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INK WRITING IMPLEMENT

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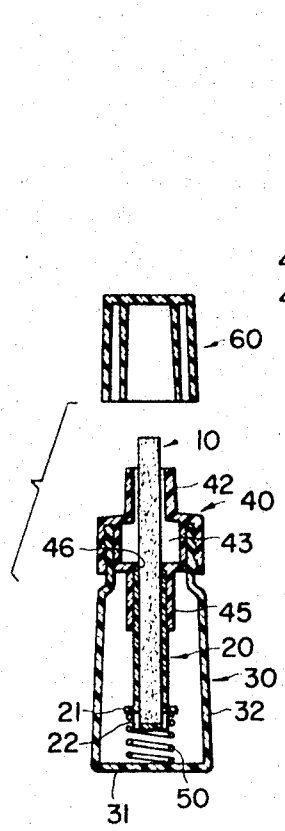


FIG. 1

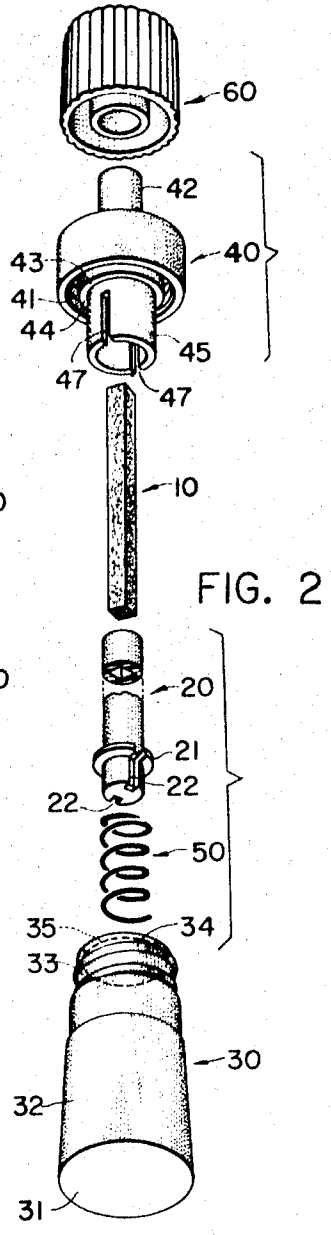


FIG. 2

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INK WRITING IMPLEMENT

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U.S. Cl. 401—206 10 Claims

ABSTRACT OF THE DISCLOSURE

The writing implement of the present invention consists of a capillary fiber pen core, a fluid ink reservoir container, and a closure member including a spring mechanism. The pen core is connected by a fluid path with the fluid ink reservoir when the implement is inverted and the end point of the core is pressed on a surface to write. Fluid ink will be supplied to the core by retrogression of its fiber core against the spring opening a fluid passageway to the reservoir.

This invention relates to an improved writing implement and more particularly a refillable fiber core pen.

In the field of writing implements, many types of pens using fiber capillary cores are known in the prior art. In some such pens, a fluid ink flows to the pen core only when the pen is held upside down and pressed on the writing surface. The fluid ink does not flow to the pen core when the writing pressure is removed.

Up to now, there have been problems in the various constructions of this type. The clearance between the pen core and fluid ink reservoir, which is the passageway for the ink, is increased by pressing in an oblique lateral direction to the pen core compared to the case of pressing directly along the axis of the pen core. The fluid ink flows through the increased clearance to the end point of the pen core, causing a blotting or leaking from the end point due to the excess ink. Another problem has been that ink has been leaked when removing the pen core by hand when replenishing the ink.

It is the objective of the present invention to provide a writing implement which is capable of passing the correct amount of fluid ink to the end point of the pen core, even if the pen core is pressed from the oblique direction when writing.

It is another objective of this invention to provide a writing implement that may be replenished exactly and easily with a fluid ink without blotting or leakage.

In accordance with the present invention, a writing implement is provided having a reservoir for storing fluid ink. The reservoir has a neck portion having a relatively large opening. A closure structure is screwed, so that it may be removed, onto the exterior surface of the neck portion. The closure structure includes an internal chamber and a guiding cylinder having a plurality of slots and projecting down toward the bottom of the chamber. A hole is provided at the bottom of the chamber through which the pen core protrudes into the ink reservoir.

The pen core is formed by curing fiber units and is tightly surrounded by a tubular member, preferably over half its area. A top portion of the said tubular member is located in the interior of said guiding cylinder.

The guiding cylinder is designed so that the tubular member is able to slide freely in its axial direction. The tubular member is spring-biased to normally be positioned with its top against the bottom of the chamber. When the top surface of the tubular member is positioned at the top of the guiding cylinder, the desired length of the pen core will be exposed.

In operation, the spring pushes and holds upward the tubular member. In writing, the implement is inverted, its cap removed, and the pen core moves backwards against the spring due to the writing pressure added from the direction oblique to the end point of the pen core. The tubular member retrogrades due to the retrogression of its pen core.

Although the guiding cylinder assists to smoothly retrogress the tubular body in the longitudinal direction, it will not permit the formation of an undesired clearance. In order to avoid such a clearance, a small and narrow slit or hole is provided in the wall of the guiding cylinder. When the tubular member retrogresses, part of the core is uncovered and exposed to the slits in the guiding cylinder. The pen core then has a path of fluid communication with the ink reservoir. When the writing pressure is removed, the pen core and tubular member return to their normal positions under the pressure from the spring.

The size of the clearance, i.e., fluid path, does not depend upon the direction of pressure on the point. Because there is direct or oblique pressure on the top end of the core (in the direction of the axis of the pen core), the relative positions of the guiding cylinder and tubular member will not be changed.

It is possible to supply desired ink to the ink reservoir without blotting by hand because the top of the fluid ink reservoir has a relatively large opening. When the cover is removed, the pen core and its associated closure members will also be removed with it.

For a better understanding of the invention, as well as further objectives and features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawings, wherein like figures are represented by like reference numerals. In the drawings:

FIG. 1 is a longitudinal sectional view of the writing implement;

FIG. 2 is an oblique perspective view of the writing implement of FIG. 1 which exposes the respective portions and in which a portion of the tubular member has been cut away.

In the present embodiment of the invention, the writing implement consists of an assembly of various parts. These parts are a pen core **10**, a tubular member **20**, a fluid ink reservoir **30**, a casing **40**, a spring **50** and a cap **60**. The tubular member **20**, reservoir **30**, cover **40** and cap **60** are preferably molded from synthetic plastic resin. The pen core **10** is a felt molded in the form of a rectangle, in cross-section, by curing fiber units.

The tubular member **20** is elongated and has an external flange **21** which is in the form of a ring so that spring **50** may be restrained against it. Spring **50** surrounds the exterior surface on the lower end of tubular member **20**. Spring **50** is closely positioned and tightened over the tubular member **20**. The tubular member **20** has two communicating holes **22** at its lower portion through its wall. In such writing implements employing a capillary action pen core, it is necessary to avoid a curing or hardening of the fluid ink. This is accomplished by connecting to the pen core with the fluid ink supply even when not using the writing implement. The holes **22** are provided at a lower end of the tubular body (corresponding to the lower bottom of the pen core) so that the pen core will always be wetted.

The ink reservoir **30** consists of a plain bottom **31**, a conical drum part **32**, a neck portion **33** and exterior male screw threads **34**. In the construction of the reservoir, the top is relatively large and has a large opening **35** for inserting elements of the implement.

The casing (closure) **40** has female screw threads **41** formed on its interior surface. These female screw threads **41** couple with the male screw threads **34**. A tubular extension **42**, extending from the top of the casing and integral with casing **40**, is adapted to cover a part of the upper portion of the pen core **10**. An annular chamber **43**, formed within casing **40**, is relatively larger in cross-section, viewed from the top, compared with extension **42**. Extension **42** fits around pen core **10** closely and casing **40** has a chamber **43** with considerable clearance from the pen core **10**. The bottom of the casing **40** has an integral guiding cylinder **45** having two slits **47**. The upper portion of tubular member **20** is guided within cylinder **45**. The tubular member **20** is free to slide up and down within cylinder **45**, i.e., the length of the guiding cylinder **45** is designed so that the tubular member **20** may reciprocate in the longitudinal direction. Normally spring **50**, acting between flange **21** and the bottom **31** of the reservoir **30**, urges tubular member **20** upward.

The top end of the tubular member **20** is normally held by spring **50** against the bottom **44** of the chamber **43**. The end point of pen core **10** will be exposed from the extension **42** only the desired length when the top end of tubular member **20** reaches to the bottom **44** of the chamber **43**. The tubular member **20** fits closely enough in the guiding cylinder **45** of the casing **40** so that it does not fall out when the casing **40** is lifted. The above-assembled members are inserted through the opening **35** of ink reservoir **30**.

In this construction, the spring **50** urges the tubular member **20** upwards. A small longitudinal ink-flow channel **46** is provided in the guiding cylinder **45** when the tubular member **20** is pushed downward against the spring. Channel **46** is formed by the opening of slots **47** in guiding cylinder **45** so that pen core **10** communicates with ink reservoir **30**. The ink flows from reservoir **30** through the slits **47**, over the top of tubular member **20**, and to the core **10** when the pen is upside down and the core retrogressed.

When using the writing implement, pressure from an oblique lateral direction applied against the end point of pen core **10** causes the pen core **10** and tubular member **20** to retrograde. Simultaneously, the pen core **10** and ink reservoir **30** are connected by means of the longitudinal channel **46**, and thence the fluid ink will be supplied to the pen core **10**.

Even if a considerable amount of ink flows through the opening in the bottom of chamber **43**, i.e., through channel **46**, the issued ink will be stored within the chamber **43**, which occupies a relatively large space, without flowing to an end point of the pen core.

In the present invention, if an excess ink flow should occur, the issued ink will be gathered in a chamber which occupies a relatively large space. This chamber is positioned before the end point of the pen core. This chamber prevents a blotting or leakage of excess ink from the end point of the pen core. The length of the pen core is from the end point of the pen core to a hole at the bottom surface of the reservoir chamber. If the writing implement is left without use, core **10** will be wetted by its own capillary action. It is easy to supply ink to the reservoir through the relatively large opening **35** without blotting by removing the casing **40** together with its connected pen core **10**, tubular member **20** and spring **50**.

While I have shown only the preferred forms of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A writing implement comprising,
an ink reservoir forming a cavity for holding ink and having an open top;
a removable assembly attached to the top of the reservoir, the assembly consisting of a tubular member,
a capillary fiber core fixedly disposed within the tubular member and extending out of the upper opening of the tubular member so as to leave a portion of the core exposed,
a closure member having a bore therethrough,
a downwardly oriented guiding sylinder having an opening in its cylinder wall and having a bore therethrough, the diameter of the cylinder's bore greater than the diameter of the closure's bore, the guiding cylinder being oriented beneath the closure member and connected to said closure member so that their bores are in alignment,
the tubular member being fitted within the cylinder's bore for slidable movement therein and with the exposed portion of the core extending up through and out of the closure's bore,
the outer surface of the tubular member and the inner surface of the cylinder having a bearing clearance just sufficient to permit motion of the tubular member only along its axis;
and spring means normally biasing the tubular member upward within the cylinder and against the closure member wherein, when the implement is inverted to write and pressure is applied to the exposed core, the core and tubular member will retrogress toward the reservoir forming an ink channel between the exposed core and the reservoir through the cylinder wall opening.

2. A writing implement as in claim **1** wherein said opening in said cylindrical wall is a plurality of slits in said wall.

3. A wrting implement as in claim **1** wherein said closure member has an internal chamber about said core.

4. A writing implement as in claim **1** and also including a removable cap which fits over said closure member.

5. A writing implement as in claim **1** and also including a hole in the wall of said tubular member.

6. A writing implement as in claim **1** wherein said spring means is a coiled spring attached to the bottom of said tubular member.

7. A writing implement as in claim **1** wherein said reservoir top and said closure member are attachable by screw threads.

8. A writing implement as in claim **1** wherein said closure member includes a tubular top extension surrounding said core near its top.

9. A writing implement as in claim **1** wherein said core is rectangular.

10. A writing instrument as in claim **1** wherein said tubular member encloses the entire length of the core which is within said reservoir.

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LAWRENCE CHARLES, Primary Examiner

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