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Apparatus for adjustably retaining an expendable medium for writing and/or drawing

Abstract

An apparatus for adjustably retaining an expendable medium for writing or drawing such as for a crayon core, a wax or oil based pencil (colored pencil) core, a chalk core or a pastel core includes a tubular barrel, at least one elongated arcuate body element, and a follower in abutting engagement with a portion of the body. The follower has a helical surface feature corresponding with spaced surface features of the body. The follower is configured to receive a non-writing end of an expendable core. The apparatus is configured such that the outer barrel of the apparatus can be made from a paper based material such as paperboard or other fibrous material that is more eco-friendly than other material such as plastics.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application claims priority to U.S. Provisional Patent Application No. 63/347,738, filed on Jun. 1, 2022, and U.S. Provisional Patent Application No. 63/409,531, filed on Sep. 23, 2022, each of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION
1. Field of the Invention
(1) Aspects of the technology described herein relate to writing utensils. More specifically, aspects of the technology described herein relate to a writing utensil with an expendable core which may be extended or retracted by rotating a portion of the utensil.
2. Description of Related Art
(2) Numerous writing utensils are capable of adjustably retaining an expendable medium, such as a crayon, a pencil, chalk, or a pastel. Frequently, these writing utensils will include a twist-to-drive mechanism that allows a user to extend or retract the expendable medium through an opening at a

writing end of the utensil. These adjustable writing utensils frequently have a rigid, unitary body and a plug that is configured to rotate relative to the body to drive the expendable medium forward and backward. Generally, the plug is positioned on a non-writing end of the utensil opposite the writing end. In most cases, these utensils are designed for one-time use. Accordingly, these utensils are predominantly made from plastic components to minimize production costs. Further, since they are designed to be disposed of after a single use, these products are generally not designed to be disassembled and/or reassembled for recycling and/or reuse.

BRIEF SUMMARY OF THE INVENTION

(3) The present invention is directed to an apparatus for adjustably retaining an expendable medium for writing or drawing such as for a crayon core, a wax or oil based pencil (colored pencil) core, a chalk core or a pastel core. The apparatus is configured such that an outer barrel of the apparatus can be made from a paper based material such as paperboard or other fibrous material that is more eco-friendly than other material such as plastics. The apparatus includes a tubular barrel having an outer barrel surface and an inner barrel surface. The tubular barrel may be formed of a paper-based material such as paper board or another fibrous material. At least one elongated arcuate body having an outer body surface and an inner body surface is positioned within the barrel with the outer body surface positioned in abutting engagement with the inner barrel surface. The inner body surface includes spaced surface features (indentations or protrusions) that define a spiral path along the length of the body. A follower having a helical surface feature (indentation or protrusion) corresponding with the spaced surface features of the body is positioned in abutting engagement with at least a portion of the inner body surface. The follower includes an aperture configured to receive a non-writing end of an expendable medium or core. The at least elongated arcuate body may have a cross-sectional profile that is less than 180°. The barrel, the at least one elongated arcuate body and the follower may be connected mechanically without the use of adhesives.

(4) In a first exemplary embodiment, a spacer is immovably affixed to an end of the tubular barrel and a rotatable collet is rotatably affixed to the spacer. The collet includes a non-circular shaped passageway corresponding in shape to the expendable core such that the core can freely slide through the passageway in the direction of the longitudinal axis of the passageway, but not rotate within the passageway relative to the collet.

(5) In some embodiments, the outer body surface is glued to the inner barrel surface. In some embodiments, the spaced surface features of the body include spaced indentations and the helical surface feature of the follower includes a helical ridge. The elongated body may also have a closed end configured to close the non-writing end of the barrel.

(6) In some embodiments, the non-circular shaped passageway of the collet has a polygonal shaped cross-section such as a hexagonal shaped cross-section. In some embodiments, the non-circular shaped passageway of the collet is configured to receive and rotate in tandem with an expendable core with a polygonal cross-section, which may include a hexagonal shaped cross-section.

(7) In use, the expendable core of the first exemplary embodiment is positioned within the body in the barrel and secured at the non-writing end within the aperture in the follower such that the core does not move relative to the follower. The writing end of the core extends through the spacer and through the non-circular shaped passageway in the collet such that the core can slide through the collet along the longitudinal axis of the passageway but not rotate relative to the collet. Rotation of the collet thereby causes rotation of the core which thereby causes rotation of the follower. The surface features on the body and the follower cause the follower to move in the body and barrel along the longitudinal axis of the apparatus upon rotation of the follower. Because the core is immovably affixed to the follower this causes the writing end of the core to be moved to extend further outward from the writing end of the apparatus or to be retracted inward toward the non-writing end. In this manner, a user can rotate the collet in order to move the writing end of the core outward as the core material is depleted.

(8) In a second exemplary embodiment, the apparatus includes a plurality of body members, a

tubular barrel, an elongated cradle, a follower and a core. The apparatus comprises a tubular barrel having an outer barrel surface and an inner barrel surface. The tubular barrel may be formed of a paper-based material such as paper board or another fibrous material. Each body member includes a head portion, a collar portion, a guide portion having an inner guide surface, and a connection portion. The inner guide surface includes spaced surface features. The elongated cradle has an outer cradle surface, an inner cradle surface and cradle edges is configured to engage abuttingly with the inner guide surface of each one of the plurality of body members. A plug is coupled to the elongated cradle. In some embodiments, the plug may be integrally formed with the elongated cradle. The plug is configured to engage the connection portion of each of the plurality of body members to secure the plug and the plurality of body members together while permitting the plug and follower to rotate about a longitudinal axis of the apparatus relative to the plurality of body members. The follower is positioned within the cradle in abutting engagement with the inner cradle surface. The follower has a helical surface feature corresponding with the spaced surface features of the inner guide surfaces of the plurality of body members such that the spaced surface features define a spiral path for the follower along the length of the apparatus. In this embodiment, the follower has two contact surfaces corresponding with the cradle edges such that the follower rotates with the cradle when a respective one of the contact surfaces abuts a corresponding one of the cradle edges and torque is applied.

(9) In use, the expendable core of the second exemplary embodiment is positioned between the plurality of body members, and each body member is positioned within the barrel. The core is secured at the non-writing end within the aperture in the follower such that the core does not move relative to the follower. The writing end of the core extends through an aperture at the writing end of the apparatus such that the core can slide through the aperture along the longitudinal axis of the apparatus. When torque is applied to the plug (or the cradle), one of the cradle edges contacts a corresponding contact surface on the follower, thereby causing the follower to rotate. As the follower is thus rotated, the surface features on the body members and the follower cause the follower to travel within the body along the longitudinal axis of the apparatus. Because the core is immovably affixed to the follower, this action causes the writing end of the core to rotate and move in tandem, either extending farther outward from the writing end of the apparatus, or retracting inward toward the non-writing end. In this manner, a user can rotate the plug in order to move the writing end of the core outward as the core material is depleted.

(10) Additional aspects of the invention, together with the advantages and novel features appurtenant thereto, will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following, or may be learned from the practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a perspective view of an apparatus in accordance with a first exemplary embodiment of the present invention showing a crayon core adjustably retained within the apparatus;

(2) FIG. **2** is a side elevational view of the apparatus of FIG. **1** showing the crayon core in the apparatus with the paper barrel removed;

(3) FIG. **3** is an exploded view of the apparatus of FIG. **1** showing the crayon core in the apparatus;

(4) FIG. **4** is a front view of the apparatus of FIG. **1**;

(5) FIG. **5** is an enlarged perspective view of the crayon core shown in FIG. **1**;

(6) FIG. **6** is an enlarged perspective view of the spacer component of the apparatus of FIG. **1**;

(7) FIG. **7** is an enlarged perspective view of the collet component of the apparatus of FIG. **1**;
(8) FIG. **8** is an enlarged perspective view of the trough component of the apparatus of FIG. **1**;
(9) FIG. **9** is a top plan view of the trough component of FIG. **8**;
(10) FIG. **10** is an enlarged perspective view of the follower component of the apparatus of FIG. **1**;
(11) FIG. **11** is a cross-sectional side view of the apparatus of FIG. **1** taken through the line **11-11** of FIG. **2**;
(12) FIG. **12** is a cross-sectional side view thereof showing the crayon core in an extended position;
(13) FIG. **13** is a perspective view of an apparatus in accordance with a second exemplary embodiment of the present invention showing a crayon core adjustably retained within the apparatus;
(14) FIG. **14** is an exploded view of the apparatus of FIG. **13** showing the crayon core in the apparatus;
(15) FIG. **15** is a side elevational view of the apparatus of FIG. **13** showing the crayon core in the apparatus with the paper barrel removed;
(16) FIG. **16** is a magnified cut-out of FIG. **15** showing the interlocking placement feature of the body members;
(17) FIG. **17** is an enlarged fragmentary cross-section of a rear end of the apparatus of FIG. **13** taken between lines **17-17** of FIG. **13**;
(18) FIG. **18** is an enlarged perspective view of a first body member of the apparatus of FIG. **13**;
(19) FIG. **19** is an enlarged perspective view of a second body member of the apparatus of FIG. **13**;
(20) FIG. **20** is an enlarged perspective view of the cradle component of the apparatus of FIG. **13**;
(21) FIG. **21** is an enlarged perspective view of the follower component of the apparatus of FIG. **13**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

(22) Aspects of the technology described herein will become more apparent with reference to the figures provided herein. An apparatus **10** for adjustably retaining an expendable writing and/or drawing medium or core (such as a crayon core) in accordance with a first exemplary embodiment of the present invention described and claimed herein is denoted generally in FIGS. **1-2**, **4** and **11-12** by numeral **10**. As shown in FIG. **1**, apparatus **10** can receive a writing medium or core such as the depicted crayon core **3** and is adjustable such that a user can drive the core **3** either forward or backward along the longitudinal axis of apparatus **10**. When core **3** is received by apparatus **10** and positioned properly, it will be appreciated that the apparatus **10** can be used for writing or drawing in a manner similar to how a user would use a traditional writing utensil. However, as the core **3** becomes worn down from use, the user can periodically adjust the apparatus **10** so that the core **3** protrudes from the body of the apparatus **10** at a generally constant distance even as the end of the core **3** is worn down from use. The apparatus **10** of the present invention may use a paper barrel **4** on its exterior, in contrast to other adjustable systems that have a body made primarily of plastic components, thereby substantially reducing the amount of plastic in the apparatus **10**. During use, the user primarily holds the apparatus **10** by gripping the paper barrel **4** and the collet **6**, though it is contemplated that other surfaces along the body of apparatus **10** are suitable for gripping and handling. As will be described herein below, collet **6** is configured to be rotated by the user to facilitate the driving action to adjust the position of the core **3**.

(23) Referring now to FIGS. **1-4**, apparatus **10** includes a paper barrel **4**, a trough **5**, a spacer **2**, a collet **6**, and a follower **1**. An expendable core for writing and/or drawing such as a crayon core **3** is received by the apparatus **10**. The exterior body of apparatus **10** is elongate and generally cylindrical, the body being defined by a closed-end **12** of the trough **5**, the tubular shaped paper barrel **4**, the spacer **2** and the collet **6**. Portions of the inside wall of the paper barrel **4** are glued or otherwise affixed to portions of the trough **5** and the spacer **2** such that the paper barrel, trough and spacer are immovable relative to one another and are generally rigid. In contrast to these body elements, which do not move relative to one another, the collet **6** is rotatably attached to the spacer

2 in a manner that allows the collet **6** to rotate clockwise and counterclockwise relative to the central axis of apparatus **10**. As will be explained in greater detail herein, the rotation of collet **6** is essential to the driving mechanism of the apparatus. The body is shaped and sized to be held and handled like a traditional writing and/or drawing utensil. It will be appreciated that the collet **6** tapers slightly inward toward the writing end of the apparatus, improving handling and gripping near the exposed portion of the core **3** that protrudes outward from the body. On the opposite end of the body, the end of the paper barrel **4** is closed by the closed end **12** of trough **5** to reduce the risk of accidental or deliberate disassembly of the apparatus **10** and/or interference with the driving mechanism housed within the body.

(24) As best shown in FIGS. **3**, **8** and **11-12**, the driving mechanism of the apparatus is defined by a guiding portion **14** of the trough **5**, the follower **1**, the collet **6** and the spacer **2**. The follower **1** is configured to securely receive a non-writing end **16** of the core **3** and to follow a spiral path defined by grooves **18** in the guiding portion of the trough **5**. Due to the constraints in the movement of the follower **1**, to which the core **3** is attached, the core **3** may only advance forward or backward along the longitudinal axis when the core **3** is rotated clockwise or counterclockwise relative to the longitudinal axis. It will be appreciated, then, that the collet **6** is configured to drive the rotation of the core **3** and, by extension, the rotation of the follower **1** to allow for the longitudinal advancement of the core. In the present embodiment, this is accomplished by forming the core **3** as a hexagonal extrusion (best shown in FIG. **5**) and providing a corresponding hexagonal passage **20** in the collet **6** (best shown in FIG. **7**) that envelops the core **3** in two dimensions while generally not constraining movement in the third direction along the longitudinal axis of the body, as can be seen in FIGS. **2** and **11-12**. It will be appreciated that the inner surface of hexagonal passage **20** should have a low frictional coefficient to facilitate movement of the core **3** therethrough. While the spacer **2** does not actively contribute to the driving action, the spacer **2** isolates the collet **6** from both the paper barrel **4** and the trough **5** and provides a durable, low-friction region of engagement for the collet **6** so the collet **6** can rotate relative to the rest of the body without catching on and/or damaging other portions of the apparatus **10**. In the present embodiment, the collet **6** and spacer **2** are snap fit together, though it is contemplated that these components can be otherwise secured together without departing from the scope of the invention. It is contemplated that in alternative embodiments, another collet may have a differently shaped passage that can engage the core in a functionally similar manner.

(25) As shown in FIGS. **8** and **9**, the trough **5** is defined by a closed end **12** and an elongated guide portion **14** extending forward of end **12**. Closed-end **12** has a round cap **22** and a short cylindrical neck **24** extending forward of the cap **22**. The neck is configured to be received by the end of the paper barrel **4** such that the sides of the cap are flush with the barrel **4**. The guide portion **14** has a hollowed, generally semicircular profile, which allows the guide portion to fit between a portion of the interior of paper barrel **4** on one side, and the follower **1** and core **3** on the other side. Referring again to FIGS. **8** and **9**, the interior wall of the guide portion includes a series of spaced grooves **18**. These grooves **18** are dimensioned to engage with the spiral or helical ridge **26** of the follower **1**. It will be appreciated that the pitch of grooves **18** in the trough **5** correspond with the pitch of ridge **26** in the follower **1**, and this, in turn, allows the follower **1** to travel forward or backward on the spiral path defined by the grooves **18** of the trough **5** when the follower **1** is rotated either counterclockwise or clockwise, respectively. In addition to its role in the driving mechanism, the guide portion **14** of the trough **5** provides structural reinforcement to the body. When the apparatus **10** is assembled, the guide portion extends the entire distance between the closed-end **12** of the trough **5** and the spacer **2**, and the guide portion is adhered to a portion of the interior wall of the paper barrel **4**. As a consequence, it will be appreciated that loads received by the body will be distributed through both the trough **5** and the paper barrel **4**. In the present embodiment, it is contemplated that the trough **5** is made of polypropylene or another semi-rigid to rigid, low-friction polymer.

(26) As shown in FIG. **10**, the follower **1** is a relatively short tubular structure with a spiral or helical ridge **26** protruding from its exterior. Follower **1** is configured to be cradled within the guide portion **14** of the trough **5** while remaining centered along the longitudinal axis of the apparatus **10**. As is already known in the art, it will be appreciated that the span of the helical ridge must exceed the distance between successive grooves in the trough **5** to ensure that the follower **1** remains in proper engagement with the trough **5**. In addition to the ridge **26**, the follower **1** has a central opening **28** that is configured to securely receive the non-writing end **16** of the core **3** such that the core does not move relative to the follower. As is generally shown in FIGS. **2-3**, it will be appreciated that the follower **1** and the collet **6** will together center the core **3** on the longitudinal axis when the core **3** is received by the follower **1** and collet **6** within the apparatus **10**. In the present embodiment, it is contemplated that the follower **1** is made from polyethylene or a similar low-friction polymer.

(27) Referring now to FIG. **6**, the spacer **2** is tubular and has a similar shape and function as the end portion of the trough **5** except that the spacer has a central opening **30** as opposed to being closed. The neck of spacer **2** is configured to be received by the opposite end of the paper barrel **4** such that the outermost sidewalls of the spacer are flush with paper barrel **4**. Spacer **2** has a central opening **30** for receiving the collet **6** and the core **3**. Opening **30** is configured to accommodate a snap-fit connection with the collet **6** such that the collet can rotate within the opening **30**. In the present embodiment, it is contemplated that the spacer **2** is made of a semi-rigid to rigid, low-friction polymer.

(28) Referring now to FIG. **7**, the collet **6** has a frustoconical body **32**, a snap fit flange **34** for engagement with the spacer **2**, and a hexagonal passage **20** for receiving and driving the core **3**. It will be appreciated that the collet **6** body tapers inward from its flanged end to its free end. As described above, passage **20** in the present embodiment is hexagonal, though it is contemplated that other non-circular cross-sectional geometries could also be used to accomplish the driving function. As shown in FIGS. **2** and **7**, the collet **6** includes several gripping elements **36** disposed around the body **32**. The gripping elements may be indentations, bumps, or other raised, depressed or textured features and are configured to improve the user's grip, particularly when the user is rotating the collet **6** to drive the core **3** forward or backward along the longitudinal axis of the apparatus **10**.

(29) Looking at FIG. **5**, the core **3** in the present embodiment is principally an elongate, hexagonally extruded body. Of course, in alternative embodiments, the geometry of the core **3** should correspond with the geometry of the passageway **20** of the collet **6** to ensure a proper driving engagement between the components. On the non-writing end **16**, the core **3** has a circular cross-section, which allows for the core **3** to be securely received by the follower **1**, such as by a press fit. In the present embodiment, the non-writing end **16** having a circular cross-section is approximately 0.4″ long such that it extends a distance into the follower. On the opposite (writing) end of the core **3**, the body of the core **3** may optionally be slightly sharpened to facilitate writing or drawing. While the core **3** of the present embodiment is a crayon, it will be understood that other retractable stick compounds may be used as a writing medium within the scope of this invention. As non-limiting examples, such compounds could include wax or oil based pencil cores, chalk, or pastels.

(30) It is contemplated that the apparatus **10** may be disassembled (e.g., after the core **3** is expended) by separating the paper barrel **4** from the trough **5** and spacer **2**. After the apparatus is disassembled, the user may recycle the plastic materials or may replace the core **3** or the paper barrel **4** (or both) and reassemble the apparatus in the above configuration. Thus, while it is understood that the trough **5** may be immovably secured to the inner surface of the paper barrel **4** for general use, the trough and spacer may be separated from the paper barrel for disassembly.

(31) An apparatus for adjustably retaining an expendable writing and/or drawing medium or core (such as a crayon core) in accordance with a second exemplary embodiment of the present invention described and claimed herein is denoted generally in FIGS. **13-15** by numeral **110**. As

shown in FIG. **13**, apparatus **110** can receive a writing medium or core such as the depicted crayon core **103** and is adjustable such that a user can drive the core **103** either forward or backward along the longitudinal axis of apparatus **110**. As will be described herein below in connection with FIG. **15**, the closed end **112** of cradle **105** is configured to be rotated by the user to facilitate the driving action to adjust the position of the core **103**.

(32) Referring now to FIGS. **13-15**, apparatus **110** includes a paper barrel **104**, two body members **102***a* and **102***b*, a cradle **105**, and a follower **101**. An expendable core for writing and/or drawing such as a crayon core **103** is received by the apparatus **110**. The exterior of apparatus **110** is elongate and generally cylindrical, the exterior being defined by head portions **106** of respective body members **102***a* and **102***b*, the tubular shaped paper barrel **104** and a closed end **112** of the cradle **105**. The paper barrel **104** is configured to fit over the bridge portions **114** of body members **102***a* and **102***b* to define a substantially continuous and generally rigid exterior surface of the apparatus **110** when apparatus **110** is fully assembled. It is contemplated that the paper barrel **104** fits tightly (and generally immovably) around outer surfaces of the body members **102***a* and **102***b* without being directly adhered or affixed thereto, reducing the materials required for manufacture and assembly. This also simplifies the manufacture and assembly process and enables easier disassembly for replacement of component parts for re-use and/or for recycling. Of course, the paper barrel **104** may alternatively be glued or otherwise affixed to one or both of the body members **102***a*, **102***b*.

(33) Referring to FIGS. **15-19**, the body members **102***a* and **102***b* are configured to remain stationary relative to one another, and the cradle **105** is configured to be secured to the connection portions **134** of respective body members **102***a*, **102***b* in a manner that allows the cradle **105** to rotate clockwise and counterclockwise relative to the central axis of apparatus **110**. As will be explained in greater detail herein, the rotation of cradle **105** (in conjunction with follower **101**) is essential to the driving mechanism of the apparatus **101**. When thus engaged, the cradle **105** secures the body members **102***a*, **102***b* together generally at the non-writing end of apparatus **110**. As will further be explained herein, an interlocking placement feature, defined by placement wings **150** in body member **102***a* and placement notches **152** in body member **102***b*, align the respective body members generally at the writing end of the apparatus **110**, as is generally shown in FIG. **16**. The barrel **104** securely and tightly envelops the body members **102***a* and **102***b* between the writing and non-writing ends, providing further body stability, as is best seen in FIGS. **13-14**.

(34) The exterior of apparatus **101** is shaped and sized to be held and handled like a traditional writing and/or drawing utensil. It will be appreciated that the head portions **106** taper slightly inward toward a writing end of the apparatus **110** to define a generally conical surface, improving handling and gripping near the exposed portion of the core **103** that protrudes outward from the body. On the opposite end of the body, the end of the paper barrel **104** abuts and is flush with the sheath **142** of the closed end **112** of cradle **105** to reduce the risk of accidental or deliberate disassembly of the apparatus **110** and/or interference with the driving mechanism housed within the body.

(35) Referring now to FIGS. **14-15** and **17**, the driving mechanism of the apparatus is defined by respective bridge portions **114** of the body members **102***a* and **102***b*, the cradle **105**, and the follower **101**. The follower **101** is configured to securely receive a non-writing end **116** of the core **103** and to follow a spiral path defined by grooves **118** in the bridge portions **114**, as will be described in greater detail below. Additionally, as will be described in greater detail below, the follower **101** is configured to rotate in conjunction with the cradle **105** about the longitudinal axis while also sliding along the longitudinal axis over the travel portion **146** of cradle **105** as the follower **101** follows the spiral path. Due to the constraints in the movement of the follower **101**, to which the core **103** is attached, the core **103** may only advance forward or backward along the longitudinal axis when the cradle **105** is rotated clockwise or counterclockwise relative to the longitudinal axis. It will be appreciated, then, that the closed end **112** of the cradle **105** is

configured to drive the rotation of the follower **101** and, by extension, the advancement of the core **103**. In the present embodiment, when the apparatus **110** is assembled, the head portions **106** of body members **102***a*, **102***b* define a generally round core passage **120** that envelops the core **103** to provide stability to the core at the writing end, as is best seen in FIG. **13**. It will be appreciated that the inner surface of core passage **120** should have a low frictional coefficient to facilitate movement of the core **103** therethrough.

(36) In the present embodiment, each body member **102***a*, **102***b* includes a respective connection portion **134** at the non-writing end opposite head portion **106**, as is best seen in FIGS. **18-19**. Each connection portion **134** has a respective receiving groove **135** near the non-writing end. When apparatus **110** is assembled, the receiving grooves **135** align and define an annular channel, which receives snap flange **136** (shown in FIGS. **17** and **20**). In this manner, the cradle **105** and body members **102***a*, **102***b* (collectively, the "snap fit elements") are joined in interlocking engagement. When the snap flange **136** is thus engaged, body members **102***a* and **102***b* are immovably secured relative to one another, and cradle **105** is restricted from moving translationally but is able to rotate about the longitudinal axis of apparatus **110**. The interlocking engagement of cradle **105** and body members **102***a*, **102***b* eliminates the need for an adhesive or an additional fastening element to join the elements together. In the present embodiment, it is contemplated that a user cannot easily overcome the interference between the snap fit elements to dismantle the apparatus **110**, as by accident. Thus, the body members **102***a*, **102***b* are immovable relative to the paper barrel **104** in use, while the cradle **105** is free to rotate relative to the body members and barrel. In some embodiments, a user may be able to unfasten and subsequently re-fasten the snap fit elements one or more times, for example, to replace the core **103** or another element that is inaccessible when apparatus **110** is fully assembled. It is contemplated that the body members **102***a*, **102***b* and cradle **105** can be otherwise secured together without departing from the scope of the invention, with a different snap fit configuration or a different fastening means.

(37) As shown in FIG. **20**, the cradle **105** is defined by a closed end **112** and an elongated travel portion **146** extending forward of closed end **112**. Closed end **112** has a generally tubular cap **122**, a sheath **142** which extends forward of the cap **122**, and a cylindrical internal neck **124** which extends forward of the cap **122** radially inward of the sheath **142** and which further includes snap flange **136** as previously described. The sheath **142** is configured to envelop a distal portion of the body members **102***a*, **102***b* and abut the non-writing end of the paper barrel **104** such that the sheath **142** is flush with the barrel **104** when the apparatus **110** is fully assembled. It will be appreciated that the sheath **142** thus secures the barrel **104** on the non-writing side. The travel portion **146** of cradle **105** has a hollowed, arcuate profile. As can generally be seen in FIG. **13**, the travel portion **146** is configured to fit between the bridge portions **114** and connection portions **134** of body members **102***a*, **102***b* on its external side, and between the core **103** and tubular portion **150** of follower **101** on its internal side. The travel portion **146** is further configured to abut the contact edges **130***a*, **130***b* the follower **101** on both of its edges **148***a*, **148***b* (described in more detail below in connection with FIG. **20**). This abutting configuration between follower **101** and travel portion **146** constrains the motion of follower **101** so it rotates in conjunction with the cradle **105**. In the present embodiment, it is contemplated that the cradle **105** is integrally formed and made of polystyrene or another semi-rigid to rigid, low-friction polymer.

(38) In the present embodiment, the body members **102***a*, **102***b* are mostly identical and will be described in relation to body member **102***a* as depicted in FIG. **18**. Differences in the features of body member **102***b* of the present embodiment, as shown in FIG. **19**, will be described where applicable. Body member **102***a* is defined by a head portion **106**, a placement collar portion **107** adjacent the head portion **106** on the non-writing side, a connection portion **134** and a narrower bridge portion **114** extending between the placement collar portion **107** and the connection portion **134**. The head portion **106** and connection portion **134** have a hollowed, generally semicircular profile, and the bridge portion **114** has a hollowed shallow arcuate profile. As previously discussed,

the hollowed profile of the head portion **106** is dimensioned to partially define the core passage **120** at the writing end of apparatus **110**. The rounded profile of the connection portion **134** and bridge portion **114** is dimensioned to allow these portions of the body member **102***a* to fit between the paper barrel **104** on its external side and the travel portion **146** of the cradle **105** on its internal side. The cross-sectional profile of each bridge portion **114** is relatively shallow such that it does not form a full semicircle. In the embodiment shown, the cross-sectional profile of each bridge portion **114** has an arc length of approximately 75 degrees. In some embodiments, the cross-sectional profile of the bridge portion **114** is less than 180 degrees and is preferably less than 90 degrees. The bridge portions **114** are centered relative to the head portion **106** and connection portion **134** such that when the body members **102***a* and **102***b* are joined together, the bridge portions **114** are on opposite sides of the apparatus with elongated gaps therebetween. Using bridge portions having cross-sectional profiles less than a full semicircle reduces the amount of material (e.g., plastic) used to make the apparatus while still providing rigidity and support to the barrel.

(39) As shown in FIG. **18**, the placement collar portion **107** of body member **102***a* extends circumferentially beyond the generally semicircular profile of the head portion **106** to define two placement wings **150***a* and **150***b*. As shown in FIG. **19**, the placement collar portion **107** of body member **102***b* extends circumferentially short of the semicircular profile of the head portion **106** to define two placement notches **152***a*, **152***b*. It will be appreciated that the depth of the placement notches **152***a*, **150***b* is generally equal to the depth of corresponding placement wings **150***a*, **150***b* so the body members **102***a*, **102***b* fit together closely when apparatus **110** is fully assembled. As will be described below in connection with FIG. **16**, the interlocking engagement of the placement wings (**150***b* shown) and corresponding placement notches (**152***a* shown) when apparatus **110** is assembled improves the alignment of body members **102***a*, **102***b* and, in particular, grooves **118**.

(40) Referring again to FIG. **18**, the interior wall of the bridge portion **114** includes a series of spaced apart threaded grooves **118**. These grooves **118** are dimensioned to engage with the helical threads **126** of the follower **101**. It will be appreciated that the pitch of the grooves **118** in each bridge portion **114** corresponds with the pitch of threads **126** in the follower **101**, and this, in turn, allows the follower **101** to travel forward or backward on the spiral path defined by the grooves **118** of each bridge portion **114** when the follower **101** is rotated either counterclockwise or clockwise, respectively. Further, it will be appreciated that the position of the grooves **118** in the body member **102***b* are displaced relative to the grooves in the body member **102***a* to ensure a uniform spiral path is defined by the grooves **118** of body member **102***a* and body member **102***b*, respectively. In the present embodiment, the displacement distance is equal to one half the pitch of the threads **126** and grooves **118** because the respective bridge portions **114** are disposed on opposite sides of apparatus **110**. In addition to its role in the driving mechanism, the bridge portion **114** of the body member **102***a* provides structural reinforcement to the body. The head portion **106** protrudes slightly outward where the head portion adjoins the bridge portion **114** so that the non-writing end of head portion **106** is flush with the paper barrel **104** when the apparatus **110** is assembled. The exterior surface of head portion **106** is smooth in the present embodiment, though in other embodiments the head portion may have a different shape, texture or pattern to improve aesthetics or functionality (e.g., enhancing user grip). In the present embodiment, it is contemplated that each of the body members **102***a*, **102***b* is integrally formed and made of polypropylene or another semi-rigid to rigid, low-friction polymer.

(41) Referring now to FIGS. **16** and **18-19**, apparatus **110** of the present embodiment includes an interlocking placement feature defined by the placement wings **150***a*, **150***b* in the placement collar portion **107** of body member **102***a* and the placement notches **152***a*, **152***b* in the placement collar portion **107** of body member **102***b*. The interlocking placement feature aligns body members **102***a*, **102***b* near the writing end of the apparatus **110** to ensure a generally uniform alignment of grooves **118** from the non-writing end (where cradle **105** and connector portions **134** are secured by snap fit) to the writing end, as well as a generally straight core passage **120** as described above in

connection with FIG. **13**. As shown in FIG. **16**, when the body members **102***a*, **102***b* are joined, each wing **150** of body member **102***a* is received by a corresponding placement notch **152** of body member **102***b* to establish the interlocking engagement described herein. In alternative embodiments, the body members **102***a*, **102***b* (or other comparable body elements) may have additional and/or other features to improve stability and alignment near the head portions **106**.
(42) As shown in FIG. **21**, the follower **101** is a relatively short tubular structure with a raised portion **125** along a portion of the circumference of follower **101** that includes a series of helically aligned threads **126** protruding from the exterior thereof. This defines a tubular portion **150** and along the remaining, non-raised portion of the follower **101**, and contact edges **130***a*, **130***b* at the radial boundaries of the raised portion **125**. As best seen in FIG. **17**, the tubular portion **150** of follower **101** is configured to be cradled within the travel portion **146** of the cradle **105** so the follower **101** remains centered on the longitudinal axis of the apparatus **110** when the apparatus is fully assembled. Referring also to FIGS. **15** and **20-21**, the contact edges **130***a*, **130***b* of the follower **101** are configured to abut respective side edges **148***a*, **148***b* of travel portion **146** so the follower **101** rotates both clockwise and counterclockwise in conjunction with the cradle **105** while advancing or regressing along the longitudinal axis. The threads **126** are configured to fit in the grooves **118**, allowing the follower **101** to advance or regress along the helical path defined thereby as the cradle **105** is rotated clockwise or counterclockwise. It will be appreciated that the span of the helical threads **126** must exceed the separation distance between successive grooves in the respective bridge portions **114** of body members **102***a*, **102***b* to ensure that the follower **101** remains aligned and engaged with the grooves **118**. In the present embodiment, the threads **126** span approximately 210 degrees, and the bridge portions **114** are separated by approximately 105 degrees, though it is contemplated that other embodiments may have differing dimensions without departing from the scope of the invention.
(43) Referring again to FIG. **21**, the follower **101** has a central opening **128** that is configured to securely receive the non-writing end **116** of the core **103** such that the core does not move relative to the follower. As is generally shown in FIGS. **14-15**, it will be appreciated that the follower **101** and the head portions **106** can together center the core **103** on the longitudinal axis when the core **103** is received by the follower **101** and body members **102***a*, **102***b* within the apparatus **110**. In the present embodiment, it is contemplated that the follower **101** is made from polyethylene or a similar low-friction polymer.
(44) From the foregoing it will be seen that this invention is one well adapted to attain all ends and objectives herein-above set forth, together with the other advantages which are obvious and which are inherent to the invention.
(45) Since many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matters herein set forth or shown in the accompanying drawings are to be interpreted as illustrative, and not in a limiting sense.
(46) While specific embodiments have been shown and discussed, various modifications may of course be made, and the invention is not limited to the specific forms or arrangement of parts and steps described herein, except insofar as such limitations are included in the following claims. Further, it will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

Claims

1. An apparatus for adjustably retaining an expendable core for writing or drawing, said apparatus comprising: a tubular barrel having an outer barrel surface and an inner barrel surface; at least one elongated arcuate body element having an outer body surface and an inner body surface, the inner body surface comprising spaced surface features, wherein the body element is positioned along a

portion of the inner barrel surface with the outer body surface positioned in abutting engagement with the inner barrel surface; a follower positioned in abutting engagement with a portion of the inner body surface, the follower having a helical surface feature corresponding with the spaced surface features of the body such that the spaced surface features define a spiral path along the length of the body for the follower, the follower having an aperture configured to receive a non-writing end of an expendable core.

2. The apparatus of claim 1, wherein each of the at least one body element has a cross-sectional profile that is less than 180°.

3. The apparatus of claim 1, wherein the tubular barrel is made of a paper based material.

4. The apparatus of claim 1, wherein the barrel, the at least one body element and the follower are mechanically connected without the use of adhesives.

5. The apparatus of claim 1, wherein the helical surface feature of the follower comprises a plurality of discontinuous follower ridges.

6. The apparatus of claim 5, wherein each of the plurality of follower ridges is configured to span at least half the perimeter of the follower about a longitudinal axis.

7. An apparatus for adjustably retaining an expendable core for writing or drawing, said apparatus comprising: a tubular barrel having an outer barrel surface and an inner barrel surface; an elongated trough having an outer trough surface and an inner trough surface, the inner trough surface comprising spaced surface features, wherein the trough is immovably affixed along a portion of the inner barrel surface with the outer trough surface positioned in abutting engagement with the inner barrel surface; a follower positioned within the trough in abutting engagement with a portion of the inner trough surface, the follower having a helical surface feature corresponding with the spaced surface features of the trough such that the spaced surface features define a spiral path along the length of the trough for the follower, the follower having an aperture configured to receive a non-writing end of an expendable core; and a collet configured to rotate relative to the tubular barrel, the collet comprising a non-circular shaped passageway corresponding in shape to the expendable core such that the core can freely slide through the passageway along a longitudinal axis of the passageway but not rotate relative to the collet, and such that a writing end of the core protrudes from the passageway.

8. The apparatus of claim 7, further comprising a spacer, the spacer comprising a first side and a second side, the first side being immovably affixed to an end of the tubular barrel, and the second side being movably affixed to the collet.

9. The apparatus of claim 7, wherein the tubular barrel comprises a paper based material.

10. The apparatus of claim 7, wherein the tubular barrel comprises paper board.

11. The apparatus of claim 7, wherein the outer trough surface is glued to the inner barrel surface.

12. The apparatus of claim 7, wherein the spaced surface features comprise spaced indentations.

13. The apparatus of claim 12, wherein the helical surface feature comprises a helical ridge.

14. The apparatus of claim 7, wherein the elongated trough comprises a closed end configured to cover an end of the barrel.

15. The apparatus of claim 7, wherein the non-circular shaped passageway has a polygonal shaped cross-section.

16. The apparatus of claim 7, wherein the non-circular shaped passageway is configured to receive a core having a polygonal shaped cross-section.

17. The apparatus of claim 7, wherein the apparatus is configured to receive a core comprising a crayon, a wax or oil based pencil, chalk or a pastel.

18. An apparatus for adjustably retaining an expendable core for writing or drawing, said apparatus comprising: a tubular barrel having a writing end and a non-writing end; a plurality of body members, each body member comprising: a head portion; a collar portion; a guide portion having an inner guide surface, the inner guide surface comprising spaced surface features; and a connection portion; an elongated cradle having an outer cradle surface, an inner cradle surface and

cradle edges, wherein the outer cradle surface is configured to engage abuttingly with the inner guide surface of each of the plurality of body members; a plug coupled to the elongated cradle, the plug being configured to engage the connection portion of each of the plurality of body members, said engagement securing the plug and the plurality of body members together while permitting the plug to rotate about a longitudinal axis of the apparatus relative to the plurality of body members; and a follower positioned within the cradle in abutting engagement with the inner cradle surface, the follower having a helical surface feature corresponding to the spaced surface features of the inner guide surface of the plurality of body members such that the spaced surface features define a spiral path for the follower along the length of the apparatus, the follower having an aperture configured to receive a non-writing end of an expendable core, and the follower further having two contact surfaces corresponding with the cradle edges such that the follower rotates with the cradle when a respective one of the contact surfaces abuts a corresponding one of the cradle edges and torque is applied.

19. The apparatus of claim 18, wherein the tubular barrel comprises paper board.

20. The apparatus of claim 18, wherein the plug and the cradle are integrally formed.