(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 128 094 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
07.04.2021 Bulletin 2021/14

(51) Int Cl.:
E04C 5/12 *(2006.01)*

(21) Application number: **16182584.9**

(22) Date of filing: **03.08.2016**

(54) ANCHORING SYSTEM AND METHOD OF COUPLING A TENSIONING MEMBER

ANKERSYSTEM UND VERFAHREN ZUM KOPPLUNG EINES SPANNELEMENTES

SYSTÉME D'ANCRAGE ET PROCÉDÉ D'ACCOUPLEMENT D'UN ÉLÉMENT DE TENSION

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **04.08.2015 US 201562200959 P**
02.08.2016 US 201615226528
02.08.2016 PCT/US2016/045171

(43) Date of publication of application:
08.02.2017 Bulletin 2017/06

(73) Proprietor: **Sorkin, Felix, L.**
Stafford, TX 77477 (US)

(72) Inventor: **Sorkin, Felix, L.**
Stafford, TX 77477 (US)

(74) Representative: **Forresters IP LLP**
Skygarden
Erika-Mann-Straße 11
80636 München (DE)

(56) References cited:
WO-A1-2007/066860
DE-A1- 3 437 107
US-A- 5 897 102
US-B1- 7 797 895
US-B1- 7 823 345

EP 3 128 094 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Technical Field/Field of the Disclosure

[0001] The present disclosure relates generally to post-tensioned, pre-stressed concrete construction. The present disclosure relates specifically to an anchoring system and a method of coupling a tensioning member to an anchor.

Background of the Disclosure

[0002] Many structures are built using concrete, including, for instance, buildings, parking structures, apartments, condominiums, hotels, mixed-use structures, casinos, hospitals, medical buildings, government buildings, research/academic institutions, industrial buildings, malls, roads, bridges,pavement, tanks, reservoirs, silos, sports courts, and other structures.

[0003] Prestressed concrete is structural concrete in which internal stresses are introduced to reduce potential tensile stresses in the concrete resulting from applied loads; prestressing may be accomplished by post-tensioned prestressing or pre-tensioned prestressing. In post-tensioned prestressing, a tension member is tensioned after the concrete has attained a desired strength by use of a post-tensioning tendon. The post-tensioning tendon may include for example and without limitation, anchor assemblies, the tension member, and sheathes. Traditionally, a tension member is constructed of a material that can be elongated and may be a single or a multi-strand cable. Typically, the tension member may be formed from a metal or composite material, such as reinforced steel. The post-tensioning tendon conventionally includes an anchor assembly at each end. The post-tensioning tendon is fixedly coupled to a fixed anchor assembly positioned at one end of the post-tensioning tendon, the "fixed-end", and stressed at the stressed anchor assembly positioned at the opposite end of the post-tensioning tendon, the "stressing-end" of the post-tensioning tendon.

[0004] Post-tension members are conventionally formed from a strand and a sheath. The strand is conventionally formed as a single or multi-strand metal cable. The strand is conventionally encapsulated within a polymeric sheath extruded thereabout to, for example, prevent or retard corrosion of the metal strand by protecting the metal strand from exposure to corrosive or reactive fluids. Likewise, the sheath may prevent or retard concrete from bonding to the strand and preventing or restricting movement of the sheath during post-tensioning. The sheath may be filled with grease to further limit the exposure of the metal strand and allow for increased mobility. Because the metal strand and the polymeric sheath are formed from different materials, the thermal expansion and contraction rates of the metal strand and polymeric sheath may differ. During conventional manufacturing, the sheaths are formed by hot extrusion over the metal strand. When the tension members are coiled for transport and storage, uneven thermal contraction may occur as the tendon cools. When installed as a post-tensioning tendon in a pre-stressed concrete member, cooling of the sheath may cause separation of the sheath from an anchorage, potentially exposing the metal strand to corrosive or reactive fluids.

[0005] CA 1240533 discloses a tension tie member. A tie member includes at least one tension element, such as a steel wire or strand, enclosed within a tubular sheathing. An anchoring unit is located at each end of the tie member for transmitting the tension force to a part of a structure. Each anchoring uni includes an anchor plate with at least one conically shaped bore so that a tension element can be secured in the borehole by a multi-part annular wedge. To provide additional corrosion protection and improve fatigue strength in the anchorage, the tension element is enclosed within a coating of a synthetic resin for its entire length. The inside surface of the wedge is shaped between the ends with a series of coarse or rough teeth with the tips rounded off. When the wedge grips a tension element the synthetic resin material is displaced by the teeth; however, the resin material continues to cover the surface of the tension element not contacted by the teeth so that oxygen is prevented from communicating with the areas where the wedge and tension element are in contact, whereby friction corrosion cannot take place.

The document WO 2007066860 also discloses an anchoring system comprising a sheathing retention capsule with a wedge and a seal.

Summary

[0006] The present invention is defined and set out in the accompanying claims.

[0007] The present invention is defined in claim 1 and consists of an anchoring system comprising a post tensioning tendon and a sheathing retention capsule. The sheathing retention capsule includes an outer body, the outer body having a tapered inner surface defining a forcing surface. The sheathing retention capsule also includes one or more holding wedges. At least one of the one or more holding wedges has a tapered outer surface abutting the inner surface of the outer body. At least one of the one or more holding wedges has an inner wall.

[0008] The present invention also comprises a post-tensioning tendon. The post-tensioning tendon includes a tension member including a strand and a sheath, the sheath positioned about the sheath. The post-tensioning tendon also includes a first anchor coupled to a first end of the tension member and a second anchor coupled to a second end of the tension member. At least one anchor includes a tapered inner surface defining a forcing surface and one or more holding wedges. The one or more holding wedges have a tapered outer surface abutting the forcing surface. The one or more holding wedges have an inner wall.

[0009] The present invention is defined in claim 5 and consists of a method of coupling a tension member to an anchor for forming a post-tensioning tendon and comprises an anchoring system as defined in the previous claims. The method includes providing an anchor. The anchor includes a tapered inner surface defining a forcing surface and one or more holding wedges. At least one of the one or more holding wedges has a tapered outer surface abutting the forcing surface. At least one of the one or more holding wedges has an inner wall. The method also includes removing a portion of the sheath from a first end of the tension member and inserting the first end of the tension member into the anchor. The method also includes inserting the sheath into the one or more holding wedges and forming a press-fit between the sheath and the one or more holding wedges. The method also includes coupling the strand to the anchor.

Brief Description of the Drawings

[0010] The present disclosure is best understood from the following detailed description when read with the accompanying figures. It is emphasized that, in accordance with the standard practice in the industry, various features are not drawn to scale. In fact, the dimensions of the various features may be arbitrarily increased or reduced for clarity of discussion.

FIGS. 1A, 1B depict a partial cross section of a post-tensioning tendon within a concrete form during stages of a concrete pouring procedure consistent with embodiments of the present disclosure.

FIG. 2A depicts a cross section view of a fixed end anchor for a post tensioned concrete member including a sheathing retention capsule consistent with at least one embodiment of the present disclosure.

FIG. 2B depicts a cross section view of a stressing end anchor for a post tensioned concrete member including a sheathing retention capsule consistent with at least one embodiment of the present disclosure.

FIG. 3 depicts a cross section view of a sheathing retention capsule not according to the present invention.

FIGS. 4A, 4B depict a wedge for use in a sheathing retention capsule consistent with at least one embodiment of the present disclosure.

FIG. 5 depicts a cross section of a sheathing retention capsule consistent with at least one embodiment of the present disclosure.

FIG. 6 depicts a wedge for use in a sheathing retention capsule consistent with at least one embodiment of the present disclosure.

Detailed Description

[0011] It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of various embodiments. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are limited within the scope defined by the appended claims. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed.

[0012] When stressing concrete member 40, anchoring systems may be provided to hold the tension member before and after stressing. In some embodiments, as depicted in FIGS. 1A, 1B, post-tensioning tendon 11 may be positioned within concrete form 21. Concrete form 21 is a form into which concrete may be poured to form concrete member 40. Post-tensioning tendon 11 may include for example and without limitation fixed end anchor 13, tension member 15, and stressing end anchor 17. As depicted in FIG. 1A, in some embodiments, fixed end anchor 13 may include fixed end anchor body 14. Fixed-end anchor body 14 may be positioned within concrete form 21 such that fixed-end anchor body 14 will be encased in concrete 23 after concrete is poured into concrete form 21. In some embodiments, fixed end cap 19 may be positioned at distal end 41 of fixed end anchor body 14. Fixed end cap 19 may, in certain embodiments, protect tension member 15 from corrosion after concrete 23 is poured by preventing or retarding corrosive or reactive fluids or concrete from contacting tension member 15.

[0013] Stressing end anchor 17 may be positioned within concrete form 21 such that it is substantially surrounded by concrete 23. Pocket former 25 may be positioned between stressing end anchor body 18 and end wall 22 of concrete form 21. Pocket former 25 may be adapted to, for example and without limitation, prevent or restrict concrete 23 from filling the space between stressing end anchor body 18 and end wall 22, thus forming a cavity or pocket in edge 42 of concrete member 40 formed by concrete 23 within concrete form 21. Pocket former 25 may thus allow access to tension member 15 from outside concrete member 40 once concrete member 40 is sufficiently hardened and end wall 22 is removed.

[0014] In the present invention the tension member 15 includes a strand 27 and sheath 29. Strand 27 may be a single or multi-strand metal cable. Sheath 29 is tubular or generally tubular and positioned about strand 27. In some embodiments, space between strand 27 and sheath 29 may be filled or partially filled with a filler such as grease. When installing tension member 15, as in the method of the present invention, a length of sheath 29 may be removed from first end 43 of tension member 15, exposing strand 27. Strand 27 is inserted through fixed end anchor 13 until sheath 29 engages with sheathing retention capsule 100. Strand 27 is then coupled to fixed end anchor 13 by the use of wedges. Tension member

15 may be positioned within concrete form 21 and tension member 15 may be cut to correspond with the length of concrete form 21. A length of sheath 29 is removed from second end 44 of tension member 15, exposing strand 27. Strand 27 is inserted through stressing end anchor 17 until sheath 29 engages with sheathing retention capsule 100 within stressing end anchor 17.

[0015] In some embodiments, as depicted in FIG. 2A, sheathing retention capsule 100 may be coupled to fixed end anchor 13. In some embodiments, as depicted in FIG. 2B, sheathing retention capsule 100 may be coupled to stressing end anchor 17. Although described hereinafter with respect to fixed end anchor 13, apparatuses, systems, and methods apply in the same manner with respect to stressing end anchor 17. Sheathing retention capsule 100 may couple to fixed end anchor 13 by a coupler, including but without limitation a thread, detent, press lock, or tab-and-slot connection. As depicted in FIG. 3, the coupler may be a tab-and-slot connection where sheathing retention capsule 100 may include one or more tabs 102 that fit into one or more corresponding anchor slots 104 formed in fixed end anchor 13. In some embodiments, tabs 102 may be wedge-shaped. When tabs 102 are wedge-shaped, sheathing retention capsule 100 may be inserted into fixed end anchor 13, but sheathing capsule 100 may be restricted or prevented from removal from fixed end anchor 13.

[0016] As depicted in FIGS. 2A, 2B, 3 sheathing retention capsule 100 includes an outer body 101 and one or more holding wedges 103. Outer body 101 and at least one of one or more holding wedges 103 may be generally tubular in shape. In some embodiments, two or more holding wedges 103 may be interconnected to form a wedge ring. Outer body 101 may be a coupler for connecting to fixed end anchor 13. One or more holding wedges 103 are positioned within outer body 101. In some embodiments, one or more holding wedges 103 may include one or more retention features to prevent or restrict the separation of one or more holding wedges 103 and outer body 101. Retention features may include, for example and without limitation, one or more detents, pins, slides, or, as depicted in FIGS. 2, 3, hooks 105. Hooks 105 may fit within outer body slots 107 formed in outer body 101.

[0017] At least one of one or more holding wedges 103 include inner wall 109, which may be cylindrical. Inner wall 109 may have inner wall diameter 110 corresponding with outer diameter 32 of sheath 29. Inner wall 109 may form a press or friction fit when sheath 29 is inserted into one or more holding wedges 103. In some embodiments, as depicted in FIG. 3, one or more holding wedges 103 may include one or more surface features on inner wall 109, which may increase the static friction between outer wall 34 of sheath 29 and one or more holding wedges 103. In some embodiments, the surface features may include, for example and without limitation, wickers 111. Wickers 111 may be one or more grooves, protrusions, or teeth that may contact the outer wall of sheath 29 and, in some embodiments, press against or into outer wall 34 of sheath 29, thus increasing the retention force between one or more holding wedges 103 and sheath 29. In some embodiments, one or more holding wedges 103 are at least partially split or may include expansion bridge 113. Expansion bridge 113 may allow at least one of one or more holding wedges 103 to at elastically deform when sheath 29 is inserted thereinto, providing normal force between one or more holding wedges 103 and sheath 29. The normal force may increase friction therebetween. In some embodiments, expansion bridge 113 may be a portion of one or more holding wedges 103 that is less thick than the remaining portion of one or more holding wedges 103. In some embodiments, expansion bridge 113, such as when one or more holding wedges 103 are a wedge ring, may be one or more gaps in the wedge ring.

[0018] In some embodiments, one or more holding wedges 103 may be formed as one or more wedges 106 as depicted in FIG. 4A. At least one wedge 106 may be arcuate. In some embodiments, wedges 106 include at least partial split 108 to allow wedge 106 to flex as depicted in FIG. 4B when compressed. This flexure may allow for deformation of wedge 106, and increased contact of wedge 106 with sheath 29. In some embodiments, the inner diameter of wedge 106 may be less than outer diameter 32 of sheath 29 to allow for a friction fit or press fit. The inner diameter of wedge 106 is the inner diameter of wedge 106 were it to extend circumferentially. Split 108 may allow deformation of wedge 106 to allow the inner diameter of wedge 106 thereof to more closely match outer diameter 32 of sheath 29.

[0019] In some embodiments, as depicted in FIG. 5, holding wedge 203 of sheathing retention capsule 200 may be positioned about only a portion of sheath 29. In some such embodiments, holding wedge 203 may be a single wedge 206. Wedge 206 may press against sheath 29 when compressed. In some embodiments, outer body 201 may include holding surface 202 positioned in opposition to wedge 206 to provide an opposing force on sheath 29 as wedge 206 engages sheath 29.

[0020] In some embodiments, as depicted in FIG. 6, at least one of one or more holding wedges 303 may be formed from a plurality of pieces. In some embodiments, at least one of one or more holding wedges 303 may include wedged piece 306 and die face piece 308. Wedged piece 306 may have tapered outer surface 310 and flat inner surface 312, where outer surface 314 of die face piece 308 may be flat. In some embodiments, wedged piece 306 may be bonded to die face 308.

[0021] The outer body 101 includes a tapered inner surface defined herein as forcing surface 115. In some embodiments, forcing surface 115 may be frustoconically tapered. Forcing surface 115 corresponds to and abuts tapered outer surface 117 of one or more holding wedges 103. Forcing surface 115 and outer surface 117 of one or more holding wedges 103 allow one or more holding wedges 103 to be pulled further into outer body 101 as tension is applied to sheath 29. The taper of forcing sur-

face 115 and outer surface 117 may bias one or more holding wedges 103 inward as shown by arrow 140, tightening the grip on sheath 29, until the reactant force, such as caused by material resistance to deformation, between forcing surface 115 and outer surface 117 is sufficient to resist the tension on sheath 29.

[0022] The sheathing retention capsule 100 does further include seal 119. Seal 119 is, as depicted in FIG. 3, positioned to seal between sheath 29 and fixed end anchor 13. Seal 119 is annular or generally annular and fits into recess 144 formed in fixed end anchor 13. Seal 119 may protect tension member 15 from corrosion after concrete 23 (shown in FIG. 1B) is poured. Seal 119 is positioned about an outer surface of outer body 101. Additionally, seal 119 may, for example, prevent or restrict concrete from ingressing into tension member 15.

[0023] Although described herein as a separate component from fixed end anchor 13, sheathing retention capsule 100 may be formed as a part of fixed end anchor 13. In such an embodiment, fixed end anchor 13 may include forcing surface 115, with one or more holding wedges 103, and, in some embodiments, seal 119 coupled thereto or formed therein.

[0024] Although described specifically with respect to fixed end anchor 13 and stressing end anchor 17, sheathing retention capsule 100 may be utilized with any anchor for a post-tensioned concrete member including an intermediate anchor. An intermediate anchor may be an anchor used between adjacent concrete members which are poured and stressed sequentially utilizing the same tension member 15.

[0025] The foregoing outlines features of several embodiments so that a person of ordinary skill in the art may better understand the aspects of the present disclosure. Such features may be replaced by any one of numerous equivalent alternatives, within the scope defined by the appended claims, only some of which are disclosed herein. One of ordinary skill in the art should appreciate that they may readily use the present disclosure as a basis for designing or modifying other processes and structures for carrying out the same purposes and/or achieving the same advantages of the embodiments introduced herein. One of ordinary skill in the art should also realize that such equivalent constructions do not depart from the scope of the present disclosure and that they may make various changes, substitutions, and alterations herein within the scope defined by the appended claims. Unless explicitly stated otherwise, nothing herein is intended to be a definition of any word or term as generally used by a person of ordinary skill in the art.

Claims

1. An anchoring system comprising a sheathing retention capsule (100, 200); and
   a post-tensioning tendon (11) that includes a fixed end anchor (13), a tension member (15), a stressing end anchor (17), a strand (27), and a sheath (29), wherein the strand (27) is a metal cable and the sheath (29) is tubular or generally tubular and positioned about the strand (27), wherein the strand (27) is inserted through the fixed end anchor (13) until the sheath (29) engages the sheathing retention capsule (100, 200), and the strand (27) is coupled to the fixed end anchor (13) by wedges, the sheathing retention capsule (100, 200) comprising:

   an outer body (101, 201), the outer body (101, 201) having a tapered inner surface defining a forcing surface (115) and an outer surface;
   a seal (119), the seal positioned to seal between the sheath (29) and the fixed end anchor (13), wherein the seal (119) is annular or generally annular and fits into a recess (144) in the fixed end anchor (13) and
   one or more holding wedges (103, 203, 303), at least one of the one or more holding wedges (103, 203, 303) having a tapered outer surface (117) abutting the tapered inner surface of the outer body (101, 201), at least one of the one or more holding wedges (103, 203, 303) having an inner wall, the anchoring system being **characterized in that**, the seal (119) is positioned about an outer surface of the outer body (101, 201), and **in that** an application of tension to the sheath (29) forces the holding wedges (103, 203, 303) against the tapered inner surface and into tighter engagement with the sheath (29), thereby forming a press or friction fit, and **in that** the holding wedges (103, 203, 303) comprise a partial slit or an expansion bridge (113).

2. The anchoring system of claim 1, wherein the sheathing retention capsule (100 ,200) further comprising wickers (111) positioned on the inner wall of at least one of the one or more holding wedges (103, 203, 303).

3. The anchoring system of claim 1 or claim 2, wherein the outer body (101, 201) of the sheathing retention capsule (100, 200) further comprises a coupler.

4. The anchoring system of any one of claims 1 to 3, wherein the one or more holding wedges (103, 203, 303) of the sheathing retention capsule (100, 200) further comprises:
   a hook (105).

5. A method of coupling a tension member (15) to an anchor to form a post-tensioning tendon (11) using an anchoring system according to any preceding claim, the method comprising the steps of:

   removing a portion of the sheath (29) from a first end of the tension member (15);

inserting the first end of the tension member (15) into the anchor (13, 17);
inserting the sheath (29) into the one or more holding wedges (103, 203, 303),
forming a press-fit between the sheath (29) and the one or more holding wedges (103, 203, 303);
coupling the strand (29) to the anchor (13, 17);
applying a tensile force to the sheath (29) and,
tightening the press-fit between the generally cylindrical sheath (29) and the one or more holding wedges (103, 203, 303).

6. The method of claim 5 further comprising:
forming wickers (111) on the inner wall of at least one of the one or more holding wedges (103, 203, 303).

7. The anchoring system of claim 1, wherein: the at least one holding wedge (103, 203, 303) includes a wedged portion (306) and a die face portion (308); the wedged portion (306) has a tapered outer surface (370) and a flat inner surface (312); the die face portion (308) has a flat outer portion (314); and the wedged portion (306) and the die face portion (308) are bonded.

8. The anchoring system of claim 7:
further comprising wickers (111) positioned on the inner wall of the wedged portion (306).

9. The anchoring system of claim 7 or 8:
wherein the outer body (101, 201) further comprises a coupler.

Patentansprüche

1. Ankersystem, umfassend eine Hülsenhaltekapsel (100, 200) und
eine Pfosten-Spannsehne (11), die einen Anker am fixierten Ende (13), ein Spannelement (15), einen Anker am beanspruchenden Ende (17), einen Strang (27) und eine Hülse (29) beinhaltet, wobei der Strang (27) ein Metallkabel ist und die Hülse (29) röhrenförmig oder allgemein röhrenförmig und um den Strang (27) positioniert ist, wobei der Strang (27) durch den Anker am fixierten Ende (13) eingeführt ist, bis die Hülse (29) mit der Hülsenhaltekapsel (100, 200) in Eingriff gelangt, und der Strang (27) durch Keile mit dem Anker am fixierten Ende (13) gekoppelt ist, wobei die Hülsenhaltekapsel (100, 200) Folgendes umfasst:

einen äußeren Körper (101, 201), wobei der äußere Körper (101, 201) eine schräge Innenoberfläche, die eine Kraft ausübende Oberfläche (115) definiert, und eine Außenoberfläche umfasst,

eine Dichtung (119), wobei die Dichtung positioniert ist, um zwischen der Hülse (29) und dem Anker am fixierten Ende (13) abzudichten, wobei die Dichtung (119) ringförmig oder allgemein ringförmig ist und in eine Vertiefung (144) in dem Anker am fixierten Ende (13) und einen oder mehrere Haltekeile (103, 203, 303) passt, wobei mindestens einer des einen oder der mehreren Haltekeile (103, 203, 303) eine schräge Außenoberfläche (117) aufweist, die an der schrägen Innenoberfläche des äußeren Körpers (101, 201) anliegt, wobei mindestens einer des einen oder der mehreren Haltekeile (103, 203, 303) eine Innenwand aufweist, wobei das Ankersystem **dadurch gekennzeichnet ist, dass** die Dichtung (119) um eine Außenoberfläche des äußeren Körpers (101, 201) positioniert ist, und dadurch, dass eine Ausübung von Spannung auf die Hülse (29) die Haltekeile (103, 203, 303) gegen die schräge Innenoberfläche und in einen festeren Eingriff mit der Hülse (29) drückt, wodurch ein Presssitz oder ein Reibschluss gebildet wird, und dadurch, dass die Haltekeile (103, 203, 303) einen Teilschlitz oder eine Ausdehnungsbrücke (113) umfassen.

2. Ankersystem nach Anspruch 1, wobei die Hülsenhaltekapsel (100, 200) ferner Röhren (111) umfassend, die an der Innenwand mindestens eines des einen oder der mehreren Haltekeile (103, 203, 303) positioniert sind.

3. Ankersystem nach Anspruch 1 oder Anspruch 2, wobei der äußere Körper (101, 201) der Hülsenhaltekapsel (100, 200) ferner einen Koppler umfasst.

4. Ankersystem nach einem der Ansprüche 1 bis 3, wobei der eine oder die mehreren Haltekeile (103, 203, 303) der Hülsenhaltekapsel (100, 200) ferner Folgendes umfassen:
einen Haken (105).

5. Verfahren zum Koppeln eines Spannelements (15) mit einem Anker, um eine Pfosten-Spannsehne (11) zu bilden, unter Verwendung eines Ankersystems nach einem der vorhergehenden Ansprüche, wobei das Verfahren die folgenden Schritte umfasst:

Entfernen eines Abschnitts der Hülse (29) von einem ersten Ende des Spannelements (15),
Einführen des ersten Endes des Spannelements (15) in den Anker (13, 17),
Einführen der Hülse (29) in den einen oder die mehreren Haltekeile (103, 203, 303),
Bilden eines Presssitzes zwischen der Hülse (29) und dem einen oder den mehreren Haltekeilen (103, 203, 303),
Koppeln des Strangs (29) mit dem Anker (13,

17),
Ausüben einer Zugkraft auf die Hülse (29) und Festziehen des Presssitzes zwischen der allgemein zylindrischen Hülse (29) und dem einen oder den mehreren Haltekeile (103, 203, 303).

6. Verfahren nach Anspruch 5, ferner umfassend:
Bilden von Röhren (111) an der Innenwand mindestens eines des einen oder der mehreren Haltekeile (103, 203, 303).

7. Ankersystem nach Anspruch 1, wobei: der mindestens eine Haltekeil (103, 203, 303) einen keilförmigen Abschnitt (306) und einen Pressformseitenabschnitt (308) beinhaltet, der keilförmige Abschnitt (306) eine schräge Außenoberfläche (370) und eine flache Innenoberfläche (312) aufweist, der Pressformseitenabschnitt (308) einen flachen Außenabschnitt (314) aufweist und der keilförmige Abschnitt (306) und der Pressformseitenabschnitt (308) verbunden sind.

8. Ankersystem nach Anspruch 7:
ferner Röhren (111) umfassend, die an der Innenwand des keilförmigen Abschnitts (306) positioniert sind.

9. Ankersystem nach Anspruch 7 oder 8:
wobei der äußere Abschnitt (101, 201) ferner einen Koppler umfasst.

Revendications

1. Système d'ancrage comprenant une capsule de retenue de gainage (100, 200) ; et
un câble de post-tension (11) comprenant un ancrage côté fixe (13), un élément de tension (15), un ancrage côté contrainte (17), un toron (27), et une gaine (29), dans lequel le toron (27) est un câble métallique et la gaine (29) est tubulaire ou généralement tubulaire et placée autour du toron (27), dans lequel le toron (27) est inséré au travers de l'ancrage côté fixe (13) jusqu'à ce que la gaine (29) s'engage dans la capsule de retenue de gainage (100, 200), et le toron (27) soit couplé sur l'ancrage côté fixe (13) par des cales, la capsule de retenue de gainage (100, 200) comprenant :

un corps externe (101, 102), le corps externe (101, 102) ayant une surface interne conique définissant une surface de forçage (115) et une surface externe ;
un joint (119), le joint étant placé de manière à assurer l'étanchéité entre la gaine (29) et l'ancrage côté fixe (13), dans lequel le joint (119) est annulaire ou généralement annulaire et s'adapte dans un évidement (144) dans l'ancrage côté fixe (13) et une ou plusieurs cales de retenue (103, 203, 303), au moins une parmi la ou les cales de retenue (103, 203, 303) ayant une surface externe conique (117) en butée sur la surface interne du corps externe (101, 201), au moins une parmi la ou les cales de retenue (103, 203, 303) ayant une paroi interne, le système d'ancrage étant **caractérisé en ce que** le joint (119) est placé autour d'une surface externe du corps externe (101, 201), et l'application d'une tension sur la gaine (29) force les cales de retenue (103, 203, 303) contre la surface interne conique et en ajustement plus serré avec la gaine (29), établissant ainsi un calage par pression ou par friction, et les cales de retenue (103, 203, 303) comprennent une fente partielle ou un pont d'expansion (113).

2. Système d'ancrage selon la revendication 1, dans lequel la capsule de retenue de gainage (100, 200) comprend en outre des clisses (111) placées sur la paroi interne d'au moins l'une parmi la ou les cales de retenue 1-3, 203, 303).

3. Système d'ancrage selon la revendication 1 ou la revendication 2, dans lequel le corps externe (101, 201) de la capsule de retenue de gainage (100, 200) comprend en outre un dispositif de couplage.

4. Système d'ancrage selon l'une quelconque des revendications 1 à 3, dans lequel la ou les cales de retenue (103, 203, 303) de la capsule de retenue (100, 200) comprend/comprennent en outre :
un crochet (105).

5. Procédé de couplage d'un élément de tension (15) sur un ancrage de manière à former un câble de post-tension (11) à l'aide d'un système d'ancrage selon l'une quelconque des revendications précédentes, le procédé comprenant :

le retrait d'une partie de la gaine (29) d'une première extrémité de l'élément de tension (15) ;
l'insertion de la première extrémité de l'élément de tension (15) dans le dispositif d'ancrage (13, 17) ;
l'insertion de la gaine (29) dans la ou les cales de retenue (103, 203, 303) ;
la formation d'un ajustement serré entre la gaine (29) et la ou les cales de retenue (103, 203, 303) ;
le couplage du toron (29) sur le dispositif d'ancrage (13, 17) ;
l'application d'une force de traction sur la gaine (29) et,
le serrage de l'ajustement par pression entre la gaine généralement cylindrique (29) et la ou les cales de retenue (103, 203, 303).

6. Procédé selon la revendication 5, comprenant en outre :
la formation de clisses (111) sur la paroi interne d'au moins une ou plusieurs cales de retenue (103, 203, 303).

7. Système d'ancrage selon la revendication 1, dans lequel : la au moins une cale de retenue (103, 203, 303) comprend une partie en coin (306) et une partie filière (308) ; la partie en coin (306) a une surface externe conique (370) et une surface interne plate (312) ; la partie filière (308) a une partie externe plate (314) ; et la partie en coin (306) et la partie filière (308) sont solidaires.

8. Système d'ancrage selon la revendication 7 :
comprenant en outre des clisses (111) placées sur la paroi interne de la partie en coin (306).

9. Système d'ancrage selon la revendication 7 ou la revendication 8 :
dans lequel le corps externe (101, 201) comprend en outre une dispositif de couplage.

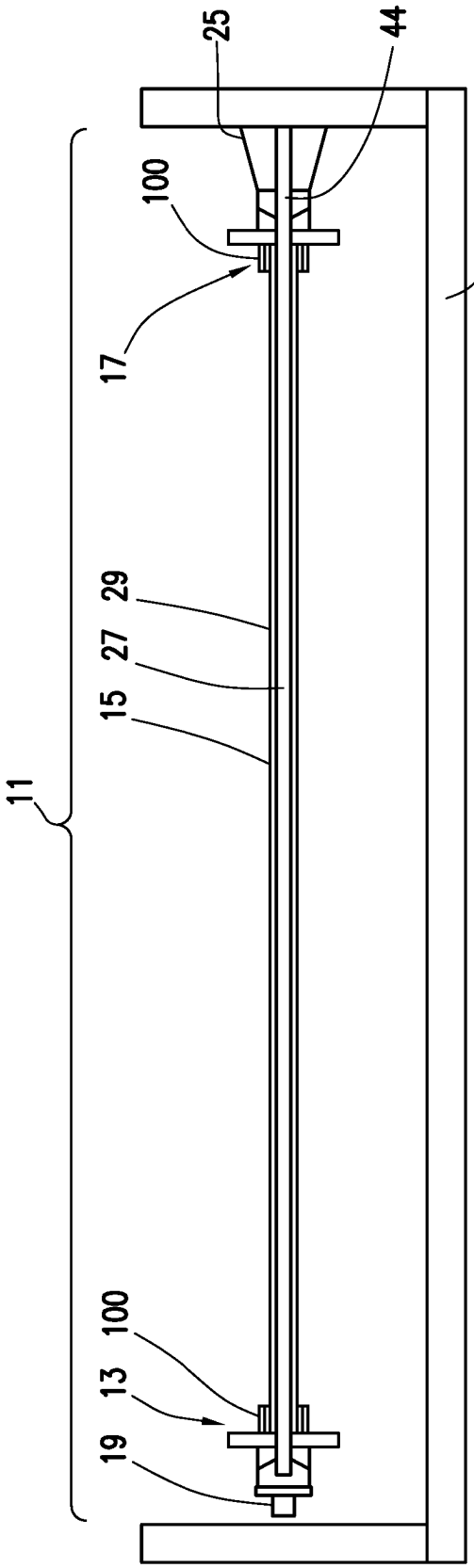
25
44
100
21
17
29
27
15
11
100
13
19

FIG. 1A

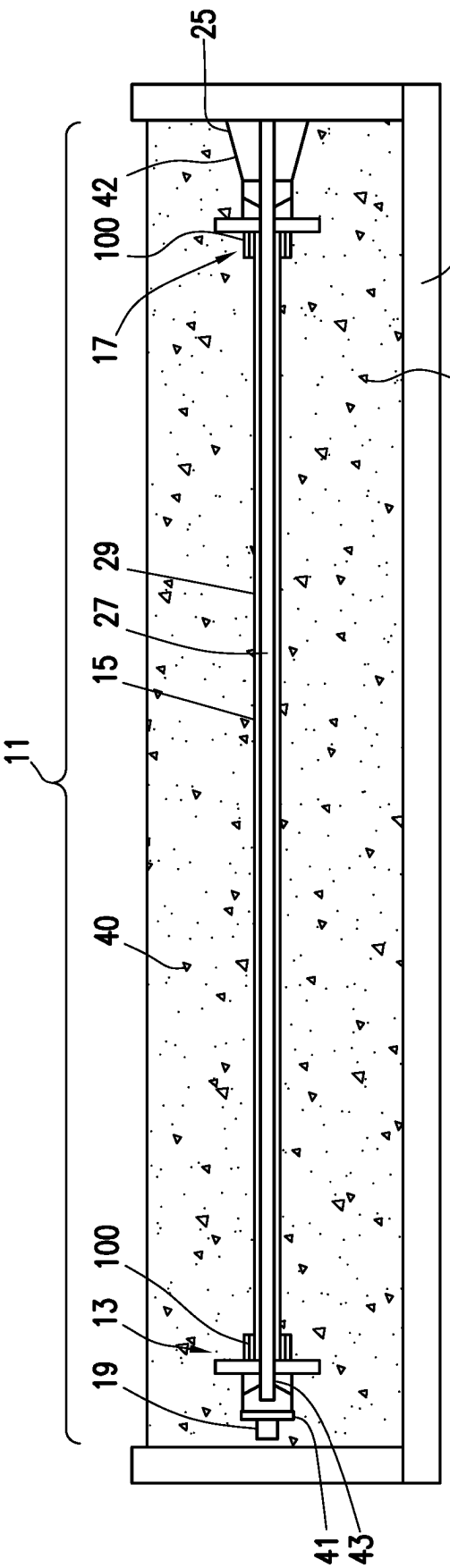
25
100
42
21
17
23
29
27
15
11
40
100
13
19
41
43

FIG. 1B

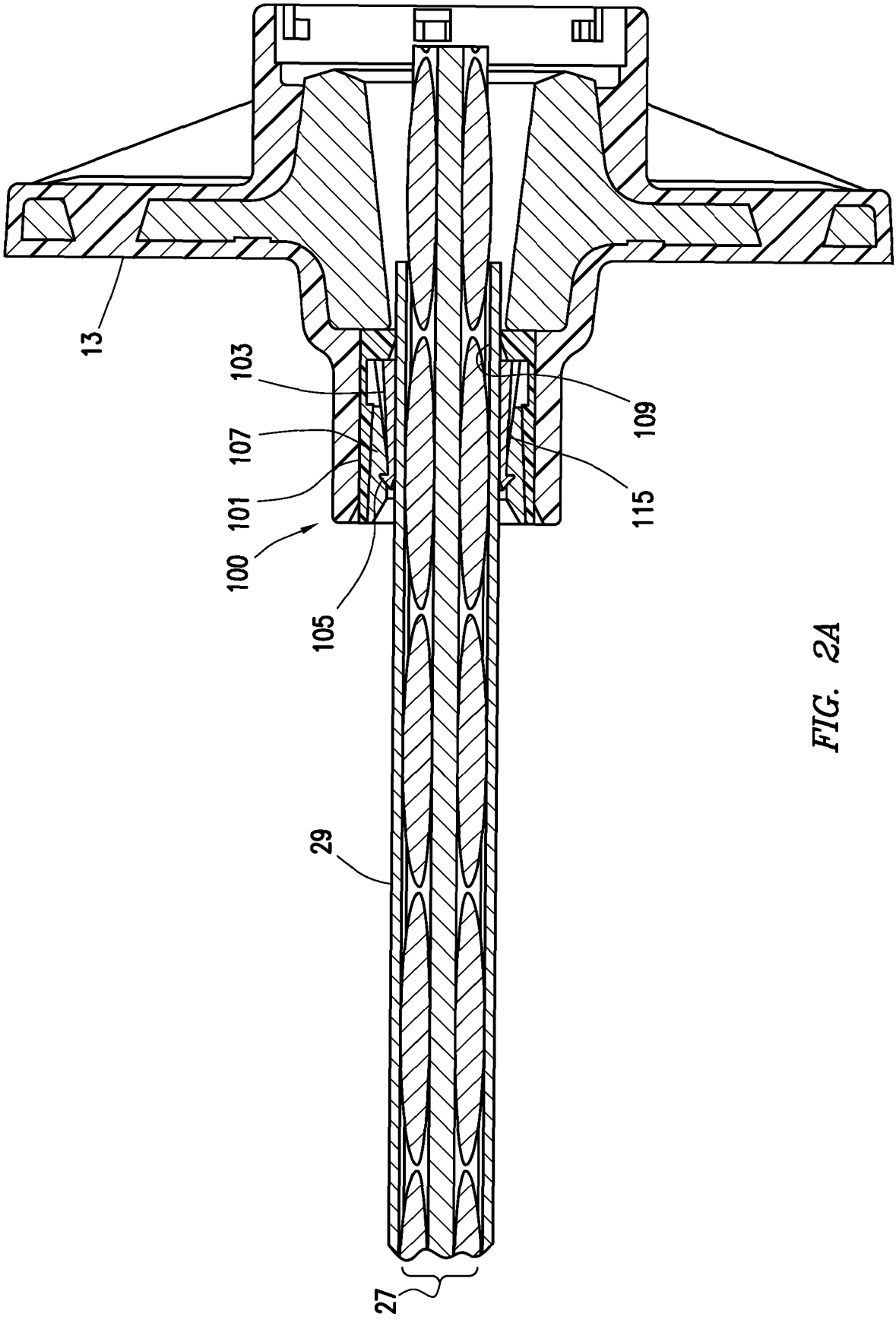

FIG. 2A

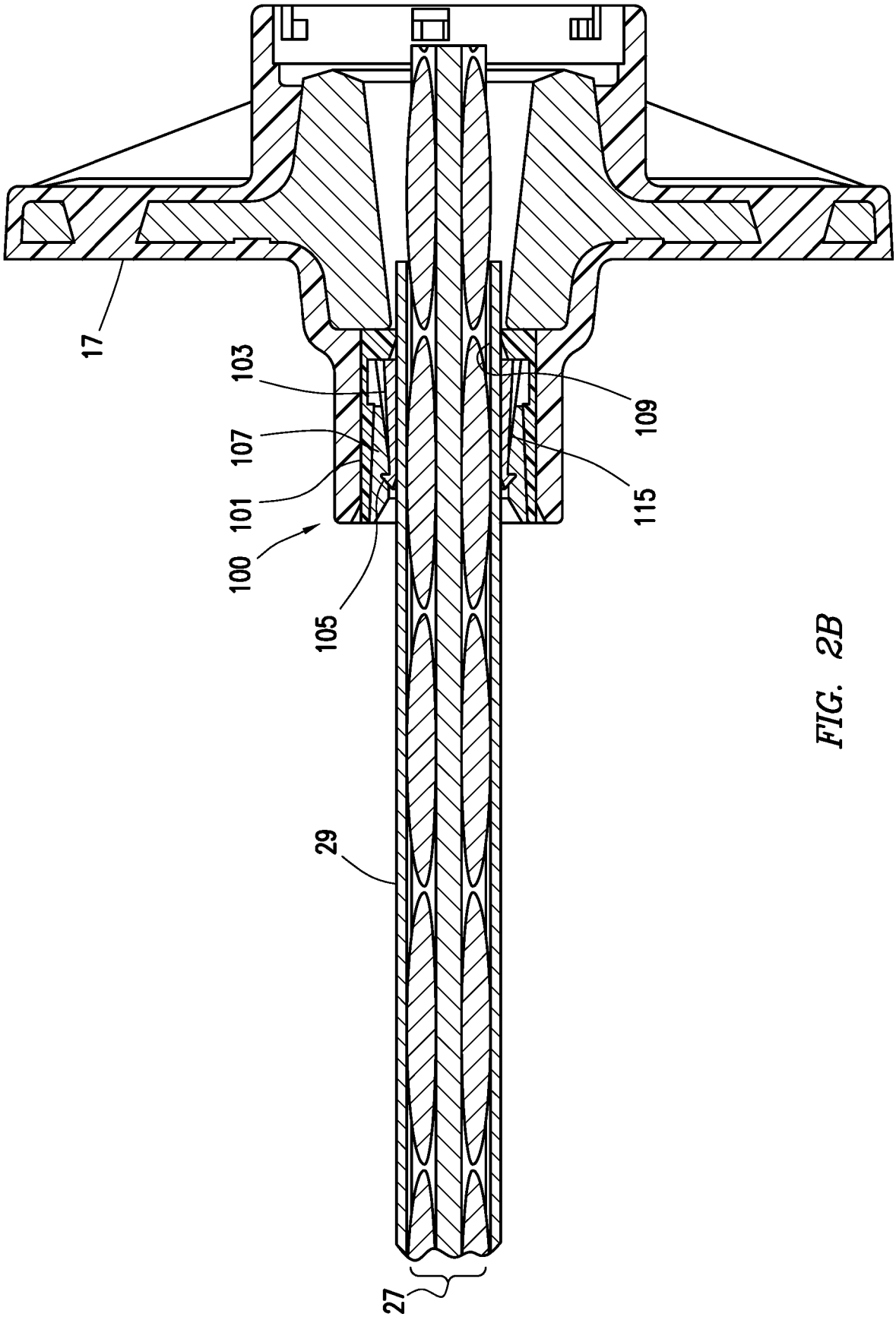

FIG. 2B

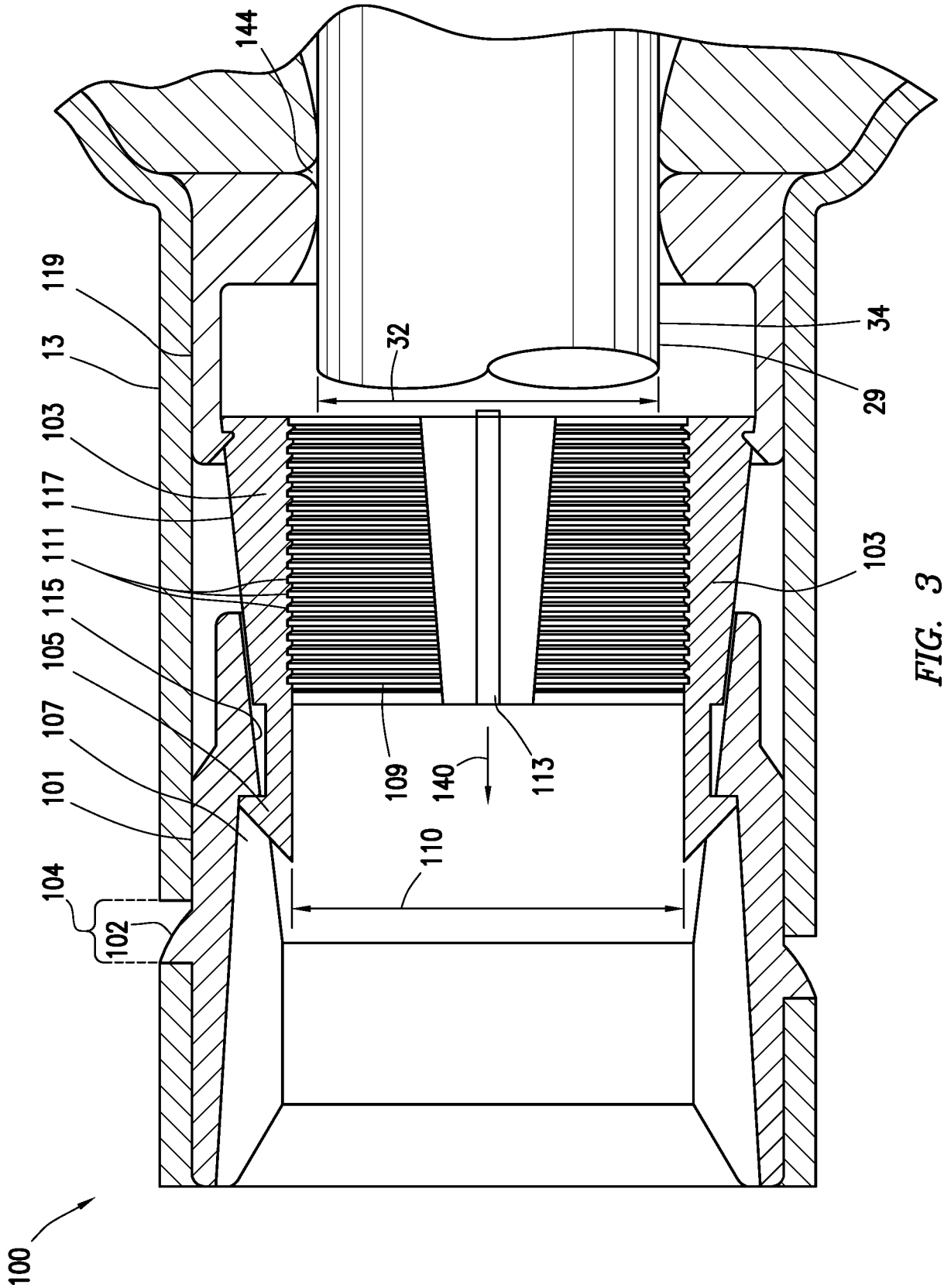
144
119
13
103
117
111
115
105
107
101
104
102
100
32
34
29
103
109
140
113
110

FIG. 3

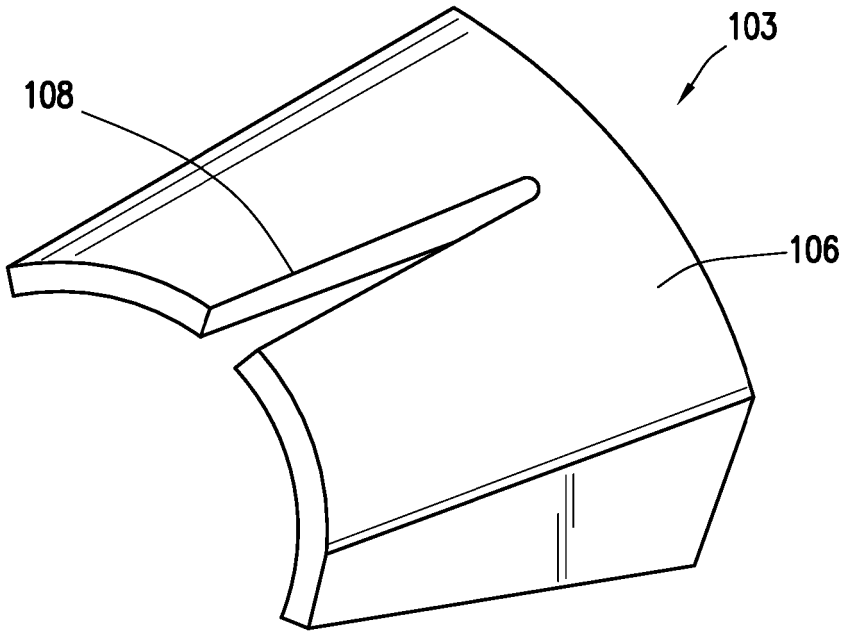

FIG. 4A

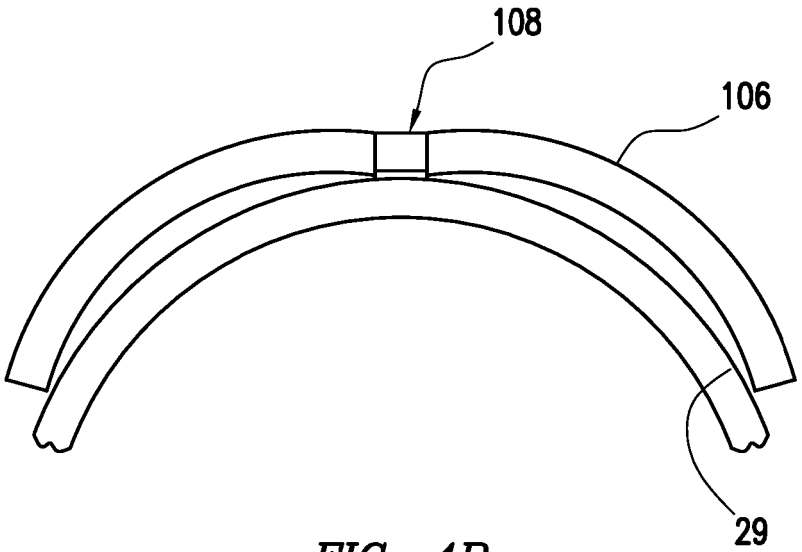

FIG. 4B

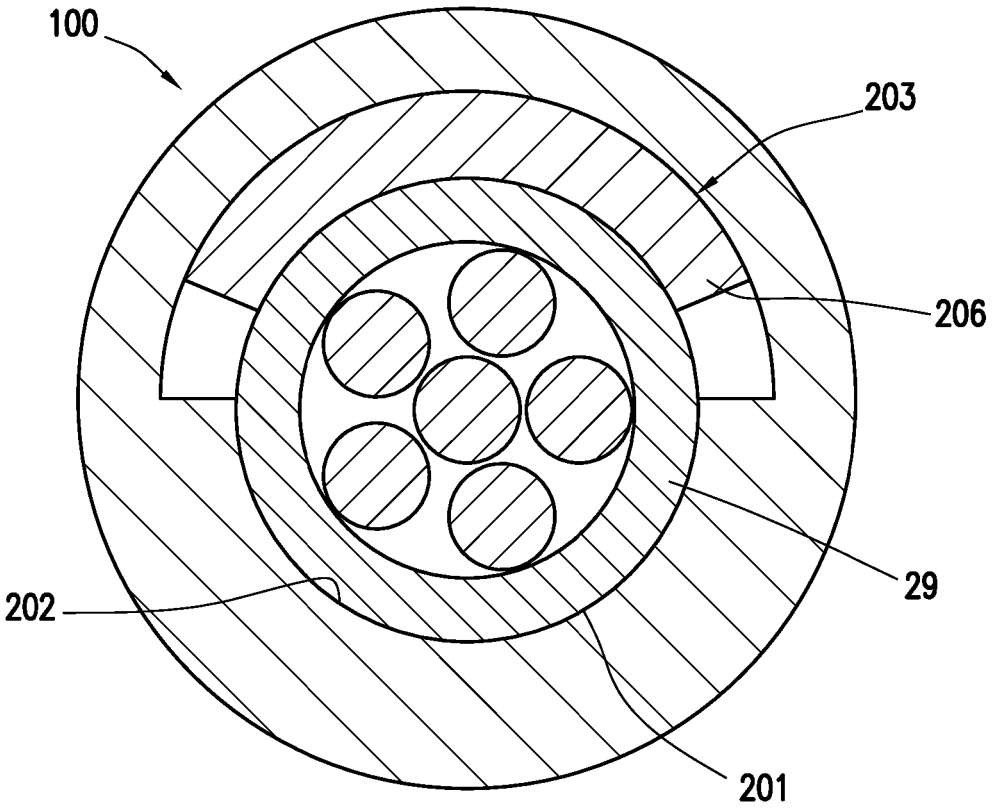

FIG. 5

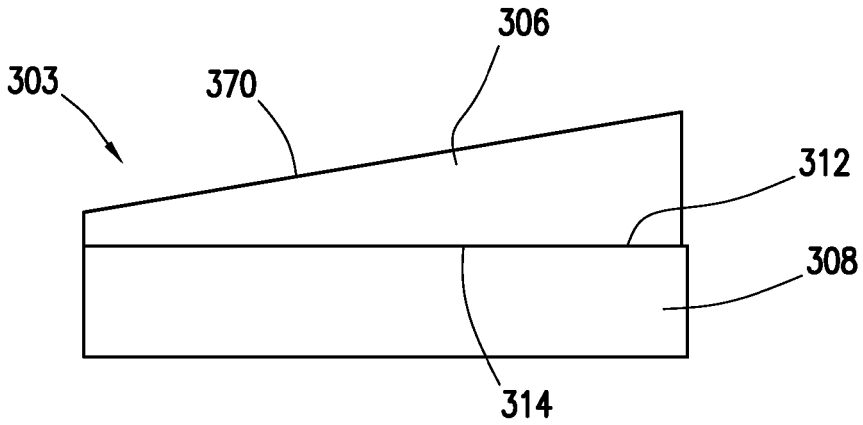

FIG. 6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CA 1240533 **[0005]**
- WO 2007066860 A **[0005]**