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<p>(21) International Application Number: PCT/US98/24437</p> <p>(22) International Filing Date: 16 November 1998 (16.11.98)</p> <p>(30) Priority Data: 08/974,566 19 November 1997 (19.11.97) US</p> <p>(71) Applicant: BIC CORPORATION [US/US]; 500 Bic Drive, Milford, CT 06460 (US).</p> <p>(72) Inventor: HAMILTON, Arthur, F., Jr.; 209 Marcdale Boulevard, Indian Rocks Beach, FL 33785 (US).</p> <p>(74) Agents: MARSHALL, Jonathan, A. et al.; Pennie & Edmonds LLP, 1155 Avenue of the Americas, New York, NY 10036 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>	
<p>(54) Title: WRITING INSTRUMENT WITH CARTRIDGE SPACING ELEMENT</p>		
<p>(57) Abstract</p>		
<p>An improvement for a writing instrument (10) consists of an elastomer spacing element (32) disposed within the interior (16) of the writing instrument (10). The improved writing instrument (10) accepts ink cartridges (18) that are within a range of lengths. Relatively short cartridges (18) are held in place, and prevented from independent movement by the spacing element (32). Conversely, relatively lengthy ink cartridges (18) cause the spacing element (32) to be compressed.</p> <div style="text-align: right;"> </div>		

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WRITING INSTRUMENT WITH CARTRIDGE SPACING ELEMENT**BACKGROUND OF THE INVENTION****5 Technical Field**

The present invention is directed to an improvement to writing instruments, wherein the writing instrument is easily and inexpensively capable of accepting ink cartridges of longer or shorter than normal length. In particular, the
10 improvement includes a resilient spacing element which decreases the nominal length of the cartridge chamber, but allows compressible contact with a cartridge longer than that nominal length.

15 Discussion of the Related Art

Ink writing instruments are well known in the art and are available in both disposable and non-disposable forms. Non-disposable forms typically utilize replaceable ink cartridges that are inserted into a chamber within the
20 instrument. When one replaceable ink cartridge is exhausted, a user simply removes it and inserts a new one.

Not all cartridges fit all writing instruments however; non-disposable writing instruments that employ ink cartridges are typically constructed with the intention of using
25 cartridges of a specified length. Therefore, a user is often forced to rely upon one brand or type of cartridge for a particular writing instrument. Complicating this situation are cartridges that are close to normal size but are somewhat shorter or longer. Shorter cartridges may fit within a prior
30 art writing instrument, but because they are of less than normal length, remain loose within the cartridge chamber. Although the user may be able to make use of the writing instrument with such a cartridge installed, the cartridge tends to slip and slide around within the chamber, resulting
35 in noise and an unstable feeling within the user's hand, thus distracting the user from making smooth strokes.

Similarly annoying are ink cartridges that are of slightly longer than normal length. When a cartridge is substantially longer than normal, the user can tell at a glance that it will not fit within the chosen writing
5 instrument. However, with cartridges that are only slightly longer than normal, the user cannot discern whether it will fit or not until he or she attempts to install it within the cartridge chamber.

Most non-disposable writing instruments consist of two
10 or more separable sections which, when joined, create the cartridge chamber and envelope the ink cartridge. When the sections of a particular writing instrument connect and release via screwing and unscrewing complementary threaded portions, the writing instrument may, by not completely
15 screwing the portions together, be capable of enclosing a cartridge that is too long. This remains unsatisfactory to the user, however, as the instrument then has a tendency to unscrew further, to the point of disassembly. In addition, the incomplete union of the instrument segments is likely to
20 feel uncomfortable within the user's grasp.

SUMMARY OF THE INVENTION

In view of the disadvantages of the prior art, it is an object of the present invention to provide a writing
25 instrument that is capable of securely accepting ink cartridges that are of less than normal length, so that such cartridges are prevented from easily moving about within the cartridge chamber.

It is a further object of the invention to accept
30 cartridges that are of longer than normal length without affecting the external appearance or assembly of the writing instrument.

It is also an object of the invention to provide the above advantages with a device which is both uncomplicated
35 and occupies a small area within the writing instrument.

In a writing instrument according to the present invention, an improvement is provided including a spacing

element assembly that allows the insertion and use of ink cartridges within a range of lengths. A conventional non-disposable writing instrument includes a main cylindrical portion which encloses a chamber in which resides an ink cartridge, an upper end from which protrudes the writing point of the ink cartridge, and a lower end. Connected to the lower end of the writing instrument by a support member is an O-ring shaped spacing element. When the chamber is empty, the spacing element reduces the longitudinal length of the ink cartridge chamber, thus allowing relatively short ink cartridges to be inserted and snugly ensconced therein. Relatively long cartridges may also be inserted, in which event the spacing element is compressed, thereby lengthening the ink cartridge chamber.

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BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become more readily apparent from the following detailed description, which should be read in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a writing instrument according to the present invention;

FIG. 2 is a longitudinal sectional view of a writing instrument employing one embodiment of the present invention;

FIG. 3 is a longitudinal sectional view of a writing instrument according to the present invention, with an ink cartridge installed.

FIG. 4 is a partial sectional view of the embodiment of the invention depicted in FIGS. 2 and 3.

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DETAILED DESCRIPTION OF THE INVENTION

The following embodiments are described in the context of a writing instrument that employs ink cartridges. Note that whenever the same reference numeral is repeated with respect to different figures, it refers to the corresponding structure in each figure.

FIGS. 1 and 2 depict an illustrative embodiment of a writing instrument employing the present invention. The body of writing instrument 10 is comprised of upper portion 12 and lower portion 14 which rotatably join to form chamber 16 in which resides ink cartridge 18 (shown in FIG. 3). Button 26 attaches to lower portion 14 and forms one end of writing instrument 10. When writing instrument 10 is not in use, cap 14 encloses the opposite, writing, end.

As seen in FIG. 3, in normal operation upper portion 12 is fully joined with lower portion 14, and cartridge 18 substantially fills the longitudinal length of chamber 16. Point 20 of cartridge 18 extends through bore 22 of upper portion 12, and spacing element 32 meets the lower end of cartridge 18.

In FIG. 4, button 26 can be seen to support spacing element 32 for yieldable interaction with cartridge 18. Spacing element 32 compresses as necessary to allow writing instrument 10 to accept cartridges having a range of lengths. Post 30, cylindrical in this illustrative embodiment, extends from surface 28 of button 26, preferably at a ninety degree angle, to support spacing element 32. The circumference of the opposite end of post 30 is surrounded by an annular flange and, as described below, cooperates with the lower end of cartridge 18. The outer diameter of the annular flange surrounding the upper end of post 30 is larger than the inner diameter of spacing element 32, thereby ensuring a secure fit of spacing element 32 to post 30.

Cartridge 18 includes a bore extending inward from its lower end, opposite button 26, of slightly greater diameter than the annular flange surrounding the upper end of post 30. Upon insertion of a relatively long ink cartridge, the bore receives post 30 as spacing element 32 is compressed. In an alternative embodiment, not pictured, instead of being encircled by a flange, the upper end of post 30 is chamfered.

When an ink cartridge is exhausted, the user unscrews the main body of the writing instrument, removes the exhausted cartridge and inserts a new one, typically by first

inserting the tip into upper portion 12 and then screwing lower portion 14 onto upper portion 12. The present invention allows the user to insert a cartridge that does not extend all the way to surface 28 of button 26 when upper 5 portion 12 and lower portion 14 are screwed together. Spacing element 32 fills the gap that would otherwise exist between cartridge 18 and button 26, thus preventing cartridge 18 from sliding around within chamber 16.

Similarly, because spacing element 32 is compressible, 10 the user can insert cartridges that are longer than the distance from bore 22 to spacing element 32. Instead of being limited to using such a cartridge with the upper and lower portions of the writing instrument partially unscrewed, spacing element 32 will be compressed by the extended 15 cartridge, and post 30 will extend into the bore situated in the corresponding end of cartridge 18, with no adverse effect upon or difference in appearance of the writing instrument.

In an exemplary embodiment, spacing element 32 is a deformable O-ring with a thickness of 0.076 inches; 20 illustrative materials for its construction include various synthetic rubber materials such as nitrile, silicone, and polyurethane. Depending upon the material used, maximum compressibility of this embodiment is 0.018 inches.

The above description is intended to be illustrative, 25 not limitative. Thus, it will be apparent to those skilled in the art that modifications may be made to the invention as described without departing from the scope of the claims set out below. For example, instead of employing an O-ring shaped spacing element, thus giving it a circular cross- 30 section, an alternative embodiment employs a square cross-section.

I claim:

1. A writing instrument comprising:
a main body having an elongated cavity within;
an ink cartridge disposed within the elongated cavity of
5 the main body, said cartridge having a length which does not
correspond exactly to the elongated cavity;
a spacer attachment disposed in said cavity at an end of
said ink cartridge, comprising a yieldable spacer and a
spacer support, such that said yieldable spacer accommodates
10 the ink cartridge length to provide a snug fit of the ink
cartridge in the cavity.
2. The writing instrument of claim 1, in which the spacer
is made from an elastomer.
- 15 3. The writing instrument of claim 2, in which the spacer
is of an annular form.
4. The writing instrument of claim 1, in which the spacer
20 attachment is connected to the main body.
5. The writing instrument of claim 4, in which the spacer
is removably attached to the spacer support.
- 25 6. The writing instrument of claim 1, in which the spacer
yieldably contacts an ink cartridge shorter than a specified
length, so as to substantially eliminate independent movement
of the ink cartridge within the writing instrument cavity.
- 30 7. The writing instrument of claim 1, in which the spacer
compresses to allow the writing instrument to accept an ink
cartridge longer than a specified length.
8. The writing instrument of claim 1, in which the spacer
35 attachment forms a first end of the main body.

9. The writing instrument of claim 1, in which the spacer support comprises:

- a cylindrical shaft;
- a first end attached to the spacer attachment; and
- 5 a second end opposite the first end.

10. The writing instrument of claim 9, in which the circumference of the second edge of the spacer support forms an annular flange.

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11. The writing instrument of claim 9, in which the ink cartridge comprises:

- a tip;
 - a body, comprising an ink reservoir; and
 - 15 an end;
- said end comprising a bore having a diameter larger than the diameter of the spacer support.

12. A writing instrument comprising:

- 20 a main body defining a cavity for housing an ink cartridge, the ink cartridge having an associated length; and
 - an annular element, composed of a compressible material, disposed within a first end of the cavity;
- wherein the compressibility of the annular element
- 25 enables the cavity to snugly accept an ink cartridge having one of a range of lengths.

13. The writing instrument of claim 12, in which the annular element is a torus.

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14. The writing instrument of claim 13, further comprising a support post for attaching the annular element to the main body.

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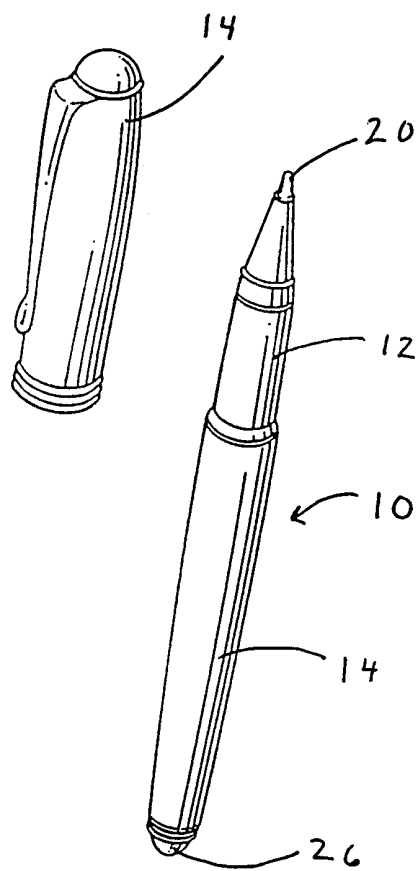


FIG. 1

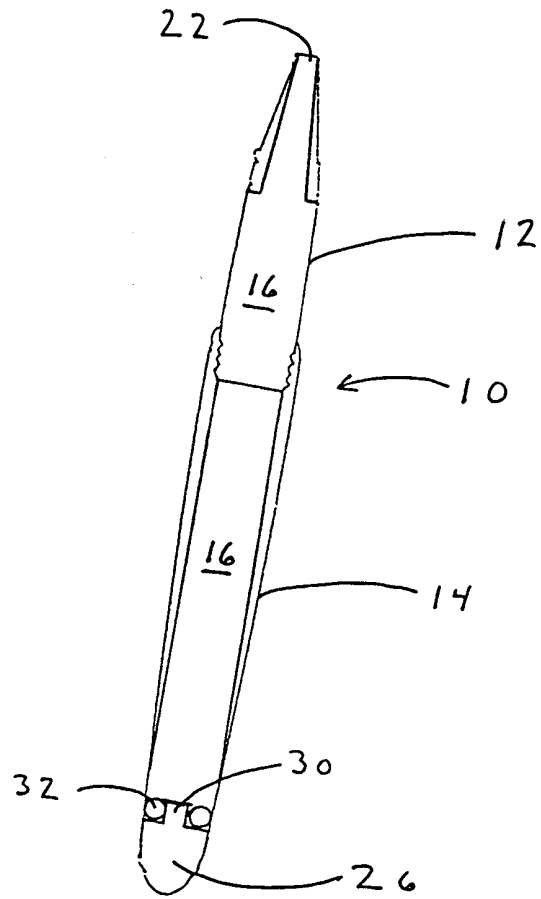


FIG. 2

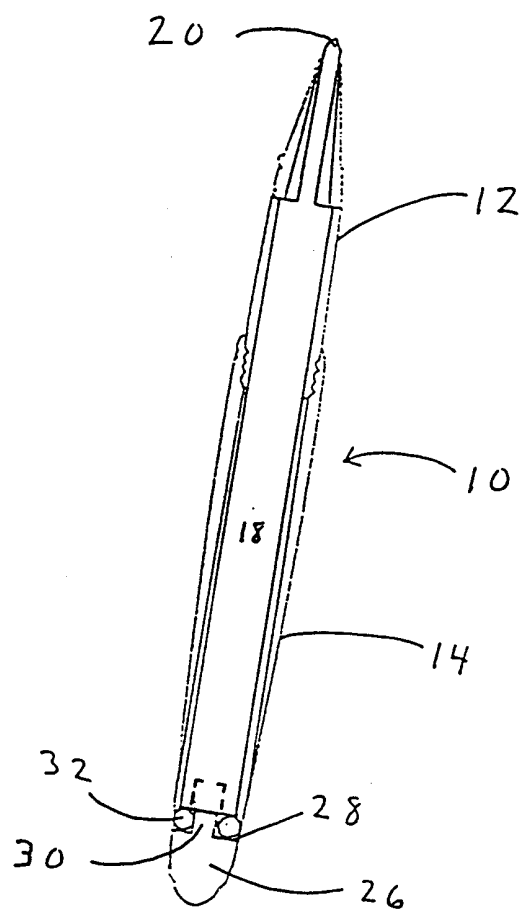


FIG. 3

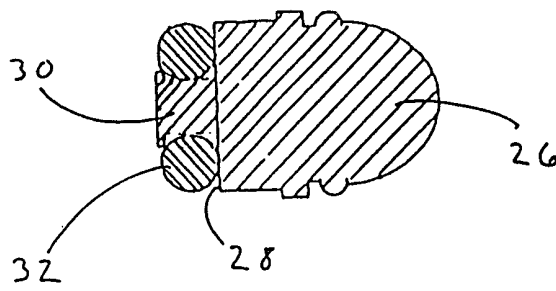
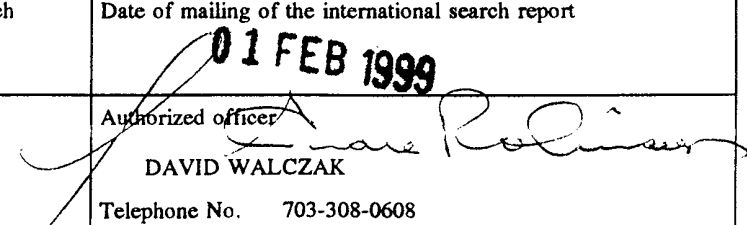


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/24437

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(6) : Please See Extra Sheet. US CL : 401/6, 54, 145, 153, 183, 208, 210, 213, 221-223 According to International Patent Classification (IPC) or to both national classification and IPC</p>																				
<p>B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) U.S. : 401/6, 54, 145, 153, 183, 208, 210, 213, 221-223 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>																				
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 3,180,320 A (DE GROFT) 27 April 1965, entire document.</td> <td>1, 3, 9, 10</td> </tr> <tr> <td>X</td> <td>US 4,167,350 A (HARRIS) 11 September 1979, entire document.</td> <td>1-8</td> </tr> <tr> <td>X</td> <td>US 5,294,206 A (MUKUNOKI) 15 March 1994, entire document.</td> <td>12</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 3,180,320 A (DE GROFT) 27 April 1965, entire document.	1, 3, 9, 10	X	US 4,167,350 A (HARRIS) 11 September 1979, entire document.	1-8	X	US 5,294,206 A (MUKUNOKI) 15 March 1994, entire document.	12						
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<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.</p>																				
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A. CLASSIFICATION OF SUBJECT MATTER:

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