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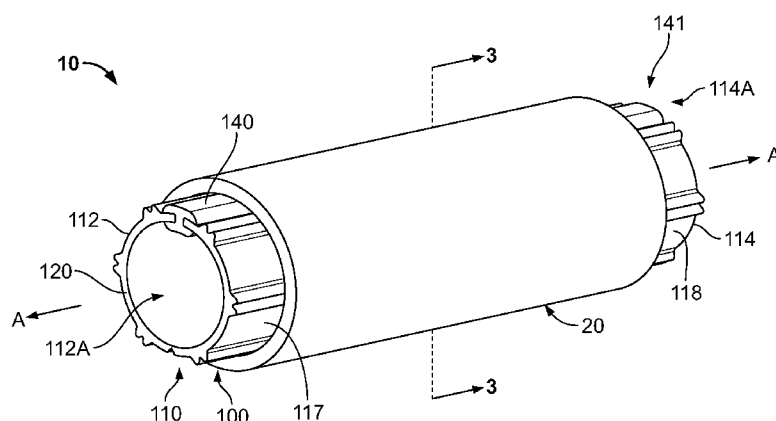


FIG. 1

(57) Abstract: A cover assembly 10 for covering an elongate substrate includes a resilient, elastically expandable sleeve member 20 and a holdout device 100. The sleeve member 20 defines an axially extending inner sleeve passage. The holdout device 100 includes a generally tubular core mounted in the inner sleeve passage. The core defines axially opposed end openings and a core passage extending therebetween to receive the elongate substrate. The core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to radially contract onto the elongate substrate. The holdout device 100 is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate.



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HOLDOUT DEVICES AND COVER ASSEMBLIES AND METHODS INCORPORATING THE SAME

Field of the Invention

[0001] The present invention relates to devices for applying a resilient sleeve onto an elongate substrate such as a cable and, more particularly, to holdout devices for applying a resilient sleeve onto an elongate substrate and cover assemblies and the methods incorporating holdout devices.

Background of the Invention

[0002] Protective sleeves or covers are commonly installed on elongate substrates such as power distribution cables as well as other electrical cables. Such sleeves are commonly formed of an electrically insulative, polymeric material. Some known covers of this type are formed of a resilient, elastomeric material. In use, the sleeves are elastically stretched, placed about the substrate, and released, whereupon they recover to a reduced diameter to conform to or seal about the substrate. These sleeves may be referred to as cold-applied covers. It is generally necessary to expand the sleeve to a diameter sufficient to allow the sleeve to be slid onto the substrate. It is known to provide a holdout device or sleeve support in the sleeve to temporarily hold the sleeve in the expanded state. The holdout and the sleeve are slid over the substrate and the holdout is then removed to allow the sleeve to contract about the substrate. Known holdouts may suffer from various drawbacks.

Summary of the Invention

[0003] According to embodiments of the present invention, a cover assembly for covering an elongate substrate includes a resilient, elastically expandable sleeve member and a holdout device. The sleeve member defines an axially extending inner sleeve passage. The holdout device includes a generally tubular core mounted in the inner sleeve passage. The core defines axially opposed end openings and a core passage extending therebetween to

receive the elongate substrate. The core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to radially contract onto the elongate substrate. The holdout device is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate.

[0004] According to method embodiments of the present invention, a method for covering an elongate substrate includes providing a cover assembly including: a resilient, elastically expandable sleeve member defining an axially extending inner sleeve passage; and a holdout device including a generally tubular core mounted in the inner sleeve passage, the core defining axially opposed end openings and a core passage extending therebetween to receive the elongate substrate; wherein the core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to contract onto the elongate substrate. The method further includes: mounting the cover assembly on the elongate substrate such that the elongate substrate extends through the core passage; thereafter removing the core from the sleeve member to permit the sleeve member to radially contract about the elongate substrate; and thereafter laterally removing the core from the elongate substrate.

[0005] According to embodiments of the present invention, a holdout device for applying a resilient, elastically expandable sleeve member onto an elongate substrate, the sleeve member defining an axially extending inner sleeve passage, includes a generally tubular core configured to be mounted in the inner sleeve passage. The core defines axially opposed end openings and a core passage extending therebetween to receive the elongate substrate. The core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to radially contract onto the elongate substrate. The holdout device is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate.

[0006] Further features, advantages and details of the present invention will be appreciated by those of ordinary skill in the art from a reading of the figures and the detailed description of the embodiments that follow, such description being merely illustrative of the present invention.

Brief Description of the Drawings

[0007] **Figure 1** is a perspective view of a cover assembly according to embodiments of the present invention.

[0008] **Figure 2** is an exploded, perspective view of the cover assembly of **Figure 1**.

[0009] **Figure 3** is a cross-sectional view of the cover assembly of **Figure 1** taken along the line 3-3 of **Figure 1**.

[0010] **Figures 4A-4E** are schematic side views illustrating methods for installing a sleeve member of the cover assembly of **Figure 1** on a substrate and removing a holdout device of the cover assembly from the substrate.

[0011] **Figure 5** is a cross-sectional view of a cover assembly according to further embodiments of the present invention.

[0012] **Figure 6** is a perspective view of a holdout device forming a part of the cover assembly of **Figure 5**.

[0013] **Figure 7** is a cross-sectional view of a cover assembly according to further embodiments of the present invention.

[0014] **Figure 8** is a cross-sectional view of a cover assembly according to further embodiments of the present invention.

[0015] **Figure 9** is a cross-sectional view of a cover assembly according to further embodiments of the present invention.

Detailed Description of Embodiments of the Invention

[0016] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which illustrative embodiments of the invention are shown. In the drawings, the relative sizes of regions or features may be exaggerated for clarity. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0017] It will be understood that, although the terms first, second, etc. may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another region, layer or section. Thus, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the present invention.

[0018] Spatially relative terms, such as "beneath", "below", "lower", "above", "upper" and the like, may be used herein for ease of description to describe one element or feature's

relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "below" or "beneath" other elements or features would then be oriented "above" the other elements or features. Thus, the exemplary term "below" can encompass both an orientation of above and below. The device may be otherwise oriented (rotated 90° or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

[0019] As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless expressly stated otherwise. It will be further understood that the terms "includes," "comprises," "including" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element or intervening elements may be present. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0020] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of this specification and the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0021] As used herein, "monolithic" means an object that is a single, unitary piece formed or composed of a material without joints or seams.

[0022] With reference to **Figures 1-4E**, a cover assembly **10** according to embodiments of the present invention is shown therein. The cover assembly **10** includes a sleeve member **20** and a holdout device **100** that supports the sleeve member **20** in an expanded condition. The cover assembly **10** may be used to install the sleeve member **20** over an elongated substrate such as a cable splice **40** (**Figure 4A**) or other cable assembly (e.g., a cable midsection or a cable termination) to protect the cable splice **40** or other substrate. As discussed in more detail below, the cover assembly **10** may be slid over the

cable splice **40** and the holdout device **100** then removed to allow the sleeve member **20** to contract about the cable splice **40**.

[0023] Turning to the sleeve member **20** in more detail, the sleeve member **20** may be referred to as a cold recoverable sleeve, a cold applied sleeve or cold shrinkable sleeve. Generally, the sleeve member **20** is a tubular structure that is formed of elastomeric-like material or has elastomeric physical recovery properties so that, when the sleeve member **20** is radially stretched to an expanded position by a restraint and thereafter released from the restraint, the sleeve member **20** will recover or return to a smaller radius (*i.e.*, a recovered position). In practice, a further restraint (*e.g.*, a substrate) may prevent the sleeve member **20** from fully recovering to a relaxed state, so that the sleeve member **20** continues to exert a radially compressive force on the substrate in the recovered position.

[0024] With reference to **Figures 2 and 3**, the sleeve member **20** includes a body **21** having opposed ends **22** and **24**. An inner surface **26** (**Figure 3**) of the sleeve member **20** defines an inner passage **26A** (**Figure 3**) communicating with opposed end openings **22A** and **24A**. In some embodiments (not shown), the sleeve member **20** may further include a plurality of integral sheds extending radially outwardly from the body **21**.

[0025] At least a portion of the body **21**, and according to some embodiments substantially the entire body **21** is formed of a resilient, radially elastic material. That is, the body **21** can be stretched radially and to an expanded (*i.e.*, radially enlarged) condition as shown in **Figures 1 and 4A** and, upon release, will radially contract or recover to a partially or fully recovered condition having a smaller radius. The body **21** may be formed of any suitable material. According to some embodiments, the body **21** is formed of an elastomeric material. Suitable elastomeric materials include natural and synthetic polyisoprenes, polybutadiene, styrene-butadiene rubber (SBR), butadiene-acrylonitrile rubber, polychlorophrene (Neoprene), butyl rubber, polysulfide, silicone rubber, urethane rubber, polyacrylate, epichlorohydrin homo and copolymers, propylene oxide rubber, fluorosilicone rubber, fluorocarbon rubber, chlorosulfonated polyethylene, chlorinated polyethylene, ethylene-propylene rubber.

[0026] With reference to **Figures 1-3**, the holdout device **100** includes a core assembly or core **110**. In some embodiments, the holdout device **100** further includes masses of lubricant **102** (*e.g.*, a lubricating grease; **Figure 3**) on the core **110**.

[0027] The core **110** defines a longitudinal axis **A-A** and has first and second opposed ends **112**, **114**. The core **110** defines an inner passage **116** extending from the end **112** to the end **114** and communicating with end openings **112A** and **114A** (**Figure 2**) also defined by

the core **110**. Opposed end sections **117, 118 (Figure 1)** extend axially outwardly beyond the ends **22, 24** of the sleeve member **20**. According to some embodiments and as shown in **Figure 2**, the core **110** is generally cylindrical in shape.

[0028] The core **110** includes a tubular body member **120** and a closure member, support member, insert, retainer or retention member **140** (hereinafter referred to as the retention member **140**).

[0029] With reference to **Figure 2**, the body member **120** is generally cylindrical in shape and has axially opposed ends **122** and **124**. The body member **120** defines opposed end openings **122A, 124A** and an axially extending interior passage **125** terminating at the end openings **122A, 124A**. Opposed free edges **128A** and **128B** extend axially from end **122** to end **124**. The free edges **128A, 128B** define an axial slot **130** that intersects each of the end openings **122A, 124A**. The side slot **130** extends continuously and completely from the end **122** to the end **124** and from the opening **122A** to the opening **124A**.

[0030] An axially extending preferential weakness line **132 (Figure 3)** is provided on a side of the body member **120** opposite the slot **130**. The weakness line **132** may be a score line, living hinge, or the like.

[0031] Sets **134** of ribs **134A** are provided on the outer surface of the body member **120** and spaced apart about the circumference of the body member **120**. Each rib set **134** includes a pair of upstanding, radially outwardly projecting and axially extending ribs **134A** defining a groove or trough **134B** therebetween. Each trough **134B** is open radially outwardly and extends axially the length of the body member **120**. In some embodiments and as shown, the ribs **134A** are substantially parallel to the axis **A-A**.

[0032] With reference to **Figure 3**, the retention member **140** is generally H-shaped in cross-section. The retention member **140** includes a divider wall **144**, opposed outer walls or flanges **146** and opposed inner walls or flanges **148**. The wall **144** and flanges **146, 148** collectively define circumferentially or laterally opposed, axially extending receiver grooves or channels **142A** and **142B**.

[0033] When the core **110** is assembled, edge sections **126A** and **126B** of the body member **120** are received in the channels **142A** and **142B**, respectively, and the divider wall **144** is interposed between the edges **128A** and **128B**, as shown in **Figure 3**. The retention member **140** and the cooperating edge sections **126A, 126B** thereby serve as a releasable retention mechanism **141** as discussed below. The installed retention member **140** spans the axial side slot **130** so that the members **120, 140** collectively surround the passage **26A** and

the side slot **130** is closed. The retention member **140** can maintain the core **110** as a rigid structure.

[0034] The body member **120** and the retention member **140** may be formed of any suitable material(s). According to some embodiments, the body member **120** and the retention member **140** are formed of a polymeric material or materials. According to some embodiments, the body member **120** and the retention member **140** are formed of polypropylene, ABS, or PVC.

[0035] According to some embodiments, the body member **120** and the retention member **140** each have a flexural modulus in the range of from about 300,000 to 400,000 psi.

[0036] According to some embodiments, the core body member **120**, in cross-section, defines an arc of between about 320 and 355 degrees when the holdout device **100** is in its closed position as shown in **Figure 3**.

[0037] According to some embodiments, the nominal thickness **T** (**Figure 3**) of the core body member **120** (not including the weakness line **132** or the slot **130**) is in the range of from about 1 to 2 mm.

[0038] The body member **120** and the retention member **140** may each be formed by any suitable technique. According to some embodiments, the body member **120** and/or the retention member **140** are each extruded and cut to length. According to some embodiments, one or both of the members **120**, **140** are molded (*e.g.*, injection molded). In some embodiments, the body member **120** is a unitary, monolithic structure. In some embodiments, the retention member **140** is a unitary, monolithic structure.

[0039] According to some embodiments, the insertion depth **D1** (**Figure 3**) of each edge section **126A**, **126B** into its respective receiver channel **142A**, **142B** is in the range of from about 1 to 4 mm. According to some embodiments, the depth **D2** (**Figure 3**) of each receiver channel **142A**, **142B** is substantially the same as the depth **D1** so that the edges **128A**, **128B** abut or nearly abut the divider wall **144**.

[0040] The lubricant **102** is contained in some or all of the troughs **134B**. The lubricant **102** may be provided as strips or beads of the lubricant **102** extending fully or partially down the length of each trough **134B**. The lubricant **134B** may fully or partially fill each trough **134B**. Suitable lubricants may include silicone or fluorosilicone grease. The lubricant **102** can be installed in the troughs **134B** before or after inserting the retention member **140** in the slot **130**.

[0041] The cover assembly **10** can be formed by any suitable method. According to some embodiments, the core **110** is assembled by inserting the retention member **140** into the

slot **130** as shown in **Figure 3**. According to some embodiments, the retention member **140** is slid axially into the slot **130** such that the edge sections **126A**, **126B** slide within the channels **142A**, **142B**.

[0042] The core **110** is mounted in the inner passage **26A** of the sleeve member **20** such that the sleeve member **20** is in a radially expanded condition or state as compared to its relaxed state and its intended installed state. For example, the core **110** can be installed in the sleeve member **20** by expanding the sleeve member **20**, then inserting the core **110** in the passage **26A**, and thereafter releasing the sleeve member **20** to contract onto the core **110**. It will be appreciated that the elastically expanded sleeve member **20** applies a persistent radially compressive load on the holdout device **100**, and the holdout device **100** resists radial collapse of the core **110** due to this load. The holdout device **100** thereby serves as a supporting structure that resists radial contraction of the sleeve member **20**. The cover assembly **10** may be stored, transported, etc. in this condition.

[0043] The cable splice **40** (**Figure 4A**) is merely exemplary and includes a pair of cables **42**, **44** and an electrically conductive connector **46**. The cables **42**, **44** each have an electrical conductor **42A**, **44A** surrounded by an electrically insulating jacket **42B**, **44B**. The conductors **42A**, **44B** are terminated at the connector **46** and mechanically and electrically coupled thereby. It may be desirable or necessary to apply an environmental protection cover such as the sleeve member **20** over the connector **46** and the adjacent portions of the cables **42**, **44**. In some embodiments, strips of mastic **48** or other sealant or gasket material may be provided about the cables **42**, **44** to provide an enhanced seal between the sleeve member **20** and the cables **42**, **44**.

[0044] To install the sleeve member **20** on the cable splice **40**, the installer first slides the cover assembly **10** over the cable **44** as shown in **Figure 4A**. The cable **46** is received in the inner passage **116**. In the supporting position as shown in **Figures 1-4**, the nominal inner diameter **G** (**Figure 3**) of the core **110** is sized to allow the core **110** to be slid over the cable **44** without undue effort or damage to the cable **44**. The cover assembly **10** can be slid onto the cable **44** from either direction or with either end leading.

[0045] The splice **40** is then formed by securing the ends of the cables **42**, **44** to the connector **46**, shown in **Figure 4A**. The cover assembly **10** is then slid in a direction **I** to position the cover assembly **10** over the splice **40** shown in **Figure 4B**. According to some embodiments, the inner diameter **G** of the core **110** is sized to allow the core **110** to be slid over the cable splice **40** without undue effort or damage to the cable splice **40** (e.g., damage

to the cables **42, 44**, the connector **46** or the engagement therebetween). The profile of the connector **46** is shown in dashed lines in **Figure 3** for reference.

[0046] The installer may grasp the holdout device **100** and sleeve member **20** and circumferentially twist (*i.e.*, in directions **J**) one or both relative to the other. In doing so, the installer may loosen the surface to surface engagement between the core **110** and the sleeve member **20** and may distribute the lubricant **102** between the engaged surfaces.

[0047] The installer then holds the sleeve member **20** in place while axially pulling and withdrawing the core **110** in a withdrawal direction **K** (**Figure 4C**) from the sleeve member **20**.

[0048] As the core **110** is withdrawn, the front end **112** is axially retracted relative to the sleeve member **20**. As a result, sleeve member **20** is no longer supported in the expanded condition by the core **110** and is permitted to progressively partially or fully recover to a radially recovered condition or position with a reduced diameter. The sleeve section **30** contracts about and conforms to the cables **42, 44** and the connector **46**. The user continues to pull out the holdout assembly **100** until the end **114** is free of the sleeve member **20**, allowing the sleeve member **20** to attain a suitably radially recovered position from the end **22** to the end **24** as shown in **Figure 4C**.

[0049] The installed sleeve member **20** may form a seal with the cables **42, 44** and the connector **46**. In some embodiments, the sleeve member **20** is configured so that, when installed on the splice **40**, the recovered sleeve member **20** remains in a partially expanded position (as compared to its relaxed state) so that the sleeve member **20** continues to apply a persistent radially compressive load to the splice **40**.

[0050] With the core **110** now free of the sleeve member **20**, the installer can remove the retention member **140** from the slot **130** and the body member **120**. In some embodiments, the installer pulls the retention member **140** to slide the retention member **140** axially out (*e.g.*, in a removal direction **M**) from the slot **130** as shown in **Figure 4D**. In this manner, the side slot **130** is opened to place the core **110** in an open position.

[0051] With the retention member **140** removed, the installer slides the cable **44** through the side slot **130** to remove the body member **120** from the cable **44**. The body member **120** can be moved or displaced transversely or laterally relative to the axis **A-A** and the cable axis **C-C** (**Figure 4A**) (*e.g.*, in a transverse or lateral direction **R**) as shown in **Figure 4E**. If desired, the installer can widen the side opening **130** by splitting, breaking, laterally bending or circumferentially expanding the body member **120**. More particularly,

the installer may bend or break the body member **120** about the weakness line **132** to further open the side slot **130**.

[0052] The removed body member **120** and retention member **140** can then be discarded or otherwise disposed of.

[0053] According to some embodiments, the sleeve member **20** as mounted on the holdout device **100** in the undeployed cover assembly **10** is expanded at least about 200% of its relaxed diameter. According to some embodiments, the sleeve member **20** is expanded between about 200 and 350% as compared to a relaxed diameter. According to some embodiments, when the core **110** is in the supporting position, the core **110** has a nominal inner diameter of between about 30 and 150 mm.

[0054] According to some embodiments, the required clearance or tolerance between the maximum diameter **D4** (**Figure 3**) of the splice **40** (*i.e.*, the portion of the substrate over which the holdout device **100** is positioned) and the minimum inner diameter **G** of the passage **26A** is less than 5 mm and, in some embodiments, less than 3 mm.

[0055] According to further embodiments, the end **22** of the sleeve **20** may be closed to form a cap. In such case, the holdout device **100** would not extend past the sleeve end **22**.

[0056] With reference to **Figures 5** and **6**, a cover assembly **201** including the sleeve member **20** and a holdout device **200** according to further embodiments of the present invention is shown therein. The cover assembly **201** may be used in place of the cover assembly **10**. The cover assembly **201** and the holdout device **200** may be formed in the same manner as the cover assembly **10** and holdout device **100** except as follows.

[0057] The holdout device **200** includes tubular body member **220** generally corresponding to the body member **120**. However, in the holdout device **200**, the retention member **140** is replaced with a releasable retention mechanism **261** including cooperating retention or interlock features **262** and **264** located on the free edges **228A** and **228B**, respectively. In the supporting position as shown in **Figure 5**, the interlock features **262**, **264** prevent the tubular body member **220** from collapsing radially inwardly under the load of the sleeve member **20**. After the body member **220** is withdrawn from the sleeve member **20** as described above with reference to **Figure 4C**, the installer can bend or break the body member **220** (*e.g.*, about the weakness line **232**) to separate the edges **228A** and **228B** and open a side slot **230** (**Figure 6**), placing the body member **220** in an open position to permit passage of the cable and lateral removal of the cover member **220** from the cable. The holdout device **200** is shown in its open position in **Figure 6**. In the illustrated embodiment,

the edges **228A**, **228B** that define the slot **230** directly engage one another when the holdout device **200** is in its closed position.

[0058] With reference to **Figure 7**, a cover assembly **301** including the sleeve member and a holdout device **300** according to further embodiments of the present invention is shown therein. The cover assembly **301** may be used in place of the cover assembly **10**. The cover assembly **301** and holdout device **300** may be formed in the same manner as the cover assembly **201** and the holdout device **200**, except as follows.

[0059] The holdout device **300** includes a core **310** including two semi-cylindrical core body section members **350** and **352**. The core body section members **350**, **352** each have cooperating retention or interlock structures **362** and **364**. More particularly, each of the body section members **350**, **352** has axially extending, laterally opposed side edges **328A**, **328B**, an axially extending, U-shaped interlock channel **362** (*i.e.*, an interlock structure of a first type) on the side edge **328B**, and an axially extending, U-shaped interlock insert portion **364** (*i.e.*, an interlock structure of a second type) on the side edge **328A**. When the holdout device **300** is assembled in a supporting position, as shown in **Figure 7**, the insert portion **364** of the body section member **350** is nested or received in the channel **362** of the body section member **352** and the insert portion **364** of the body section member **352** is nested or received in the channel **362** of the body section member **350** to provide two releasable retention mechanisms **361**. This hermaphroditic interlock feature configuration permits assembly of the core **310** from two identical body section members.

[0060] The body section members **350**, **352** thereby collectively form a tubular member (*i.e.*, the core **310**) that resists the radial compression load of the sleeve member **20**. The cover assembly **301** can be used to install the sleeve member **20** on a splice or the like in the same manner as described above. However, in the case of the cover assembly **301**, once the core **310** has been withdrawn from the sleeve member **20**, the body section members **350**, **352** can be broken apart at the junctions between the interlock features **362**, **364** to open the core **310** and permit the installer to laterally remove the core **310** from the cable.

[0061] With reference to **Figure 8**, a cover assembly **401** including the sleeve member **20** and a holdout device **400** according to further embodiments of the present invention is shown therein. The cover assembly **401** may be used in place of the cover assembly **10**. The cover assembly **401** and holdout device **400** may be formed and used in the same manner as the cover assembly **301** and the holdout device **300**, except as follows. The holdout device **400** includes a core **410** comprising three discrete body section members **450**, **452**, **454**. Each of the body section members **450**, **452**, **454** has opposed retention or

interlock structures of first and second types (an axially extending, V-shaped interlock channel **462** and an axially extending, V-shaped insert portion **464**) to provide three releasable retention mechanisms **461**. The body section members **450, 452, 454** can thus be assembled and disassembled in a similar manner to that described above with regard to the body section members **350, 352**. While three body section members **450, 452, 454** are shown, holdout devices in accordance with embodiments of the invention may also include four or more interlocked body section members. The provision of multiple body section members can facilitate the construction of larger diameter holdout devices.

[0062] With reference to **Figure 9**, a cover assembly **501** including the sleeve member and a holdout device **500** according to further embodiments of the present invention is shown therein. The cover assembly **501** may be used in place of the cover assembly **10**. The holdout device **500** is shown in **Figure 9** in its supporting position. The cover assembly **501** and holdout device **500** may be formed in the same manner as the cover assembly **301** and the holdout device **300**, except as follows.

[0063] The holdout device **500** includes a core **510** including two body section members **550, 552** generally corresponding to the body section members **350, 352** except that the lateral opposed edges of the body sections **550, 552** are not provided with interlock channels. Instead, the core **510** includes a pair of retention members **540** corresponding to the retention member **140**. Opposed edge portions **526A** and **526B** of each body section **550, 552** are received in channels **542A** and **542B** of each retention member **540** to provide a pair of releasable retention mechanisms **541** that couple the body sections **550, 552** in a tubular configuration.

[0064] The cover assembly **501** can be used in the same manner as described above with regard to the cover assembly **10** to install the sleeve member **20** and to withdraw the holdout device **500**. The core **510** can be removed from the cable or other substrate by slide out one or more of the retention members **540** and the body sections **550, 552** to provide a side slot for passage of the substrate or to substantially disassemble the core **510**.

[0065] Optionally and as shown, the retention members **540** each include an integral set **545** of ribs **545A** defining a trough **545B**, which may contain the lubricant **102**. For example, the ribs **545A** can be integrally molded or extruded on the retention members **540**. This feature may likewise be incorporated into the retention member **140**, for example. In this case, the rib sets **134** may be redistributed about the circumference of the body member **120** so that the rib sets **134** and the rib set of the retention member **140** are equidistantly distributed.

[0066] The cover assemblies and holdout devices of the present invention may provide a number of advantages. After the sleeve member has been installed, the holdout device can be easily removed from the substrate even when an opening or terminal end of the substrate is not available or conveniently accessible to slide the holdout device off of the substrate.

[0067] Because it is not necessary to pull a rip cord or the like through the interior passage of the holdout device between the holdout device and the substrate, holdout devices of the present invention may be used with a wider range of substrate diameters. The risk of disturbing mastics or the like on the substrate with such a rip cord are eliminated, so that it is not necessary to apply mastic after removing the holdout device and/or to tape over such mastic, as may be the case with a helically wound holdout.

[0068] The cover assemblies provide an effective mechanism for applying a cold-applied or cold shrinkable cover onto an elongate substrate such as a cable, cable splice or cable termination. The holdout devices may provide improved reliability and convenience as compared to other holdout devices.

[0069] Various modifications may be made to the embodiments discussed above in accordance with the present invention. For example, the retention member **140** may be substantially permanently secured (*e.g.*, glued or welded) to one of the edge sections **126A**, **126B**, in which case the core **110** could be removed from the substrate in the manner described with respect to the holdout device **200**.

[0070] While V-shaped, U-shaped, and rectangular interlock channels and insert portions **264**, **364**, **464** are illustrated herein in particular embodiments, these shapes may be employed in any of the embodiments and various other shapes may be used.

[0071] Body members (*e.g.*, the body members **120**, **220**) and body sections (*e.g.*, the body sections **350**, **352**, **450**, **452**, **454**, **550**, **552**) may be formed by extruding tubular or semi-tubular members and cutting to the desired length. Alternatively, these components may be formed by forming sheets (*e.g.*, by extrusion, cutting to desired width and/or length if needed, and rolling the sheets into the shape of the component. For example, the core **110** can be formed by extruding and cutting a sheet, rolling the sheet to form the body member **120**, and installing the retention member **140** on the edges **126A**, **126B**. Likewise, a sheet may be extruded and rolled to form the tubular body member **220**, for example. This method of forming may permit the manufacture of holdout devices having a wide range of diameters without requiring a different extrusion die for each size.

[0072] According to some embodiments, the core (*e.g.*, the core **110**, **210**, **310**, **410** or **510**) is assembled inside the sleeve member **20** instead of being assembled and thereafter inserted into an expanded sleeve member **20**. More particularly, the core components can be inserted into the passage **26A** with the sleeve member non-expanded (or not yet expanded to the full extent of expansion in the ultimate cover assembly), and then expanded along with the sleeve member **20** and locked in its tubular, supporting configuration. Moreover, the core component(s) (*e.g.*, the body member **220** or the body sections **350**, **352**) may be designed such that they will automatically lock into place (*i.e.*, the interlock features **262**, **264** will mate) when the sleeve member **20** reaches the desired expansion. These methods can allow easier expansion of the sleeve member **20**, removal of the cover assembly from the expander, and faster cycle time and part throughput.

[0073] The foregoing is illustrative of the present invention and is not to be construed as limiting thereof. Although a few exemplary embodiments of this invention have been described, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention. Therefore, it is to be understood that the foregoing is illustrative of the present invention and is not to be construed as limited to the specific embodiments disclosed, and that modifications to the disclosed embodiments, as well as other embodiments, are intended to be included within the scope of the invention.

THAT WHICH IS CLAIMED IS:

1. A cover assembly for covering an elongate substrate, the cover assembly comprising:
 - a resilient, elastically expandable sleeve member defining an axially extending inner sleeve passage; and
 - a holdout device including a generally tubular core mounted in the inner sleeve passage, the core defining axially opposed end openings and a core passage extending therebetween to receive the elongate substrate;
 - wherein the core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to radially contract onto the elongate substrate; and
 - wherein the holdout device is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate.
2. The cover assembly of Claim 1 wherein:
 - the core defines an axially extending side slot intersecting the core passage and the end openings; and
 - the holdout device is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate by passing the elongate substrate through the side slot.
3. The cover assembly of Claim 2 including a retention mechanism configured to releasably close and/or cover the side slot.
4. The cover assembly of Claim 3 wherein:
 - the core includes a core body member including opposed edge sections defining the side slot; and
 - the retention mechanism includes a retention member mounted in the side slot and releasably engaged with the opposed edge sections.
5. The cover assembly of Claim 4 wherein the retention member includes an integral trough and a mass of lubricant disposed in the trough to lubricate an interface between the retention member and the sleeve member.

6. The cover assembly of Claim 4 wherein the retention member includes at least one integral, upstanding rib engaging an inner surface of the sleeve member.

7. The cover assembly of Claim 4 wherein the retention member is slidably mounted on the opposed edge sections to permit removal from the core by axially withdrawing the retention mechanism from the side slot.

8. The cover assembly of Claim 3 wherein:
the core includes a core body member including first and second opposed edge sections defining the side slot; and
the retention mechanism includes cooperating first and second integral retention features located on the first and second opposed edge sections, respectively.

9. The cover assembly of Claim 8 wherein the first and second integral retention features include first and second interlock features integrally formed in the core body member.

10. The cover assembly of Claim 1 wherein:
the core includes a plurality of coupled, separable core body section members;
and
the core can be laterally removed from the elongate substrate by disassembling the core body section members from one another.

11. The cover assembly of Claim 10 wherein the core includes at least three coupled, separable core body section members.

12. The cover assembly of Claim 10 wherein:
each core section member has opposed lateral edge sections; and
the core further includes a retention mechanism including a plurality of retention members each engaging a respective pair of adjacent ones of the edge sections to releasably couple the core body section members to one another.

13. The cover assembly of Claim 10 wherein:

each core body section member has opposed lateral edge sections; and
the core further includes a retention mechanism including cooperating first and second integral retention features located on the first and second opposed edge sections, respectively, of each core body section member, the first and second integral retention features of each core body section member being engaged with the second and first integral retention features of adjacent ones of the core section body members to releasably couple the core body section members to one another.

14. The cover assembly of Claim 1 wherein the core is rigid.

15. The cover assembly of Claim 1 wherein the core includes an integral weakness line to facilitate bending and/or breaking of the core about an axially extending bend line.

16. A method for covering an elongate substrate, the method comprising:
providing a cover assembly including:

a resilient, elastically expandable sleeve member defining an axially extending inner sleeve passage; and

a holdout device including a generally tubular core mounted in the inner sleeve passage, the core defining axially opposed end openings and a core passage extending therebetween to receive the elongate substrate;

wherein the core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to contract onto the elongate substrate;

mounting the cover assembly on the elongate substrate such that the elongate substrate extends through the core passage; thereafter

removing the core from the sleeve member to permit the sleeve member to radially contract about the elongate substrate; and thereafter

laterally removing the core from the elongate substrate.

17. The method of Claim 16 wherein:

the core defines an axially extending side slot intersecting the core passage and the end openings; and

laterally removing the core from the elongate substrate includes passing the elongate substrate through the side slot.

18. The method of Claim 17 wherein:
the cover assembly includes a retention mechanism configured to releasably close and/or cover the side slot; and
laterally removing the core from the elongate substrate includes operating the retention mechanism to open the side slot and thereafter passing the elongate substrate through the side slot.
19. The method of Claim 18 wherein:
the core includes a core body member including opposed edge sections defining the side slot; and
the retention mechanism includes a retention member mounted in the side slot and releasably engaged with the opposed edge sections.
20. The method of Claim 18 wherein:
the core includes a core body member including first and second opposed edge sections defining the side slot; and
the retention mechanism includes cooperating first and second integral retention features located on the first and second opposed edge sections, respectively.
21. The method of Claim 16 wherein:
the core includes a plurality of coupled, separable core body section members;
and
laterally removing the core from the elongate substrate includes disassembling the core body section members from one another.
22. A holdout device for applying a resilient, elastically expandable sleeve member onto an elongate substrate, the sleeve member defining an axially extending inner sleeve passage, the holdout device comprising:
a generally tubular core configured to be mounted in the inner sleeve passage, the core defining axially opposed end openings and a core passage extending therebetween to receive the elongate substrate;

wherein the core retains the sleeve member in a radially expanded state and can be withdrawn from the sleeve member to release the sleeve member to radially contract onto the elongate substrate; and

wherein the holdout device is configured such that, after removal of the sleeve member from the core, the core can be laterally removed from the elongate substrate.

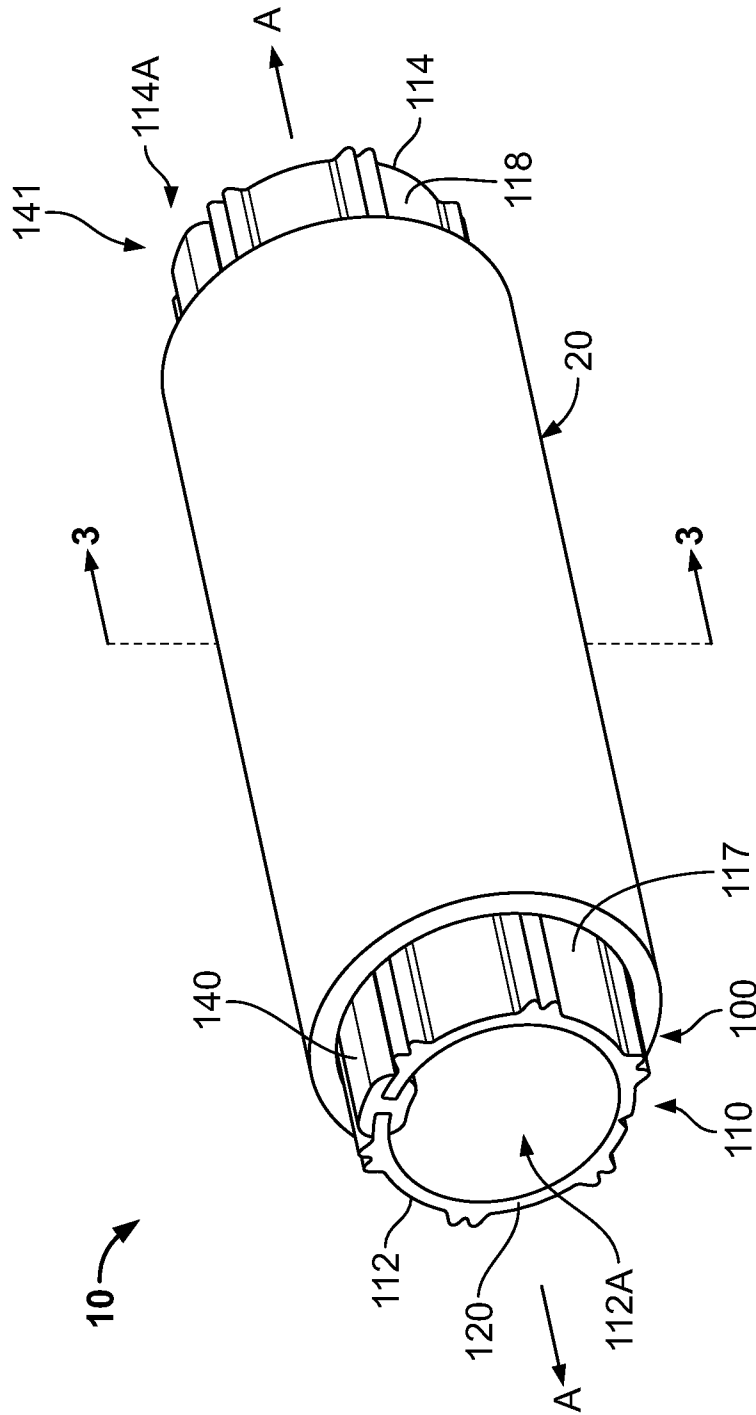


FIG. 1

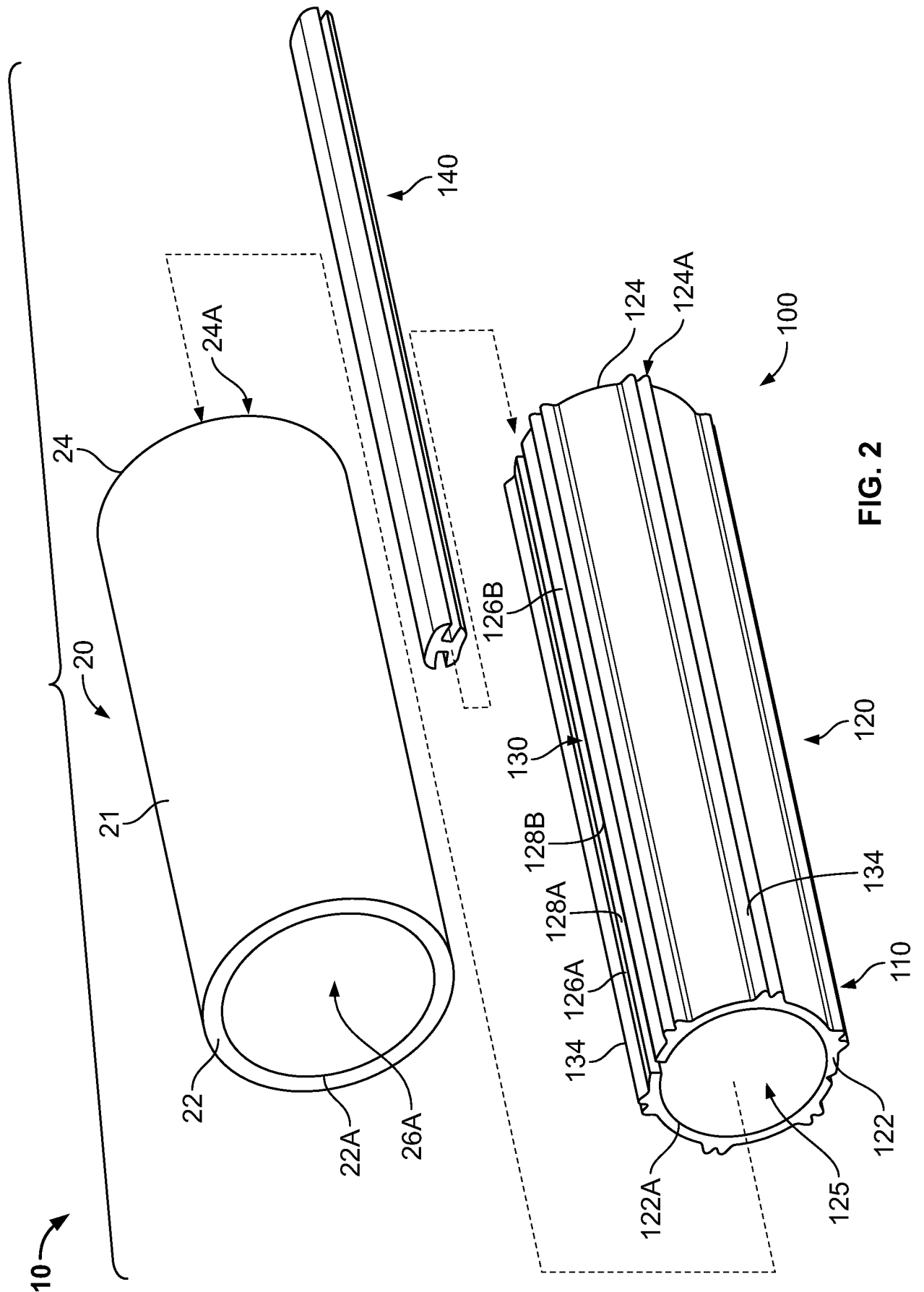


FIG. 2

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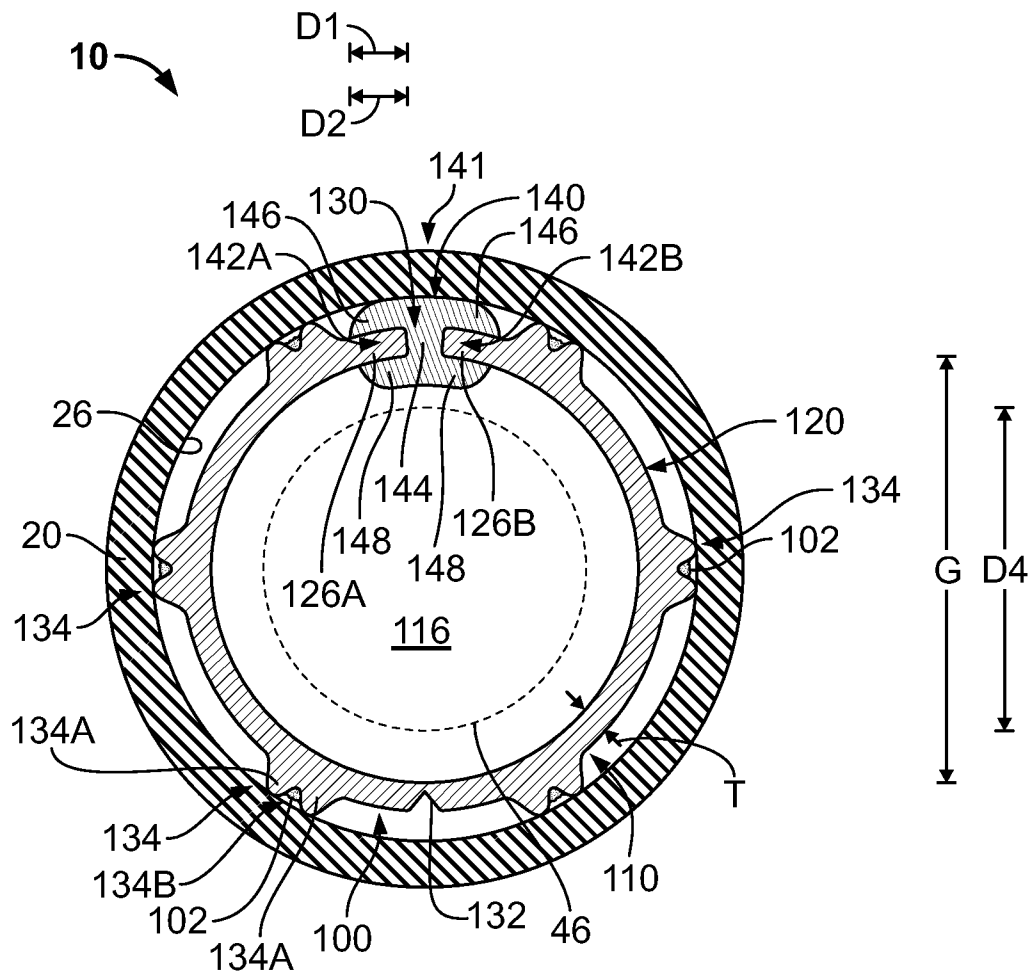
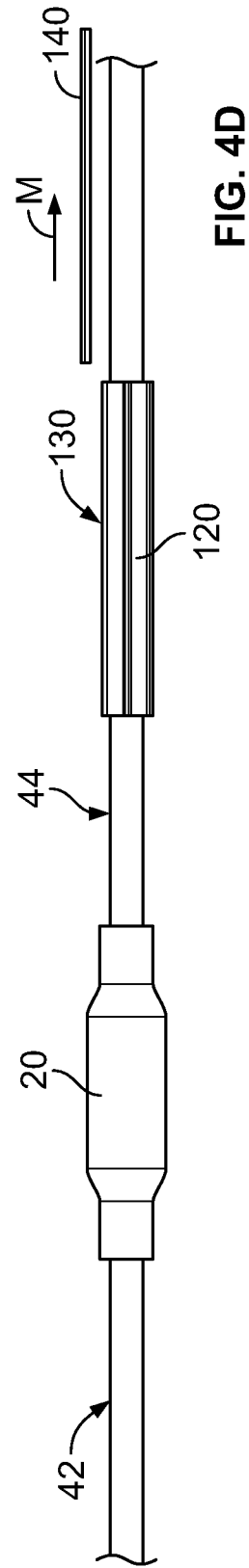
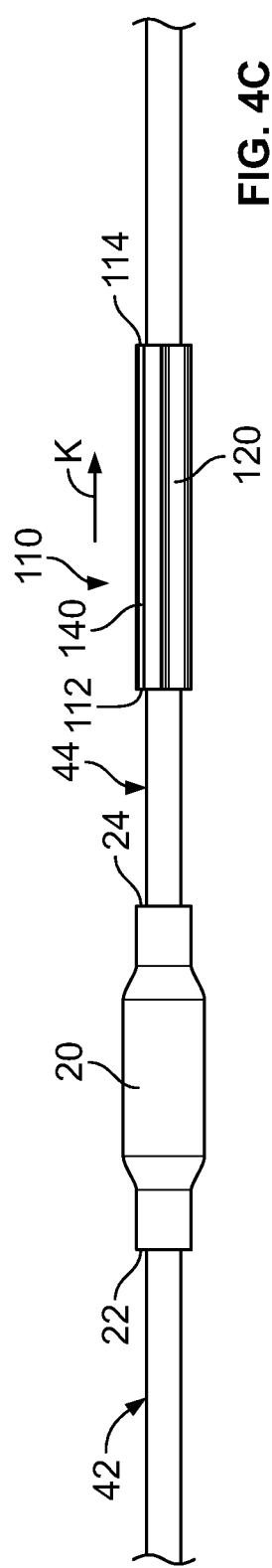
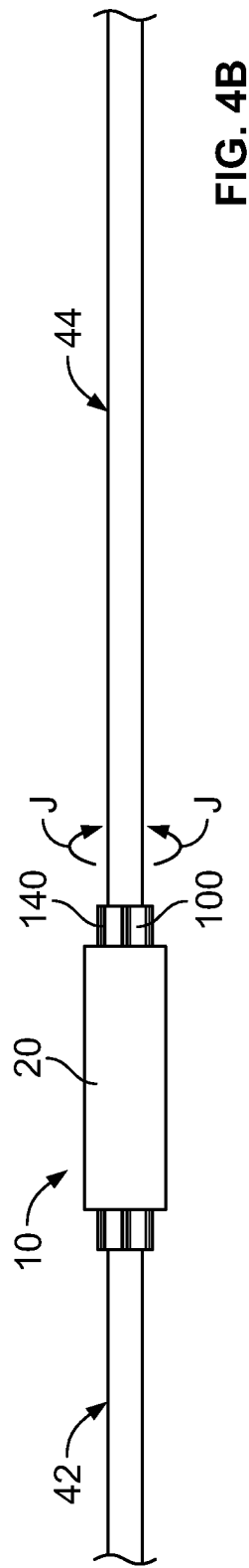
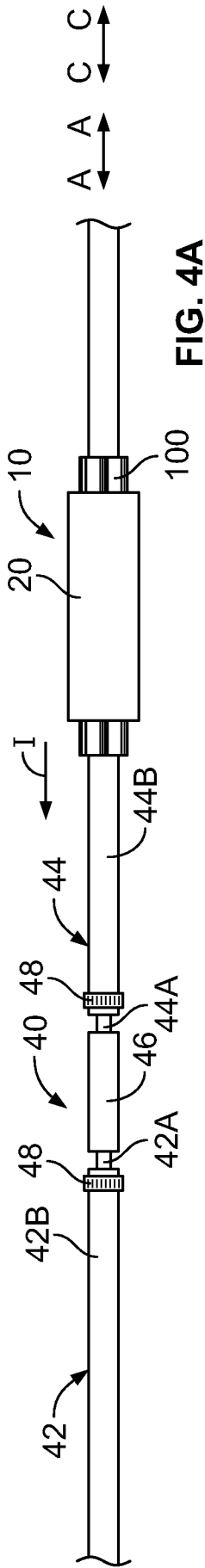
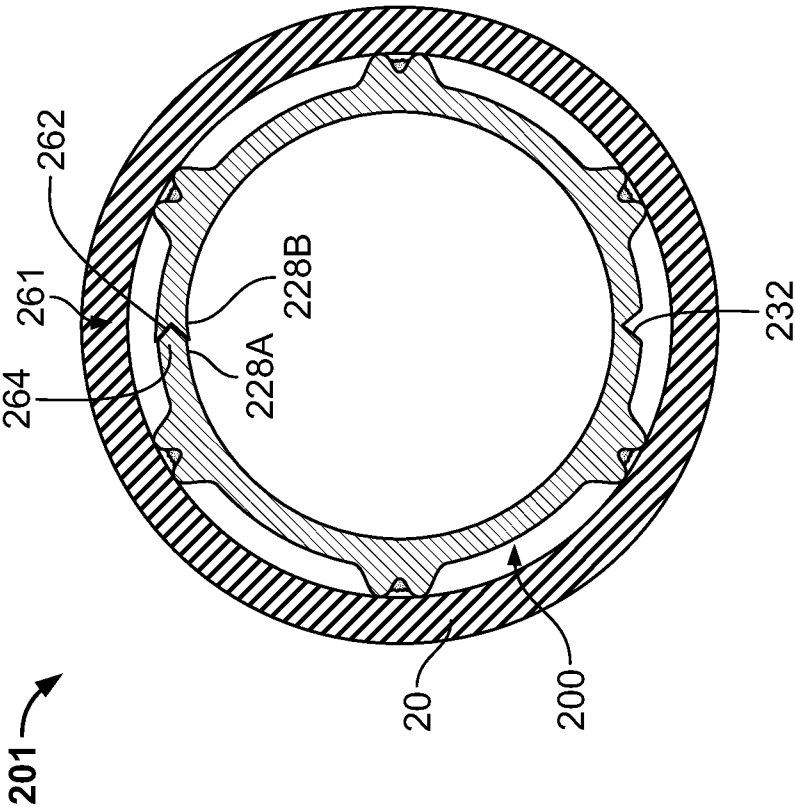
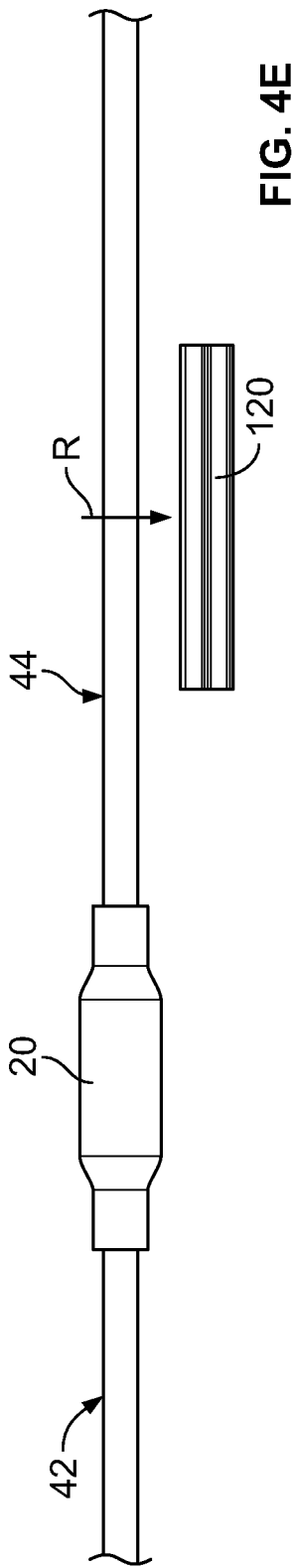


FIG. 3





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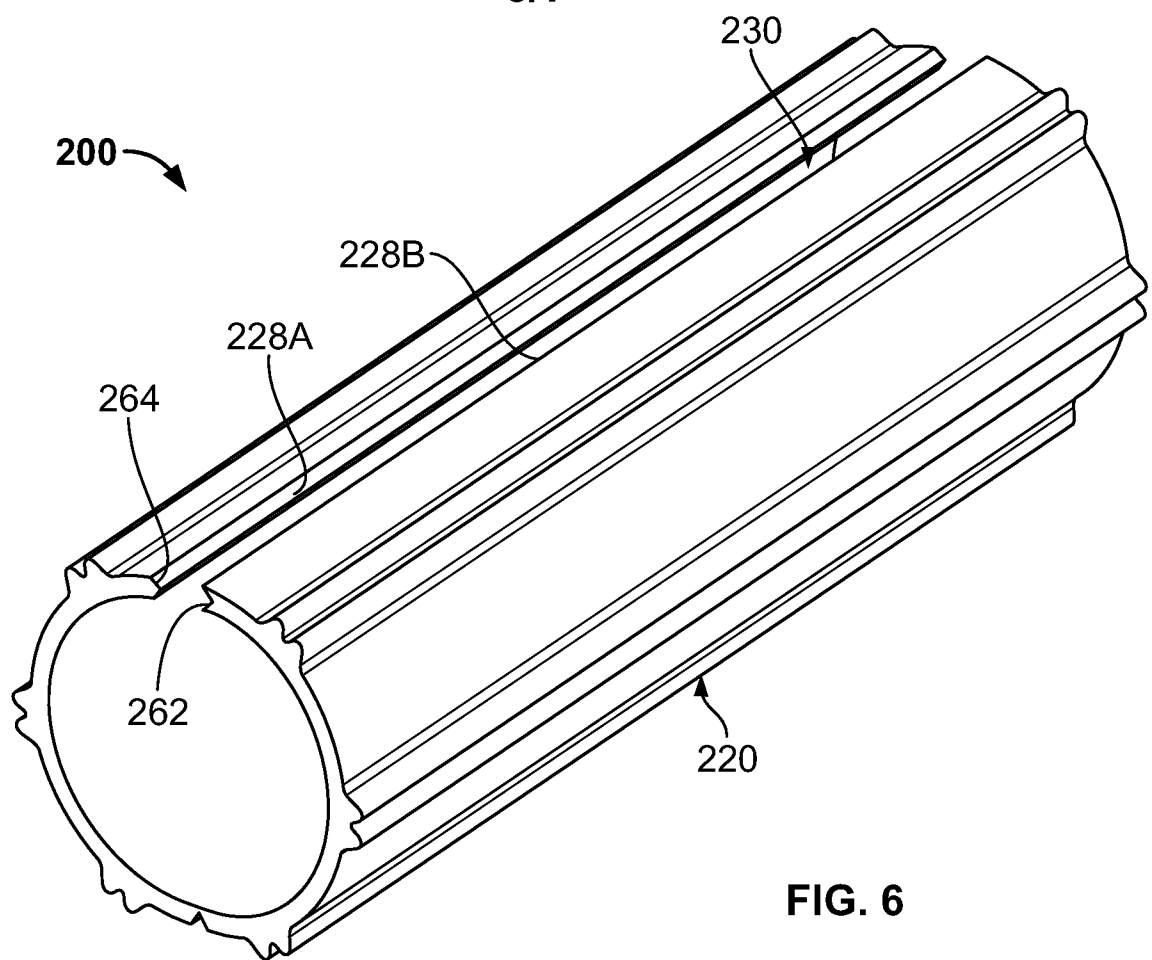


FIG. 6

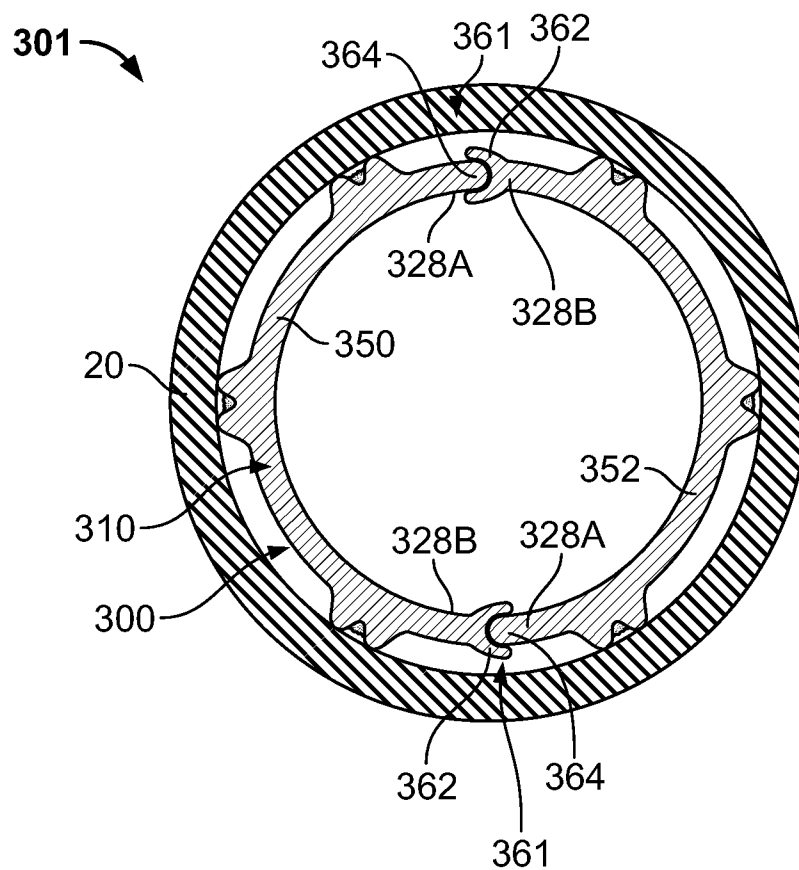
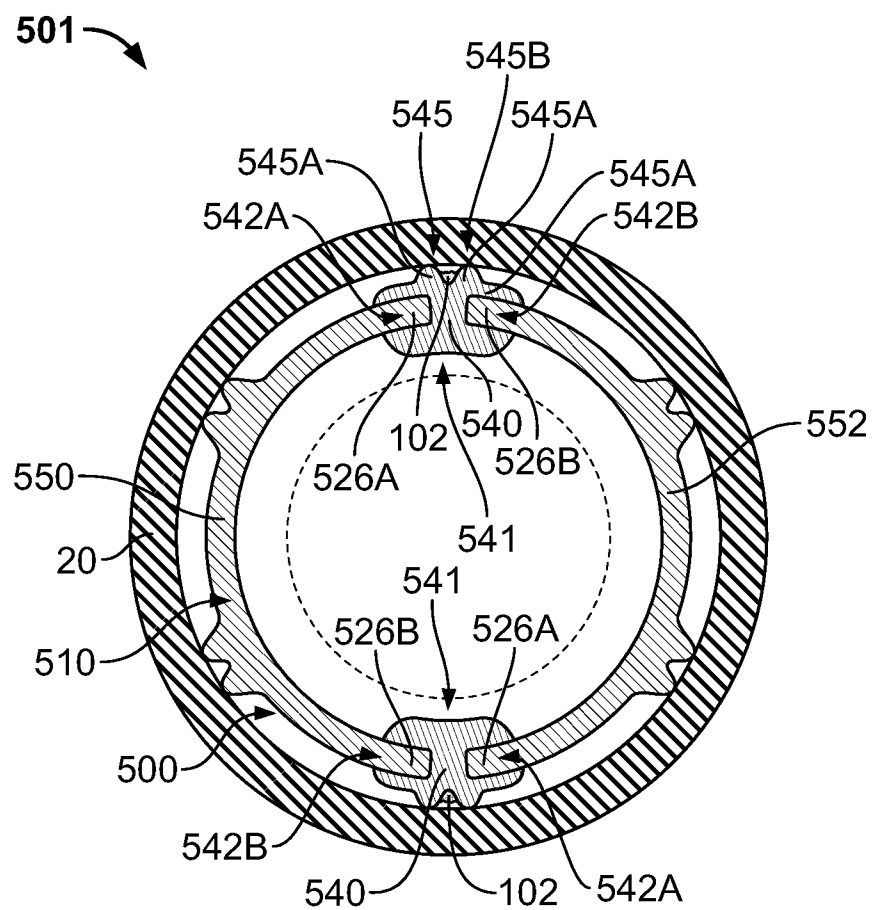
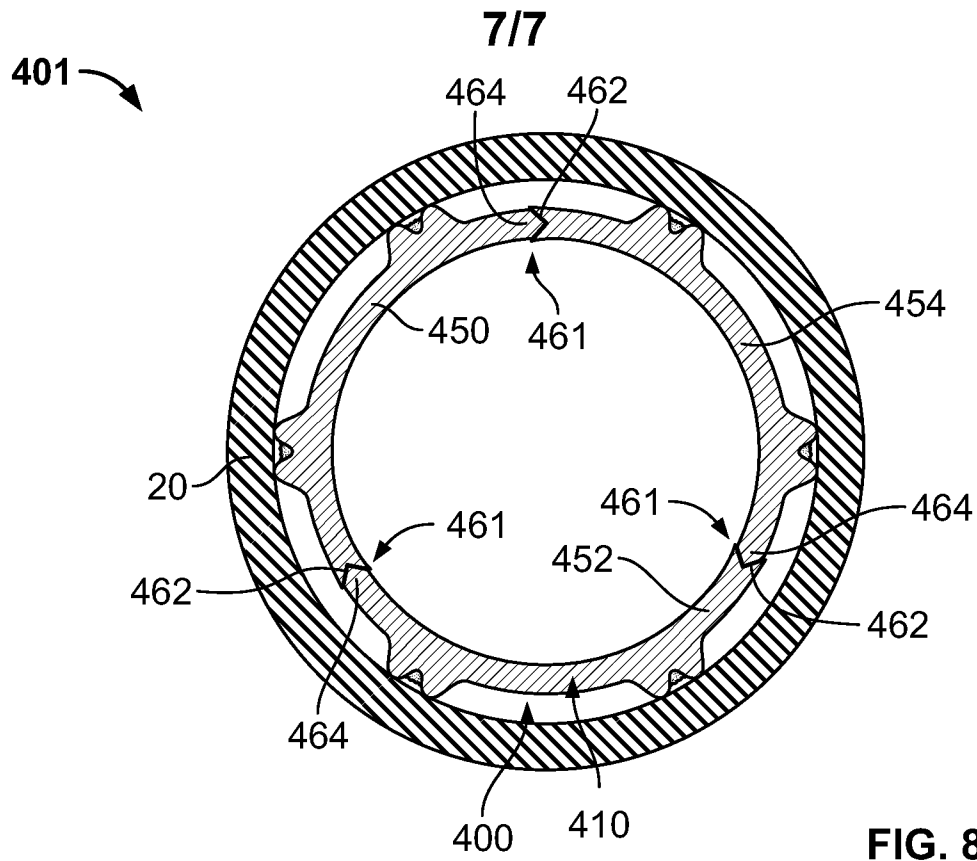


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2013/074394

A. CLASSIFICATION OF SUBJECT MATTER
INV. H02G15/18 H01R4/70
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02G H01R

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)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	----- US 2011/254197 A1 (VERNER DENNIS [US] ET AL) 20 October 2011 (2011-10-20) paragraph [0020] - paragraph [0023] -----	1-3, 16-18, 20-22
A	EP 0 750 381 A1 (MINNESOTA MINING & MFG [US]) 27 December 1996 (1996-12-27) the whole document -----	1-22



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

10 March 2014

Date of mailing of the international search report

21/03/2014

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Authorized officer

Tamme, H

INTERNATIONAL SEARCH REPORT

Information on patent family members

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