ink through the nib by capillary action, the included angle of taper of the rear section is preferably smaller than the cone-shaped writing tip. Further, the star-shaped opening **60** in the nib defines six circumferentially equispaced venting legs **62** in the writing tip and a similar number of absorption legs **64** in the rear terminal end **30** of the nib. Each of these legs is of comparatively small cross section D. It has been found that for optimum flow of the ink through the nib, the cross sectional dimension D of the legs may be in the order of 0.005 inch to 0.0025 inch. The width of the legs in the nib will depend on the type of ink used, the viscosity of the writing fluid and other factors. The external diameter of the nib may vary, however, the length L of aligned legs of the nib should be in the range of from 0.020 to 0.030 less than the external diameter of the nib. Further it has been found that while six circumferentially equispaced legs provide a good transfer of ink, four may be suitable and a number greater than six may also provide the desired ink flow.

There is illustrated in FIG. 6 a schematic arrangement for producing nibs of the type described above. As illustrated therein, the nib material may be extruded through a suitable die **70** to provide an elongated rod **72** having the central star-shaped opening therein. As the rods are extruded, a double-faced grinder **74** engages the rod at a selected location to provide a nib of the desired length and simultaneously form the rear section and writing tip of the nib. It is, of course, to be understood that this method is one means of making a nib, and that other suitable means may be employed for making the nib having the characteristics of the nib described above.

It is further noted that even though the nib of the present invention is illustrated and described in conjunction with a writing instrument having an ink carrier made of felt, the nib may also be used in a writing instrument where the ink is stored in a cartridge or the like.

While a particular embodiment of the present invention has been illustrated and described herein, it is not intended to limit the invention and changes and modifications may be made therein within the scope of the following claims.

I claim:

1. In a writing instrument including an elongated hollow casing defining an ink reservoir, a filler for the ink reservoir and a nib holder for mounting a nib at one end of the casing, the nib holder being spaced from the filler, a nib comprising an elongated member having a star-shaped opening disposed centrally thereof and extending the entire length thereof, a writing tip at one end of said nib disposed exteriorly of the casing and a rear terminal end opposite said one end of said nib adapted to engage the filler to draw ink therefrom, said star-shaped opening having a plurality of legs of a size to permit flow of ink therethrough by capillary action.

2. In a writing instrument as claimed in claim **1** wherein the nib is made of a resilient, flexible material.

3. In a writing instrument as claimed in claim **2** wherein said material is a thermoplastic resin.

4. In a writing instrument as claimed in claim **1** wherein said writing tip is conical and preferably tapered at an included angle of approximately 30° and wherein the rear terminal end of the nib is cone shaped and is tapered at an included angle less than the angle of taper of the writing tip.

5. In a writing instrument as claimed in claim **1** wherein the star-shaped opening in the nib defines six circumferentially equispaced venting legs in the writing tip and a similar number of absorption legs in the rear terminal end thereof.

6. In a writing instrument as claimed in claim **5** wherein each of said legs is of comparatively small cross section of between approximately 0.005 inch to 0.0025 inch.

7. In a writing instrument as claimed in claim **5** wherein the length of aligned legs of the nib are approximately 0.020 to 0.030 less than the external diameter of the nib.

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