



(51) International Patent Classification:

H01R 13/6593 (2011.01) H01R 13/50 (2006.01)
H01R 13/6591 (2011.01) H01R 9/05 (2006.01)
H01R 4/20 (2006.01)

(21) International Application Number:

PCT/US2023/016986

(22) International Filing Date:

30 March 2023 (30.03.2023)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

17/708,878 30 March 2022 (30.03.2022) US

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG,
KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY,
MA, MD, MG, MK, MN, MU, MW, MX, MY, MZ, NA,
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RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH,
TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, CV,
GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, SD, SL, ST,

(54) Title: ANGLED SUBASSEMBLY FOR AN ANGLED CONNECTOR AND METHOD OF ASSEMBLING THEREOF

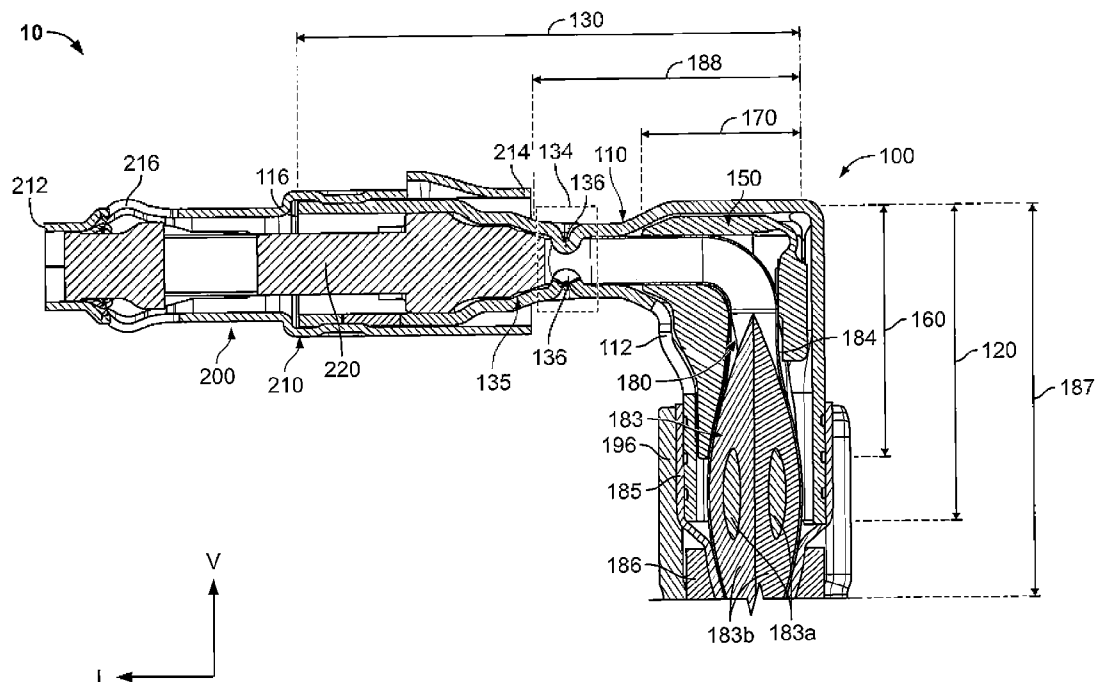


Fig. 5

(57) Abstract: An angled subassembly (100) of an angled connector (10) includes an angled shield (110) having a first shield section (120) and a second shield section (130) extending at a bend angle (140) with respect to the first shield section (120), and a cable (180) disposed in the angled shield (110). The cable (180) has a first portion (187) positioned in the first shield section (120) and a second portion (188) positioned in the second shield section (130). The second portion (188) extends at the bend angle (140) with respect to the first portion (187).



SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, ME, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

ANGLED SUBASSEMBLY FOR AN ANGLED CONNECTOR AND METHOD OF ASSEMBLING THEREOF

[0001] The present invention relates to a subassembly of a connector and, more particularly, to an angled subassembly for an angled connector.

[0002] An angled connector commonly includes a housing, contacts disposed within the housing, a shield disposed around the housing, and a cable disposed within the housing and electrically connected to the contacts. Angled connectors are used in applications in which the contacts of the connector are required to be disposed at an angle with respect to a direction in which the cable extends into the connector.

[0003] The cable extends in a single direction into the angled connector and the contacts disposed within the housing have a bend forming the angle desired for the angled connector. The contacts can be formed in a single piece and subsequently bent to the desired angle or can be formed in multiple pieces that are attached to one another to form the desired angle. These arrangements of the contacts, however, result in high component cost, complicated assembly, inconsistent formation of the necessary angles, and difficult impedance control.

[0004] An angled subassembly of an angled connector includes an angled shield and a cable disposed in the angled shield. The angled shield has a first shield section and a second shield section extending at a bend angle with respect to the first shield section. The cable has a first portion positioned in the first shield section and a second portion positioned in the second shield section. The second portion extends at the bend angle with respect to the first portion.

[0005] The invention will now be described by way of example with reference to the accompanying Figures, of which:

[0006] Figure 1 is a perspective view of an angled connector according to an embodiment;

[0007] Figure 2 is an exploded perspective view of the angled connector;

[0008] Figure 3 is a perspective view of an angled shield of the angled connector;

[0009] Figure 4A is a perspective view of a cable of the angled connector connected to contacts of the angled connector;

[0010] Figure 4B is a perspective view of the cable and an angled dielectric of the angled connector with a dielectric cover of the angled dielectric in an open dielectric position;

[0011] Figure 4C is a perspective view of the cable and the angled dielectric with the dielectric cover in a closed dielectric position;

[0012] Figure 4D is a perspective view of the cable with the angled dielectric in the angled shield, with a shield cover of the angled shield in an open shield position;

[0013] Figure 4E is a perspective view of the cable in the angled shield with the shield cover in a closed shield position;

[0014] Figure 4F is a perspective view of the cable in the angled shield with the shield cover in the closed shield position and a braid of the cable disposed over a first shield section of the angled shield;

[0015] Figure 5 is a sectional side view of the angled connector; and

[0016] Figure 6 is a sectional top view of the angled connector.

[0017] An angled connector 10 according to an embodiment, as shown in Figure 1, includes an angled subassembly 100 and a mating subassembly 200 connected to the angled subassembly 100.

[0018] The angled subassembly 100, as shown in Figures 1, 2, 5, and 6, includes an angled shield 110, an angled dielectric 150 disposed in the angled shield 110, a cable 180 disposed in the angled shield 110, a contact 190 electrically connected to the cable 180, and a ferrule 196 disposed around the cable 180 and the angled shield 110.

[0019] As shown in Figure 3, the angled shield 110 has a shield body 112 extending from a first end 114 to an opposite second end 116. The angled shield 110 has a first shield section 120 and a second shield section 130 extending from the first shield section 120.

[0020] The first shield section 120, as shown in Figure 3, extends from the first end 114 of the shield body 112. The first shield section 120 has a first shield axis 122 extending centrally through the first shield section 120. In the shown embodiment, the first shield axis 122 extends along a vertical direction V.

[0021] The second shield section 130 extends from the first shield section 120 to the second end 116 of the shield body 112, as shown in Figure 3. The second shield section 120 has a second shield axis 132 extending centrally through the second shield section 120. In the shown embodiment, the second shield axis 132 extends along a longitudinal direction L perpendicular to the vertical direction V.

[0022] As shown in Figure 3, due to the direction of extension of the second shield axis 132 with respect to the first shield axis 122, the second shield section 130 extends at a bend angle 140 with respect to the first shield section 120. In the shown embodiment, the bend angle 140 is 90°

and the second shield section 130 extends perpendicularly with respect to the first shield section 120. In other embodiments, the bend angle 140 can be any angle greater than 90° and less than 180° , and the second shield section 130 can extend at angles between 90° and 180° with respect to the first shield section 120.

[0023] In the first shield section 120, as shown in Figures 2 and 3, the angled shield 110 has a shield cover 124 attached to the shield body 112 at a shield hinge 128. The shield cover 124 is pivotable with respect to the shield body 112 about the shield hinge 128 between an open shield position SO, shown in Figure 2, and a closed shield position SC, as shown in Figure 3. In the embodiment shown in Figures 2 and 3, the shield body 112 has a tab 123 in the first shield section 120 and the shield cover 124 has a recess 126 extending into the shield cover 124. When the shield cover 124 is pivoted into the closed shield position SC, as shown in Figure 3, the tab 123 enters the recess 126 and secures the shield cover 124 in the closed shield position SC.

[0024] In the second shield section 130, as shown in Figure 5, the angled shield 110 has a narrowed portion 134 in which a dimension of an interior space 135 of the second shield section 130 is decreased along the vertical direction V. In the shown embodiment, the narrowed portion 134 is formed by a pair of protrusions 136, as shown in Figures 1, 3, and 5, extending into the interior space 135 of the second shield section 130 opposite one another in the vertical direction V. In another embodiment, the narrowed portion 134 can be formed by one protrusion 136 extending in the vertical direction V, or could be formed by any other bend or element of the shield body 112 that can decrease the dimension of the interior space 135. A dimension of the narrowed portion 134 along the longitudinal direction L shown in Figure 3 is merely exemplary; in other embodiments in which the second shield section 130 has a larger dimension along the longitudinal direction L, the narrowed portion 134 may also have a longer dimension along the longitudinal direction L.

[0025] The angled shield 110 is formed of a conductive material, such as aluminum, and in an embodiment is monolithically formed in a single piece with at least the shield body 112, the first section 120, the second section 130, and the shield cover 124. The angled shield 110 may be formed by stamping and bending from a sheet of conductive material. In other embodiments, the angled shield 110 may be formed from a plurality of separate elements attached together.

[0026] The angled dielectric 150, as shown in Figure 2, has a dielectric body 152 extending from a first end 154 to an opposite second end 156. The angled dielectric 150 has a first dielectric section 160 and a second dielectric section 170 extending from the first dielectric section 160.

[0027] The first dielectric section 160, as shown in Figure 2, extends from the first end 154 of the dielectric body 152. The first dielectric section 160 has a first dielectric axis 162 extending centrally through the first dielectric section 160. In the shown embodiment, the first dielectric axis 162 extends along the vertical direction V.

[0028] The second dielectric section 170 extends from the first dielectric section 160 to the second end 156 of the dielectric body 152, as shown in Figure 2. The second dielectric section 170 has a second dielectric axis 172 extending centrally through the second dielectric section 170. In the shown embodiment, the second dielectric axis 172 extends along the longitudinal direction L.

[0029] As shown in Figure 2, due to the direction of extension of the second dielectric axis 172 with respect to the first dielectric axis 162, the second dielectric section 170 extends at the bend angle 140 with respect to the first dielectric section 160. The bend angle 140 of the second dielectric section 170 with respect to the first dielectric section 160 is the same as the bend angle 140 of the second shield section 130 with respect to the first shield section 120; the bend angle 140 of the second dielectric section 170 with respect to the first dielectric section 160 is greater than or equal to 90° and less than 180°.

[0030] In the first dielectric section 160, as shown in Figure 2, the angled dielectric 150 has a dielectric cover 164 attached to the dielectric body 152 at a dielectric hinge 168. The dielectric cover 164 is pivotable with respect to the dielectric body 152 about the dielectric hinge 168 between an open dielectric position DO, shown in Figures 2 and 4B, and a closed dielectric position DC, shown in Figure 4C.

[0031] In the embodiment shown in Figures 2, 4B, and 4C, the dielectric body 152 has a catch 158 in the first dielectric section 160 and the dielectric cover 164 has a latch 166. When the dielectric cover 164 is pivoted into the closed dielectric position DC, the latch 166 engages with the catch 158 and secures the dielectric cover 164 in the closed dielectric position DC. In the shown embodiment, the catch 158 is a recess and the latch 166 is a protrusion complementary to the recess of the catch 158. In other embodiments, the catch 158 may be a protrusion and the latch 166 may be a recess complementary to the protrusion of the catch 158, or the catch 158 and

the latch 166 may be any other elements capable of engaging with one another to secure the dielectric cover 164 in the closed dielectric position DC. In another embodiment, the catch 158 and the latch 166 may be omitted.

[0032] The angled dielectric 150 is a dielectric material, such as a plastic, and in an embodiment is monolithically formed in a single piece with at least the dielectric body 152, the first dielectric section 160, the second dielectric section 170, and the dielectric cover 164; in this embodiment, the dielectric hinge 168 is a film hinge. In other embodiments, the angled dielectric 150 may be formed from a plurality of separate elements attached together.

[0033] The cable 180, as shown in Figure 2, has a wire 183, a foil 184 disposed around the wire 183, a braid 185 disposed around the foil 184, and a cable insulation 186 disposed around the braid 185.

[0034] In the shown embodiment, the cable 180 includes a twisted pair of wires 183, with each of the wires 183 having a conductor 183a and a wire insulation 183b disposed around the conductor 183a. In the twisted pair embodiment, the wires 183 are twisted around one another within the foil 184 with the wire insulation 183b of each of the wires 183 in abutment with one another. In another embodiment, the cable 180 includes a pair of wires 183 extending parallel to one another, each of the wires 183 having the conductor 183a and the wire insulation 183b. In another embodiment, the cable 180 may have one wire 183 with one conductor 183a surrounded by one wire insulation 183b.

[0035] The foil 184 is disposed around the wires 183 or wire 183 in abutment with the wire insulation 183b, as shown in Figure 2. The foil 184 is formed of a conductive material. The braid 185 is disposed around and in abutment with the foil 184; the braid 185 is formed of a conductive material. The cable insulation 186, formed of an insulative material, is disposed around and in abutment with the braid 185.

[0036] The contact 190, as shown in Figure 2, has a mating portion 192 and a connection portion 194 at an end opposite the mating portion 192. The contact 190 is formed of a conductive material. In the shown embodiment, the mating portion 192 is a receptacle for a pin; in other embodiments, the mating portion 192 could be a pin or any other type of contact element capable of mating with another contact element. In the shown embodiment, the connection portion 194 is a crimping portion capable of being crimped to a conductor. In other embodiments, the connection portion 194 could be a flat element capable of being welded to a conductor, or any

other type of element capable of mechanically and electrically connecting the contact 190 to a conductor. The angled subassembly 100 has two contacts 190 in the shown embodiment. The number of contacts 190 corresponds to the number of wires 183 of the cable 180; the angled subassembly 100 may alternatively have one contact 190 for an embodiment of the cable 180 having one wire 183.

[0037] The ferrule 196, as shown in the embodiment of Figures 1 and 2, is an approximately cylindrical element formed of a conductive material. In an embodiment, the ferrule 196 is formed from bending or rolling a sheet of conductive material.

[0038] The mating subassembly 200, as shown in Figures 1 and 2, includes a mating shield 210 and a mating dielectric 220 disposed within the mating shield 210. The mating shield 210, formed of a conductive material, extends from a first end 212 to an opposite second end 214 along the longitudinal direction L. The mating shield 210 has a plurality of contact springs 216 disposed adjacent to the first end 212. In an embodiment, the mating shield 210 is monolithically formed in a single piece. The mating dielectric 220 is formed of a dielectric material and, as shown in Figure 6, has a plurality of contact receiving passageways 222 extending through the mating dielectric 220 along the longitudinal direction L. The mating dielectric 220 can alternatively have one or more than two contact receiving passageways 222; the number of contact receiving passageways 222 corresponds to the number of wires 183 of the cable 180 and the number of contacts 190.

[0039] The assembly of the angled connector 10 will now be described primarily with respect to Figures 4A-4F.

[0040] In a first step, shown in Figure 4A, the cable insulation 186, the braid 185, and the foil 184 are stripped to expose the wires 183. For each of the wires 183, a portion of the wire insulation 183b is stripped to expose a portion of the conductor 183a. The connection portion 194 of each of the contacts 190 is electrically and mechanically connected to one of the exposed conductors 183a. In the embodiment shown in Figure 4A, the connections portions 194 are crimped to the conductors 183a.

[0041] In a next step, shown in Figure 4B, the cable 180 is inserted into and through the angled dielectric 150 with the dielectric cover 164 in the open dielectric position DO. The cable 180 is bent within the angled dielectric 150 as shown in Figures 2 and 4B. When the cable 180 is bent, the cable 180 has a first portion 187 and a second portion 188 extending at the bend angle 140

with respect to the first portion 187, as shown in Figure 4C. The first portion 187 is disposed in the first dielectric section 160 and the second portion 188 is disposed in the second dielectric section 170. As shown in Figure 4B, the wires 183 and the foil 184 of the cable 180 extend through the angled dielectric 150.

[0042] With the cable 180 fully inserted through the angled dielectric 150 and bent into the shape described above and shown in Figures 2 and 4B, the dielectric cover 164 is moved from the open dielectric position DO to the closed dielectric position DC shown in Figure 4C. In an embodiment, the catch 158 engages the latch 166 to secure the dielectric cover 164 in the closed dielectric position DC. In another embodiment, in lieu of or in addition to the catch 158 and the latch 166, the dielectric cover 164 is secured to the dielectric body 152 in the closed dielectric position DC by plastic welding of the dielectric cover 164 to the dielectric body 152. In another embodiment, the angled dielectric 150 does not have the dielectric cover 164 pivotable with respect to the dielectric body 152, but rather is overmolded in a single piece over the foil 184 of the cable 180 in the position shown in Figure 4C.

[0043] The angled dielectric 150 in the position shown in Figure 4C, due to the structure and the bend angle 140 of the first dielectric section 160 with respect to the second dielectric section 170 shown in Figures 2 and 4B, secures the cable 180 in the position shown in Figure 4C with the first portion 187 at the same bend angle 140 with respect to the second portion 188. In the shown embodiment, the cable 180 is inserted into the angled dielectric 150 to be bent and held with the contacts 190 already connected to the wires 183. In another embodiment, the cable 180 can be inserted into the angled dielectric 150, bent, and held by the angled dielectric 150 prior to connecting the contacts 190 with the wires 183.

[0044] In an embodiment shown in Figure 4D, the cable 180 bent and held by the angled dielectric 150 is inserted into the angled shield 110 with the shield cover 124 in the open shield position SO. In the position shown in Figure 4D, the braid 185 is flared outwards from the cable 180.

[0045] The shield cover 124 is then moved from the open shield position SO shown in Figure 4D to the closed shield position SC shown in Figure 4E, enclosing the cable 180 in the shield body 112. In the shown embodiment, the tab 123 is disposed in the recess 126 to secure the shield cover 124 in the closed shield position SC. In an embodiment, the shield cover 124 can be crimped to the shield body 112 to retain the shield cover 124 in the closed shield position SC. In

other embodiments, including the tab 123 and the recess 126 or omitting the tab 123 and the recess 126, and in addition to or in lieu of crimping the shield cover 124 to the shield body 112, the shield cover 124 can be welded to the shield body 112 to secure the shield cover 124 in the closed shield position SC.

[0046] With the shield cover 124 in the closed shield position SC shown in Figure 4E, the braid 185 is dressed or folded over the first shield section 120 of the angled shield 110, as shown in Figure 4F. The ferrule 196 is then positioned over the exposed portion of the braid 185 and a portion of the cable insulation 186 and crimped over the braid 185, the first shield section 120, and the cable insulation 186, as shown in Figures 1 and 5.

[0047] In the embodiment shown in Figures 4D-4F, the mating subassembly 200 is already connected to the angled shield 110 when the angled dielectric 150 and the cable 180 are inserted into the angled shield 110. As shown in Figures 5 and 6, the second end 116 of the angled shield 110 at the second shield section 130 is inserted into the second end 214 of the mating shield 210 and disposed in the mating shield 210. The angled shield 110 is mechanically and electrically connected to the mating shield 210 through the second shield section 130. The mating dielectric 220 is disposed within the interior space 135 of the second shield section 130, as shown in Figures 5 and 6. The mating dielectric 220 extends from a position adjacent to the narrowed portion 134 and out of the second shield section 130 along the longitudinal direction L. In another embodiment, the mating subassembly 200 can be connected to the angled shield 110 after the angled dielectric 150 and the cable 180 are inserted into the angled shield 110.

[0048] The angled connector 10 is shown in a fully assembled state in Figures 1, 5, and 6 in which the cable 180 is disposed and held within the angled shield 110 and the angled dielectric 150.

[0049] As shown in Figure 5, the first portion 187 of the cable 180 is positioned in the first shield section 120 of the angled shield 110 and in the first dielectric section 160 of the angled dielectric 150. The foil 184 is disposed around the wires 183 in the first portion 187 and is held in abutment against the wire insulation 183b of the wires 183. The first shield section 120 mechanically and electrically contacts the foil 184 in the first portion 187 and is disposed between the foil 184 and the braid 185. The braid 185 in the first portion 187 is crimped to the first shield section 120 by the ferrule 196 and is disposed between the first shield section 120 and the ferrule 196; in an embodiment, the first shield section 120 provides a support for crimping of

the ferrule 196 around the braid 185 and the cable 180 that prevents the crimping of the ferrule 196 from damaging the foil 194 or the wires 183.

[0050] The second portion 188 of the cable 180, as shown in Figures 5 and 6, is positioned in the second shield section 130 of the angled shield 110 and in the second dielectric section 170 of the angled dielectric 150. The foil 184 is disposed around the wires 183 in the second portion 188 and is held in abutment against the wire insulation 183b of the wires 183; the wires 183 and the foil 184 are each disposed in the first portion 187 and the second portion 188 of the cable 180.

[0051] In the second portion 188, as shown in Figure 5, the wire insulation 183b of the wires 183 is disposed in the narrowed portion 134 of the angled shield 110. In an embodiment, the narrowed portion 134 is smaller in the vertical direction V than an outer diameter of the wires 183 and the cable 180 and the foil 134 are held in the second shield section 130 by an interference fit between the second portion 188 of the cable 180 and the narrowed portion 134. The foil 134 terminates to the angled shield 110 at the narrowed portion 134. In the shown embodiment, the protrusions 136 abut the wire insulation 183b to secure the wires 183 in the angled shield 110.

[0052] As shown in Figure 6, each of the contacts 190 is positioned and held in one of the contact receiving passageways 222 of the mating dielectric 220. The conductors 183a of the wires 183 electrically and mechanically connected to the connection portions 194 of the contacts 190 are disposed within the mating dielectric 220 and the mating portions 192 of the contact 190 opposite the connection portions 194 are disposed adjacent to the first end 212 of the mating shield 210.

[0053] In the fully assembled state shown in Figures 1, 5, and 6, the foil 184 of the cable 180, the angled shield 110, the braid 185, the ferrule 196, and the mating shield 210 are electrically connected. The conductors 183a of the wires 183 are electrically connected to the contacts 190 and are electrically isolated from the foil 184, the angled shield 110, the braid 185, and the mating shield 210 by the wire insulations 183b and the mating dielectric 220. When the angled connector 10 is connected with a mating connector, the contact springs 216 of the mating shield 210 resiliently abut and electrically connect with a shield of the mating connector, and the contacts 190 mate and electrically connect with contacts of the mating connector.

[0054] In the angled connector 10, the cable 180 extends through a bend with the first portion 187 held at the bend angle 140 with respect to the second portion 188 by the angled shield 110

and the angled dielectric 150. By having the bend in the cable 180 itself, the foil 184 can remain over a longer portion of the cable 180 in the angled connector 10, allowing for a high degree of impedance control and improved shielding performance. The foil 184 extending over a large portion of the cable 180 and through the bend also avoids the crimping of the ferrule 196 having a significant impact on the impedance control; the ferrule 196 can be crimped as tight as necessary for mechanical robustness and as described above, can bear on the first shield section 120 instead of potentially damaging the foil 184. Simple designs of the contact 190 can be used with the angled connector 10, saving on component cost and decreasing the complexity of assembly.

[0055] In the shown embodiment, the angled dielectric 150 maintains a tight fit of the wire or wires 183 within the angled shield 110 and a tight wrap of the foil 184 around the wires 183 in the first portion 187 and the second portion 188. In another embodiment, the angled dielectric 150 can be omitted. In an embodiment omitting the angled dielectric 150, the other elements of the angled connector 10 are still arranged as described above; the cable 180 extends through the angled shield 110 with the first portion 187 and the second portion 188 still at the bend angle 140, and the narrowed portion 134 of the second shield section 130 is relied upon to maintain the tightness of the wires 183 with each other and the tight wrap of the foil 184.

[0056] The angled connector 10 in the shown embodiment holds the first portion 187 of the cable 180 with respect to the second portion 188 of the cable 180 on the opposite side of the bend at the bend angle 140 of 90°. In other embodiments, the bend angle 140 can be any angle greater than 90° and less than 180°. The cable 180 in the shown embodiment also has a particular rotational position with respect to the contacts 190 about a rotational axis of the longitudinal direction L. The angled connector 10 is not limited to the rotational position of the shown embodiment, and the cable 180 could be arranged and held by the angled subassembly 100 at any rotational position about the longitudinal axis L with respect to the contacts 190.

WHAT IS CLAIMED IS:

1. An angled subassembly (100) of an angled connector (10), comprising:
an angled shield (110) having a first shield section (120) and a second shield section (130) extending at a bend angle (140) with respect to the first shield section (120); and
a cable (180) disposed in the angled shield (110), the cable (180) having a first portion (187) positioned in the first shield section (120) and a second portion (188) positioned in the second shield section (130), the second portion (188) extending at the bend angle (140) with respect to the first portion (187).
2. The angled subassembly (100) of claim 1, wherein the cable (180) has a wire (183) and a foil (184) disposed around the wire (183), the wire (183) and the foil (184) are each disposed in the first portion (187) and in the second portion (188) of the cable (180).
3. The angled subassembly (100) of claim 2, wherein the wire (183) has a conductor (183a) disposed within a wire insulation (183b), the foil (184) abuts the wire insulation (183b) in the first portion (187) and in the second portion (188) of the cable (180).
4. The angled subassembly (100) of claim 1, wherein the angled shield (110) has a narrowed portion (134) in the second shield section (130), the narrowed portion (134) has an interference fit with the second portion (188) of the cable (180).
5. The angled subassembly (100) of claim 1, wherein the angled shield (110) has a shield body (112) and a shield cover (124) attached to the shield body (112), the shield cover (124) is pivotable with respect to the shield body (112) between an open shield position (SO) in which the cable (180) is insertable into the shield body (112) and a closed shield position (SC) enclosing the cable (180) in the shield body (112).
6. The angled subassembly (100) of claim 2, further comprising a ferrule (196) disposed around the cable (180) and the first shield section (120).

7. The angled subassembly (100) of claim 6, wherein the first shield section (120) is disposed between the ferrule (196) and the foil (184).
8. The angled subassembly (100) of claim 7, wherein the cable (180) has a braid (185) disposed around the foil (184), the braid (185) is disposed between the first shield section (120) and the ferrule (196).
9. The angled subassembly (100) of claim 2, further comprising an angled dielectric (150) disposed within the angled shield (110), the wire (183) and the foil (184) of the cable (180) extend through the angled dielectric (150), the angled dielectric (150) has a first dielectric section (160) and a second dielectric section (170) extending at the bend angle (140) with respect to the first dielectric section (160), the first portion (187) of the cable (180) is disposed in the first dielectric section (160) and the second portion (188) of the cable (180) is disposed in the second dielectric section (170).
10. The angled subassembly (100) of claim 9, wherein the angled dielectric (150) has a dielectric body (152) and a dielectric cover (164) attached to the dielectric body (152), the dielectric cover (164) is pivotable with respect to the dielectric body (152) between an open dielectric position (DO) in which the cable (180) is insertable into the dielectric body (152) and a closed dielectric position (DC) securing the cable (180) in the dielectric body (152).
11. An angled connector (10), comprising:
 - an angled subassembly (100) including an angled shield (110) and a cable (180) disposed in the angled shield (110), the angled shield (110) having a first shield section (120) and a second shield section (130) extending at a bend angle (140) with respect to the first shield section (120), the cable (180) having a first portion (187) positioned in the first shield section (120) and a second portion (188) positioned in the second shield section (130), the second portion (188) extending at the bend angle (140) with respect to the first portion (187); and
 - a mating subassembly (200) connected to the angled subassembly (100).

12. The angled connector (10) of claim 11, wherein the mating subassembly (200) has a mating shield (210) electrically connected to the angled shield (110).
13. A method of assembling an angled subassembly (100) of a connector (10), comprising:
providing an angled shield (110) having a first shield section (120) and a second shield section (130) extending at a bend angle (140) with respect to the first shield section (120); and
inserting a cable (180) into and through the angled shield (110), the cable (180) having a first portion (187) positioned in the first shield section (120) and a second portion (188) positioned in the second shield section (130), the second portion (188) extending at the bend angle (140) with respect to the first portion (187).
14. The method of claim 13, wherein the cable (180) has a wire (183) and a foil (184) disposed around the wire (183), the wire (183) and the foil (184) are each disposed in the first portion (187) and in the second portion (188) of the cable (180).
15. The method of claim 14, wherein the cable (180) has a braid (185) disposed around the foil (184), and further comprising crimping a ferrule (196) around the braid (185) and the first shield section (120).

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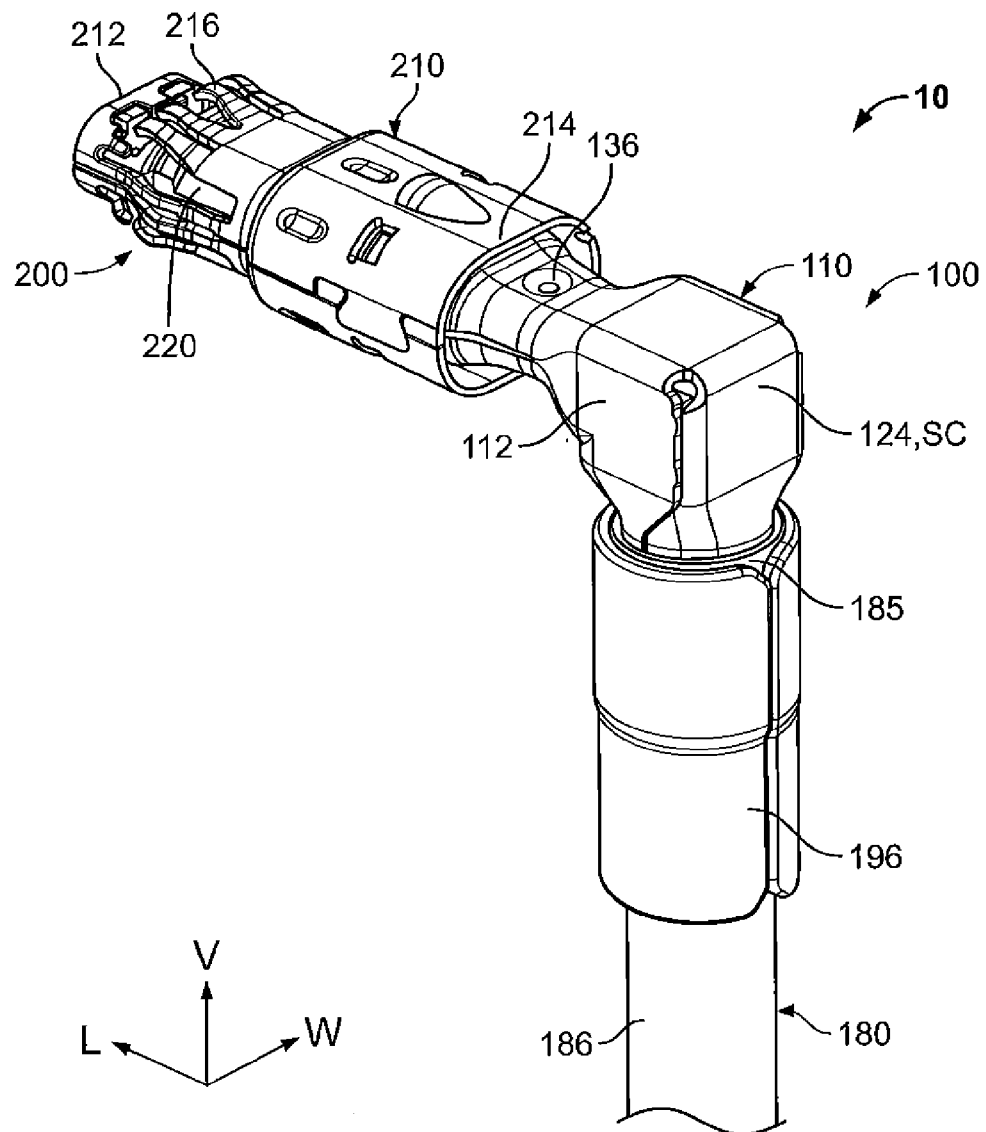
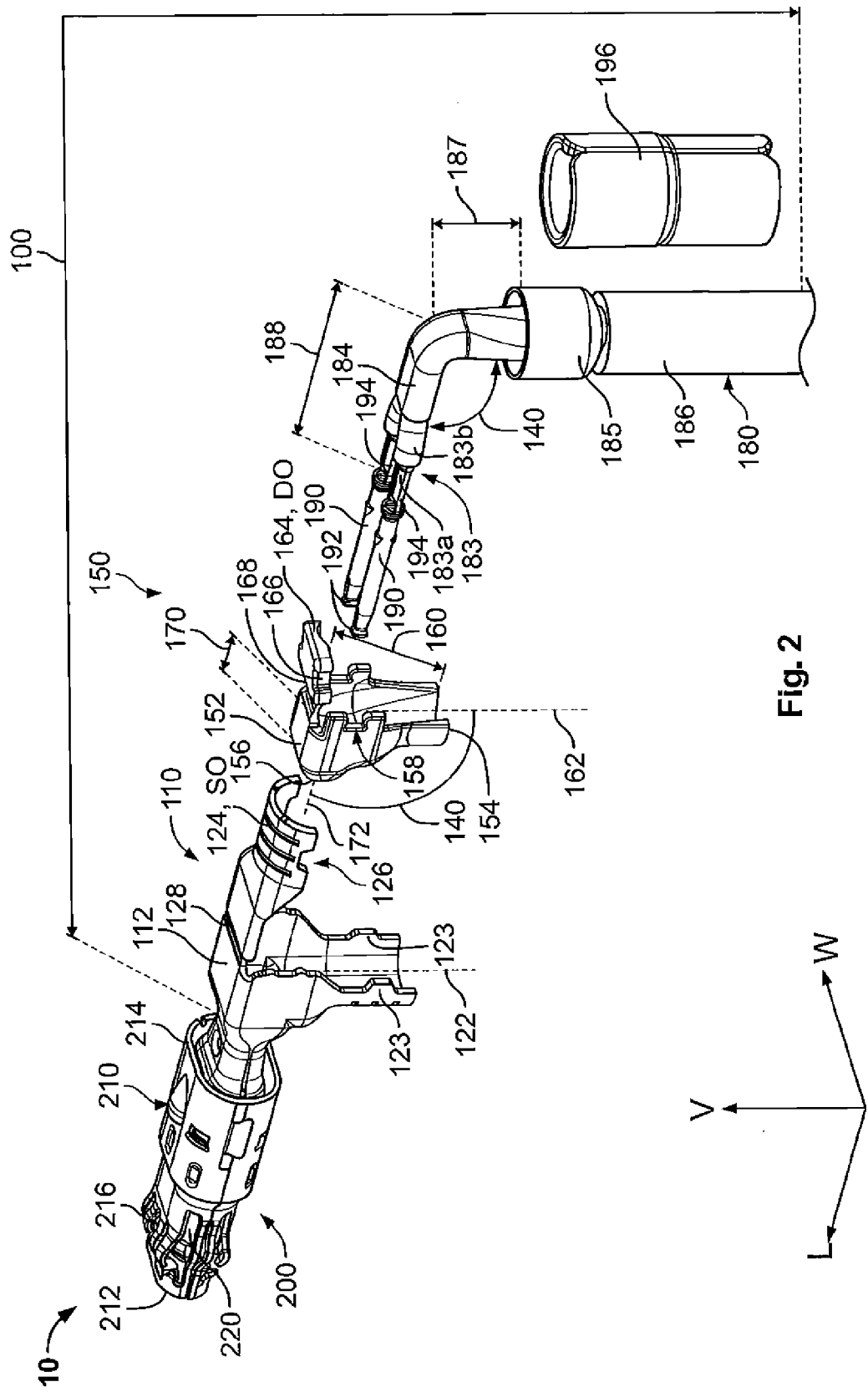


Fig. 1



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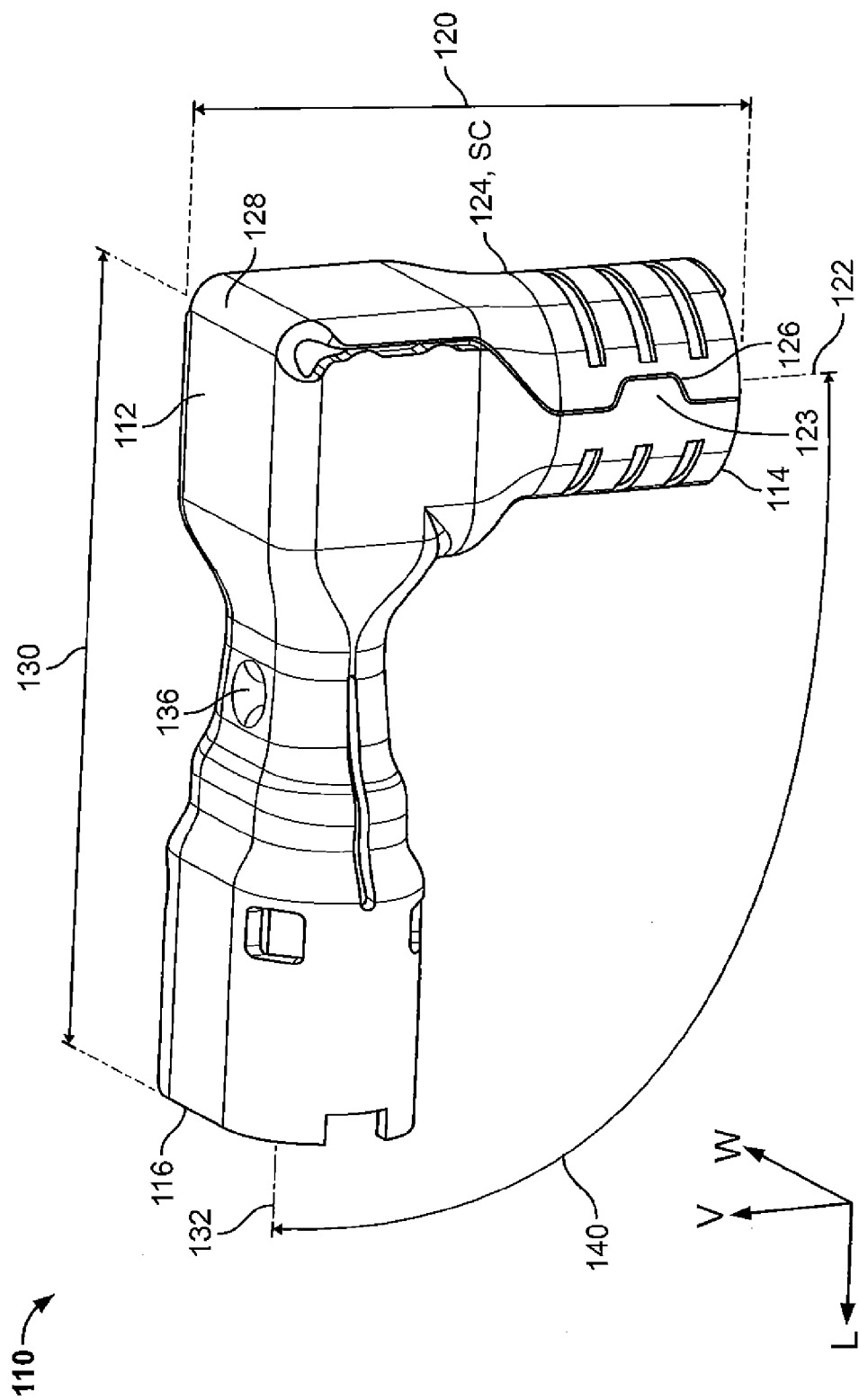


Fig. 3

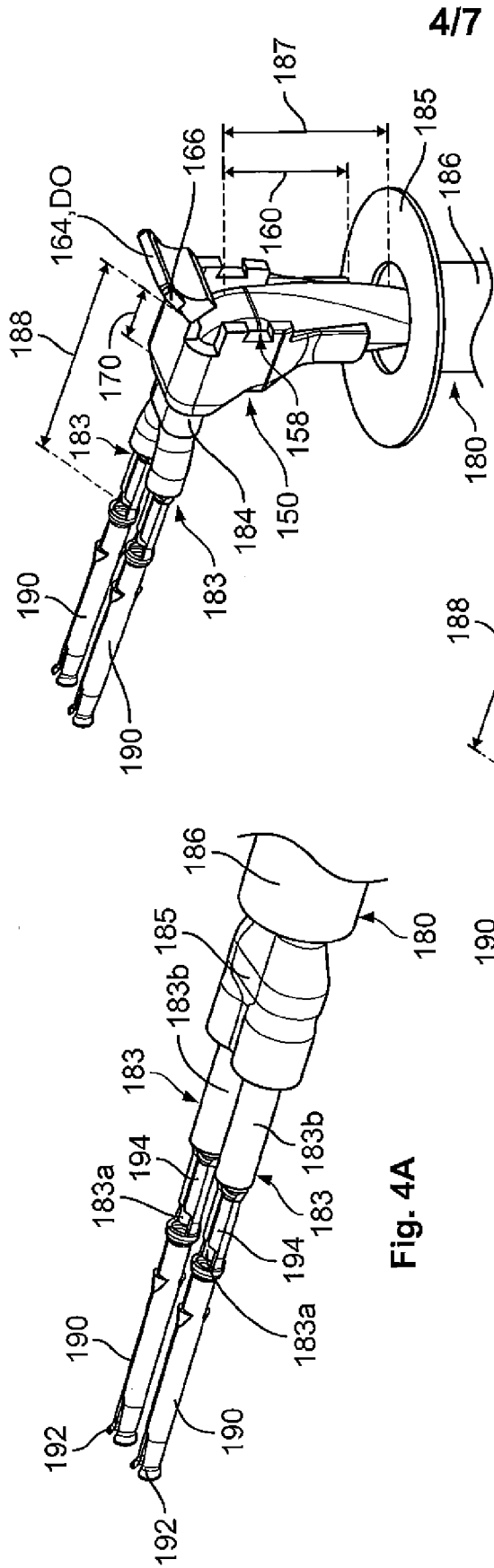


Fig. 4B

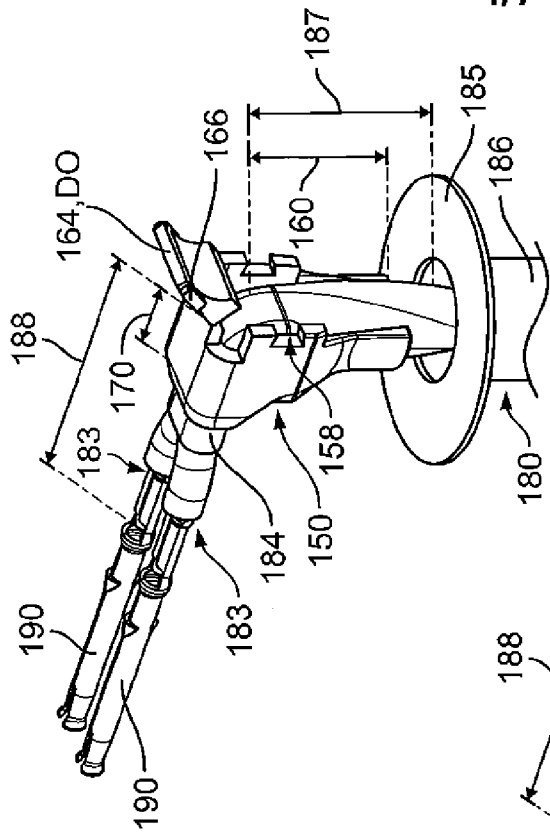
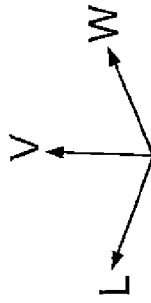
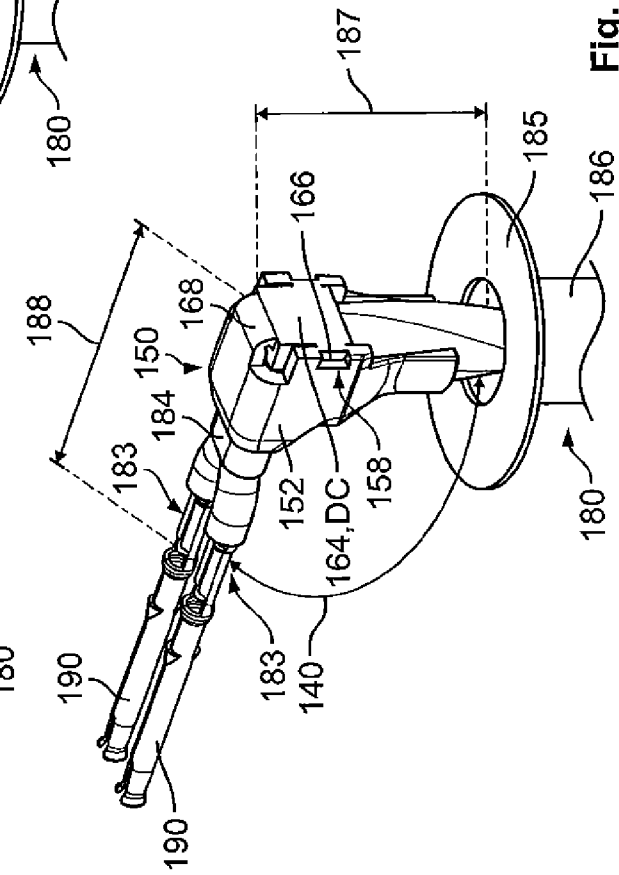


Fig. 4C



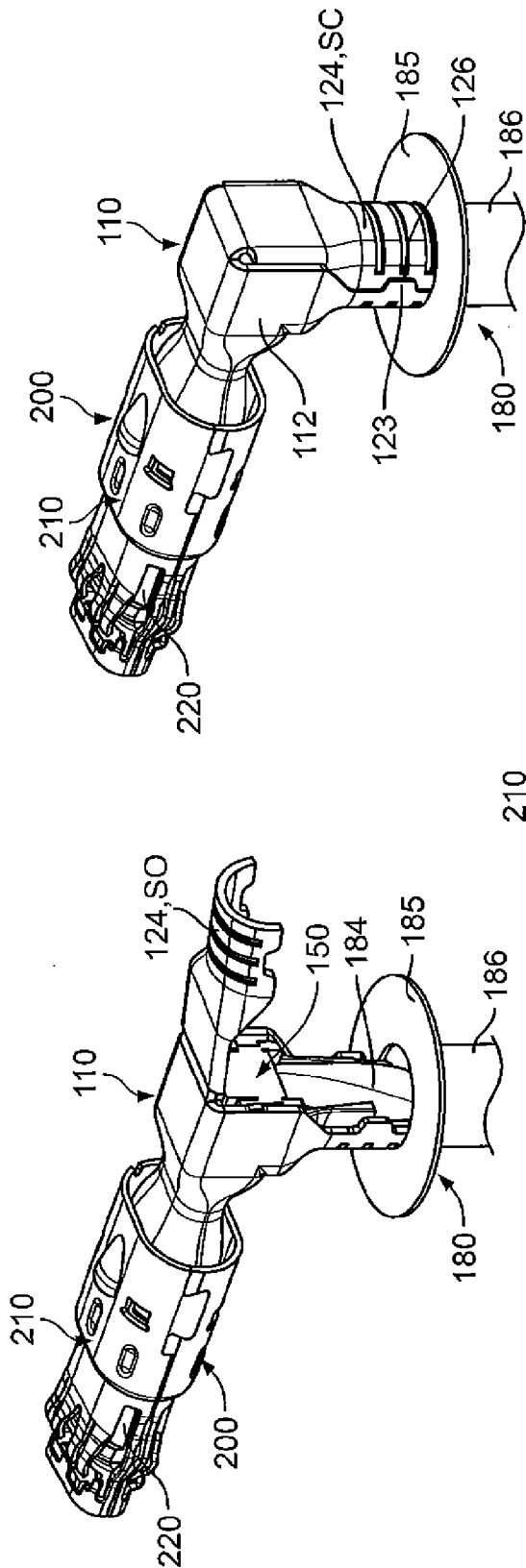


Fig. 4D

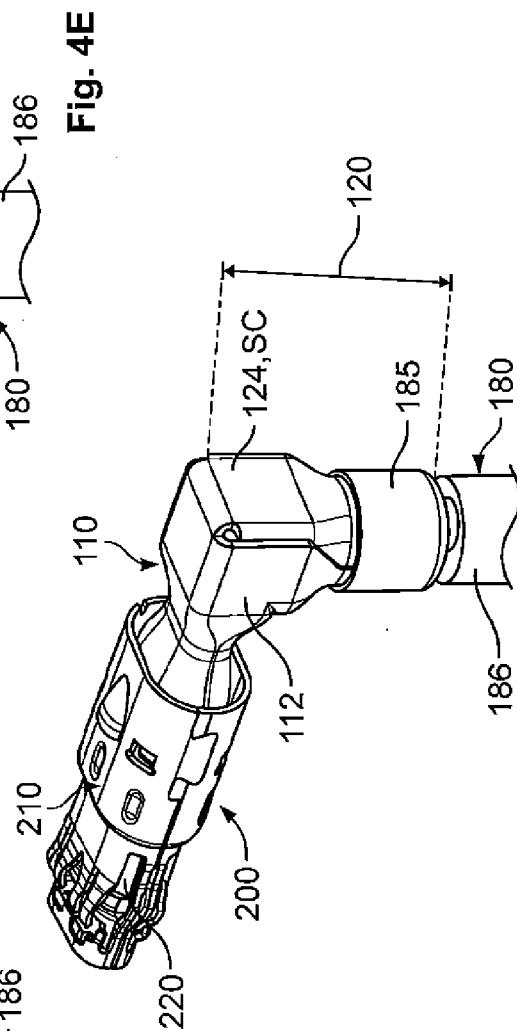
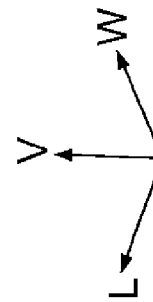


Fig. 4F



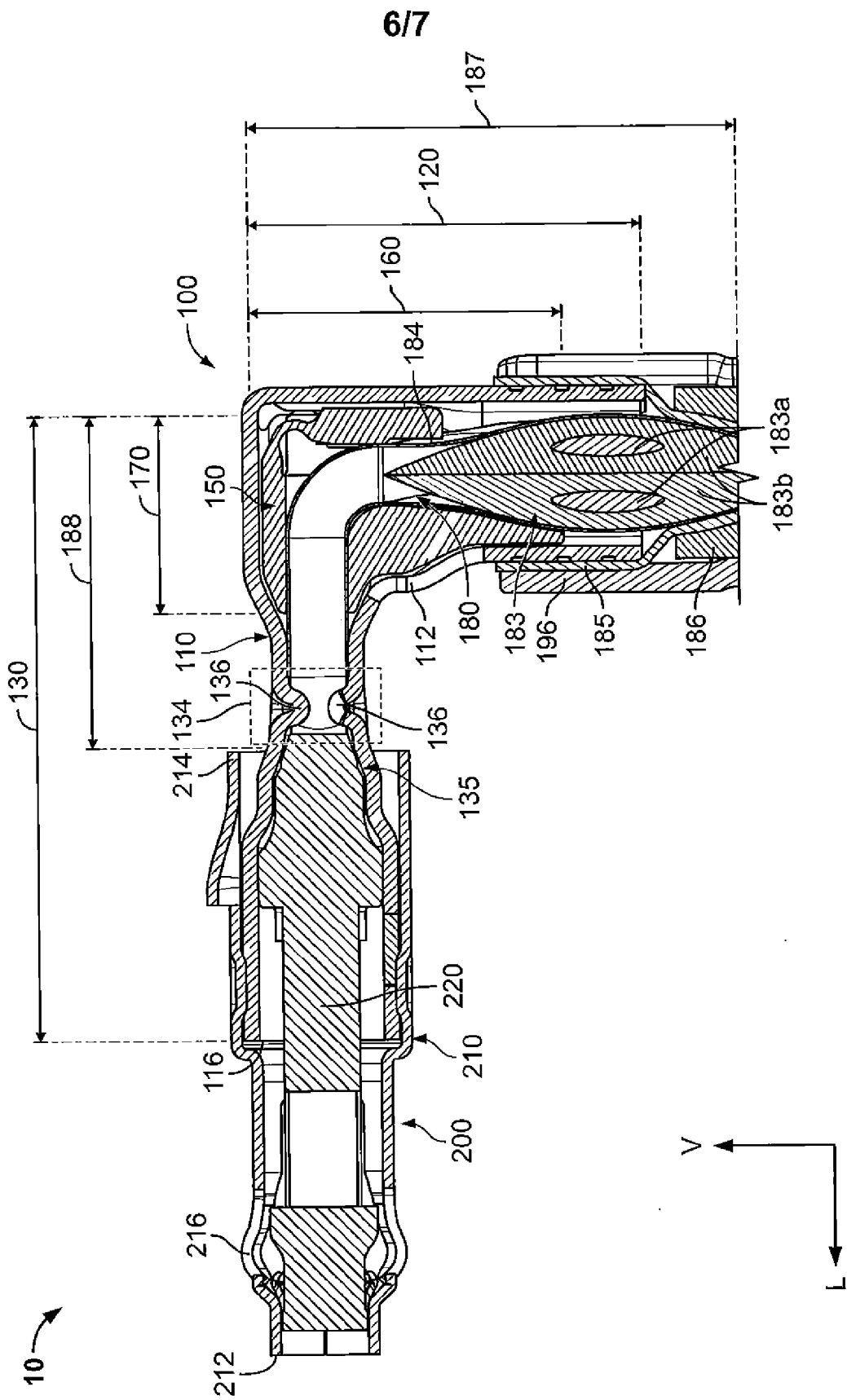


Fig. 5

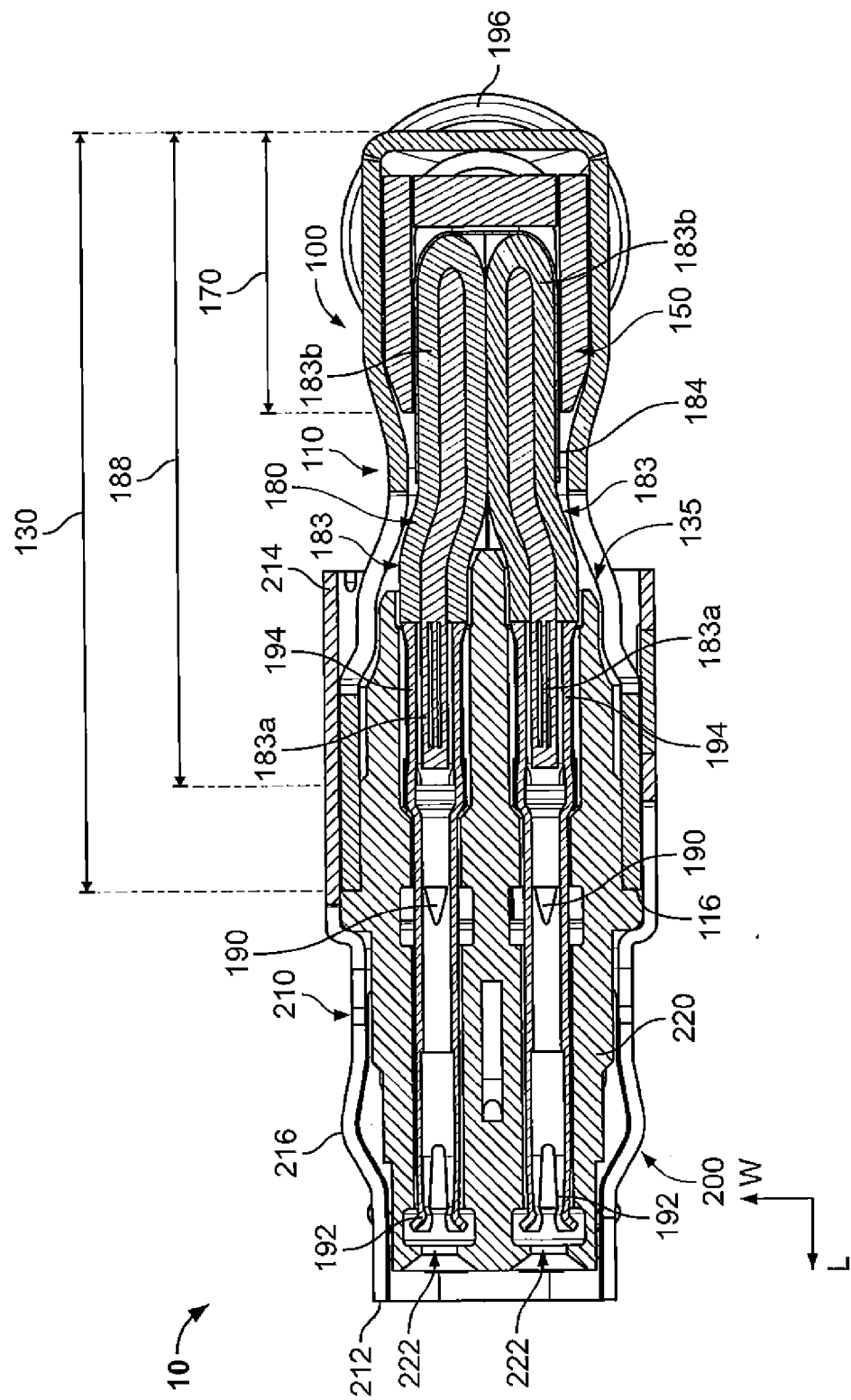


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2023/016986

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R13/6593 H01R13/6591
 ADD. H01R4/20 H01R13/50 H01R9/05

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)

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)

EPO-Internal, WPI Data**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/188119 A1 (OKAMURA TOSHIO [JP] ET AL) 7 August 2008 (2008-08-07)	1, 4-8,
Y	paragraphs [0102], [0103]; figures 3, 4, 5	13, 15
	-----	2, 3, 9,
		10, 14
X	US 2009/068891 A1 (OSENBERG HOLGER [DE]) 12 March 2009 (2009-03-12)	1, 11-13
	figures 1, 4-7	

Y	WO 2015/164090 A2 (TYCO ELECTRONICS CORP [US]) 29 October 2015 (2015-10-29)	9, 10
	paragraph [0033]; figures 4, 5	

Y	US 2018/375233 A1 (MORELLO JOHN R [US] ET AL) 27 December 2018 (2018-12-27)	2, 3, 14
	paragraph [0028]; figure 11	

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Further documents are listed in the continuation of Box C.



See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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Date of the actual completion of the international search

16 June 2023

Date of mailing of the international search report

27/06/2023

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2023/016986

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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A	US 4 173 386 A (KAUFFMAN ROGER S [US] ET AL) 6 November 1979 (1979-11-06) figures 1-5 -----	1-15
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2023/016986

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