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(54) **An attachment device for mounting a connector to a panel**

(57) A connector (100) having an attachment device (102) for mounting the connector to a panel is disclosed. The connector comprises first and second connecting parts (104, 106) for connecting to respective coaxial cables, a connector body (108) to engage an aperture of a panel and to abut the panel on a first side thereof, and a clamping ring (112) adapted to be mounted to the body member on a second side of the panel. Protrusions provided on the clamping ring (112) are adapted to engage slots (118) on the connector body, and the clamping ring is rotatable relative to the connector body between a first position in which the clamping ring can be removed from the connector body, and a second position in which the protrusions engage abutments (130) in the slots to resist removal of the clamping ring from the connector body. A spring (110) urges the protrusions into engagement with the abutments.

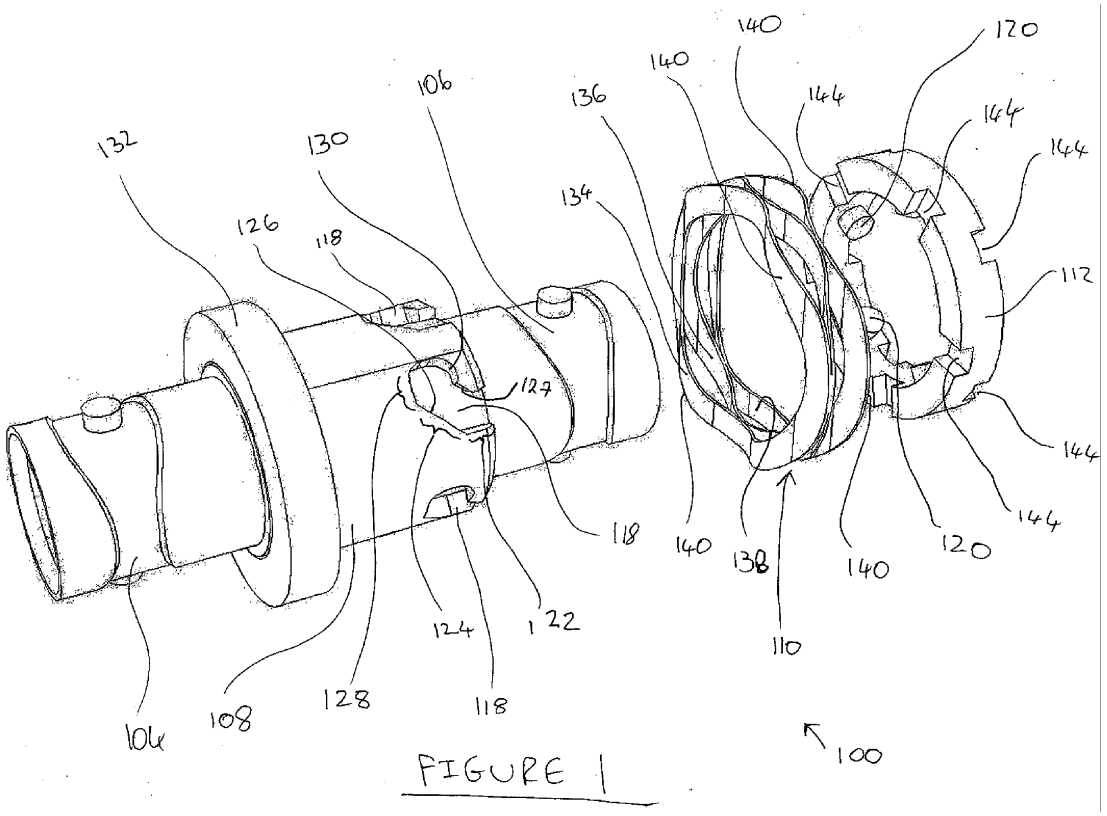

FIGURE 1

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Description

[0001] The present invention relates to an attachment device for mounting a connector to a panel, and relates particularly, but not exclusively, to an attachment device for enabling a connector to be connected to a first signal transmitting cable on a first side of a panel and to a second signal transmitting cable on a second side of a panel.

[0002] It is known to mount cable connectors to panels by means of a threaded body having a flange which abuts one side of the panel and a threaded nut which is mounted to the threaded body on a second side of the panel to clamp the panel between the nut and the flange.

[0003] This type of connector suffers from the drawbacks that it is relatively difficult to correctly engage the threaded nut and threaded body, which can become damaged and thereby make mounting of the connector to the panel difficult or even impossible, and that the threaded connector can work loose, especially in situations such as use of outside broadcast equipment where the panel and connector may be subject to significant vibration.

[0004] Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

[0005] According to the present invention there is provided an attachment device for mounting a connector to a panel to enable the connector to be connected to a first signal transmitting cable on a first side of the panel and to a second signal transmitting cable on a second side of the panel, the attachment device comprising:

(i) a body member adapted to engage an aperture of a panel and to abut the panel on a first side thereof;
(ii) a locking member adapted to be mounted to the body member on a second side of the panel, wherein protrusions provided on one of the body member and the locking member are adapted to engage slots on the other of the body member and the locking member, and said locking member is rotatable relative to the body member between a first position in which the locking member can be removed from the body member, and a second position in which the protrusions engage abutments in the slots to resist removal of the locking member from the body member; and
(iii) biasing means for urging the protrusions into engagement with the abutments.

[0006] Because the locking member can be rotated between two positions relative to the body member to fixably attach and subsequently un-attach the body member and locking member from each other, this provides the advantages of allowing quick and convenient attachment of the attachment device to a panel, while avoiding the use of screw threads which may become damaged. Also, by providing a locking member rotatable between a locked position and a released position, this provides the advantage that a tool providing a high turning moment can be used to rotate the locking member, which in turn enables a biasing means having a stronger biasing force to be used. This enables the attachment device to be more securely mounted to a panel.

[0007] At least one slot may comprise at least one cam surface.

[0008] This provides the advantage of increasing the ease with which the body member and locking member can be engaged or released from each other by guiding the movement of the protrusions.

[0009] The biasing means may comprise at least one annular strip having a plurality of bend portions.

[0010] The biasing means may be adapted to apply a force substantially evenly over at least one first surface of the locking member.

[0011] At least one said first surface may be annular.

[0012] The protrusions or slots on the locking member may be closer to one side of the locking member than the other.

[0013] This provides the advantage of allowing the attachment device to be attached to panels of different thicknesses. For example, by using biasing means of suitable spring force, the attachment device can be used on a range of panel thicknesses, with the locking member used in one orientation for part of the range, and the other orientation for the rest of the range.

[0014] The attachment device may further comprise engagement means on an end face of said locking member for engagement by a tool to enable rotation of said locking member relative to the body member.

[0015] The attachment device may further comprise a plurality of said locking members, wherein a distance between the slots or protrusions and the engagement means of a first said locking member is different from the corresponding said distance of a second said locking member.

[0016] The body member may further comprise connecting means for mounting to at least one cable.

[0017] The connecting means may be adapted to transmit electronic and/or optical signals.

[0018] A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a cable connector embodying the present invention;

Figure 2 is a perspective view of cable connecting parts being attached to the connector body of the cable connector of Figure 1;

Figure 3 is a perspective view of the attachment device of the cable connector in Figure 1; and

Figure 4 is a perspective view of the cable connector of Figure 1 being attached to a panel.

[0019] A cable connector 100 of the present invention has an attachment device 102 and first and second cable connecting parts 104, 106 for connection to respective co-axial cables (not shown). The attachment device 102 includes a connector body 108, an annular compression spring 110 and a clamping ring 112. As shown in Figure 2, the first and second connecting parts 104, 106 are connected by a connector part 114 so that signals from a first co-axial cable connected to first connector part 104 can be directly transmitted to a second co-axial cable connected to second connector part 106 while the connector 100 is mounted to a panel 116 (Figure 4).

[0020] Referring in detail to Figure 1, the connector body 108 is provided with a plurality of slots 118 in its outer surface for engaging respective protrusions 120 protruding radially inwardly on clamping ring 112. Each of the slots 118 has a respective axially extending first portion 122, a second portion 124 extending at an angle to the first portion 122 and forming a cam surface 126 for engagement with a respective protrusion 120 on the clamping ring 112, and a third portion 128 having a respective abutment 130. The protrusions 120 are located behind these abutments 130 so that the force of the spring 110 on clamping ring 112 may be acted against which prevents removal of the protrusions 120 from the third portions 128 of the slots 118. This retains the clamping ring 112 in position on the connector body 108 to clamp the panel 116 between a flange 132 on the connector body 108 and the annular compression spring 110.

[0021] The protrusions 120 on the clamping ring 112 are located nearer to one axial face of the clamping ring 112 than to the other. This enables the connector 100 to be used with a range of panel thicknesses by reversing the orientation of the clamping ring 112 on the connector body 108, such that the connector is used for part of range the with the clamping ring 112 in one orientation and for the rest of the range with the clamping ring 112 in the other orientation. Alternatively, two separate clamping rings could be provided, the clamping rings having different distances between the protrusions 120 and recesses 144.

[0022] The spring 110 consists of a plurality of undulating rings 134, 136, 138 of suitable metallic or plastics material (three are shown in the Figures, but two or more may be used) in which peaks 140 of one ring are circumferentially offset from peaks 140 of the adjacent ring. This construction causes distribution of an axial compression force on the spring 110 throughout the entire ring, as a result of which a relatively uniform compression force is distributed over as wide an area of the end faces of the spring 110 as possible, and over a relatively wide range of axial compressions.

[0023] Referring to Figure 4, in order to mount the connector 100 to a panel 116, the connector body 108 with the first 104 and second 106 connector portions is inserted into an aperture 142 in the panel 116 until the flange 132 on the connector body 108 abuts a first side of the panel 116. The compression spring 110 is then placed over the portion of the connector body 108 protruding from a second side of the panel 116, and the clamping 112 ring placed over the compression spring 110. The clamping ring 112 is then urged by means of a tool (not shown), engaging recesses 144 on the exposed axial end face of the clamping ring 112 so that the protrusions 120 of the clamping ring 112 are urged against the spring force of the spring 110, along the first 122 and second 124 portions of the slots 118. When the protrusions 120 of the clamping ring 112 reach the second portions 124 of the slots 118, the clamping ring 112 can be rotated relative to the connector body 108 by means of a suitable tool (not shown) having, for example, a sufficiently long handle to provide a mechanical advantage in rotating the clamping ring 112. This enables a spring of stronger spring force to be used. By doing so the protrusions 120 engage either the cam surfaces 126, or cam surfaces 127 opposite the cam surfaces 126, of the second portions 124 of the slots 118. As a result, rotation of the clamping ring 112 relative to the connector body 108 causes the protrusions 120 to move along the slots 118 until they reach the third portions 128 of the slots 118 where they are urged by the spring 110 into position behind the abutments 130. Engagement of the protrusions 120 with the abutments 130 resists removal of the clamping ring 112 from the connector body 108 and allows a panel 116 to be tightly clamped between the flange 132 on the connector body 108 and the compression spring 110. Co-axial cables can then be connected to the first 104 and second 106 connector portions.

[0024] The connector 100 can be conveniently removed from the panel 116 by reversing the process, i.e. by engagement of the recesses 144 in the end face of the clamping ring 112 by means of the tool (not shown). The protrusions 120 are then urged against the compression force of the spring 110 into engagement with the second portions 124 of the slots 118, as a result of which the protrusions 120 on the clamping ring 112 are urged by the compression force of the spring 110 along the cam surfaces 126 into engagement with the first portions 122 of the slots 118. This enables the clamping ring 112 and compression spring 110 to be removed from the connector body 108, and the connector body 108 to be removed from the aperture 142 in the panel 116.

[0025] It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only, and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

Claims

1. An attachment device for mounting a connector to a panel to enable the connector to be connected to a first signal transmitting cable on a first side of the

panel and to a second signal transmitting cable on a second side of the panel, the attachment device comprising:

(i) a body member adapted to engage an aperture of a panel and to abut the panel on a first side thereof;
(ii) a locking member adapted to be mounted to the body member on a second side of the panel, wherein protrusions provided on one of the body member and the locking member are adapted to engage slots on the other of the body member and the locking member, and said locking member is rotatable relative to the body member between a first position in which the locking member can be removed from the body member, and a second position in which the protrusions engage abutments in the slots to resist removal of the locking member from the body member; and
(iii) biasing means for urging the protrusions into engagement with the abutments.

2. An attachment device according to claim 1, wherein at least one said slot comprises at least one cam surface.

3. An attachment device according to any one of the preceding claims, wherein said biasing means comprises at least one annular strip having a plurality of bend portions.

4. An attachment device according to any one of the preceding claims, wherein said biasing means is adapted to apply a force substantially evenly over at least one first surface of said locking member.

5. An attachment device according to claim 4, wherein at least one said first surface is annular.

6. An attachment device according to any one of the preceding claims, wherein the protrusions or slots on said locking member are closer to one side of said locking member than the other.

7. An attachment device according to any one of the preceding claims, further comprising engagement means on an end face of said locking member for engagement by a tool to enable rotation of said locking member relative to the body member.

8. An attachment device according to claim 7, further comprising a plurality of said locking members, wherein a distance between the slots or protrusions and the engagement means of a first said locking member is different from the corresponding said distance of a second said locking member.

9. An attachment device according to any one of the preceding claims, wherein said body member further comprises connecting means for mounting to at least one cable.

10. An attachment device according to claim 9, wherein said connecting means is adapted to transmit electronic and/or optical signals.

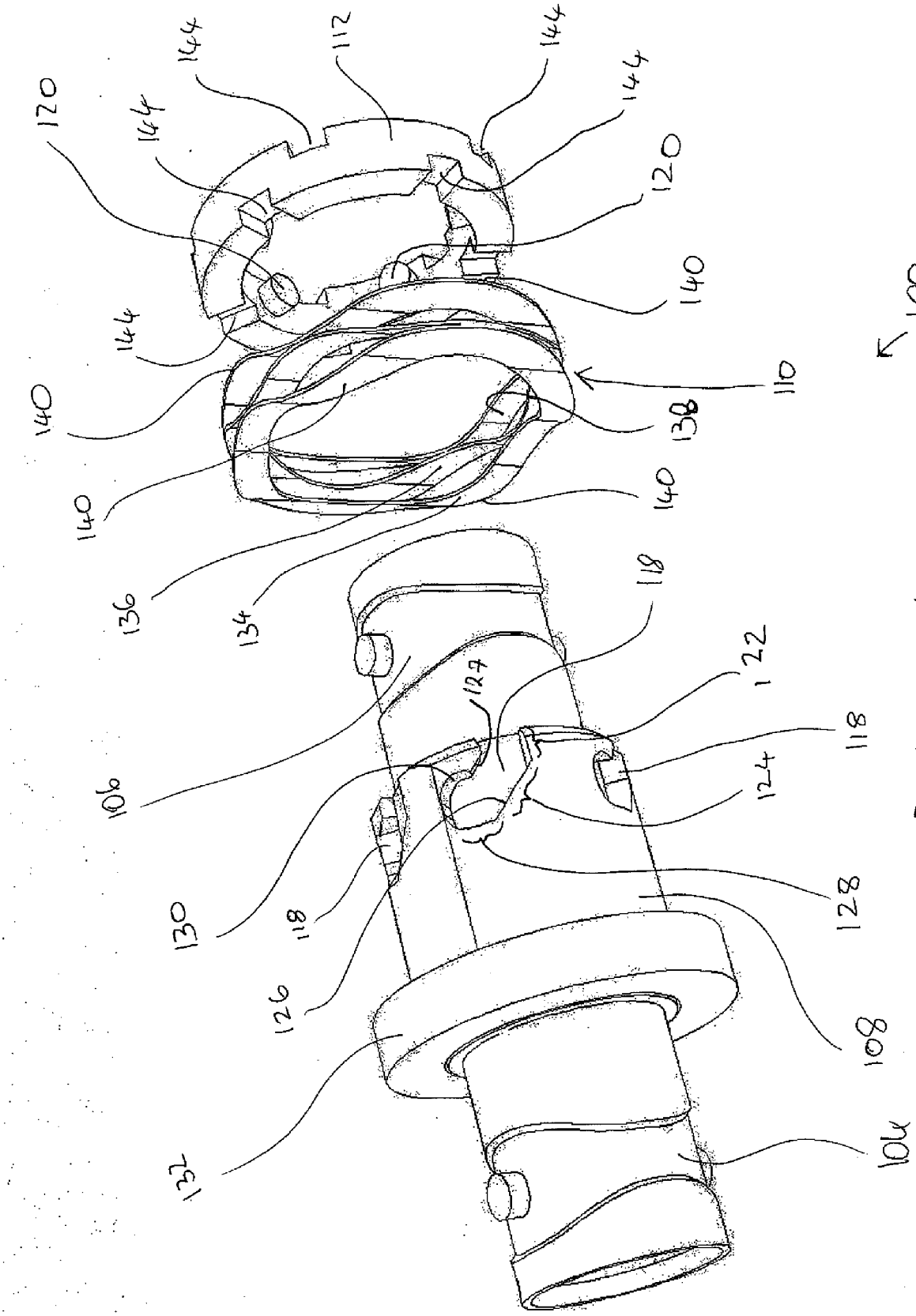
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FIGURE 1

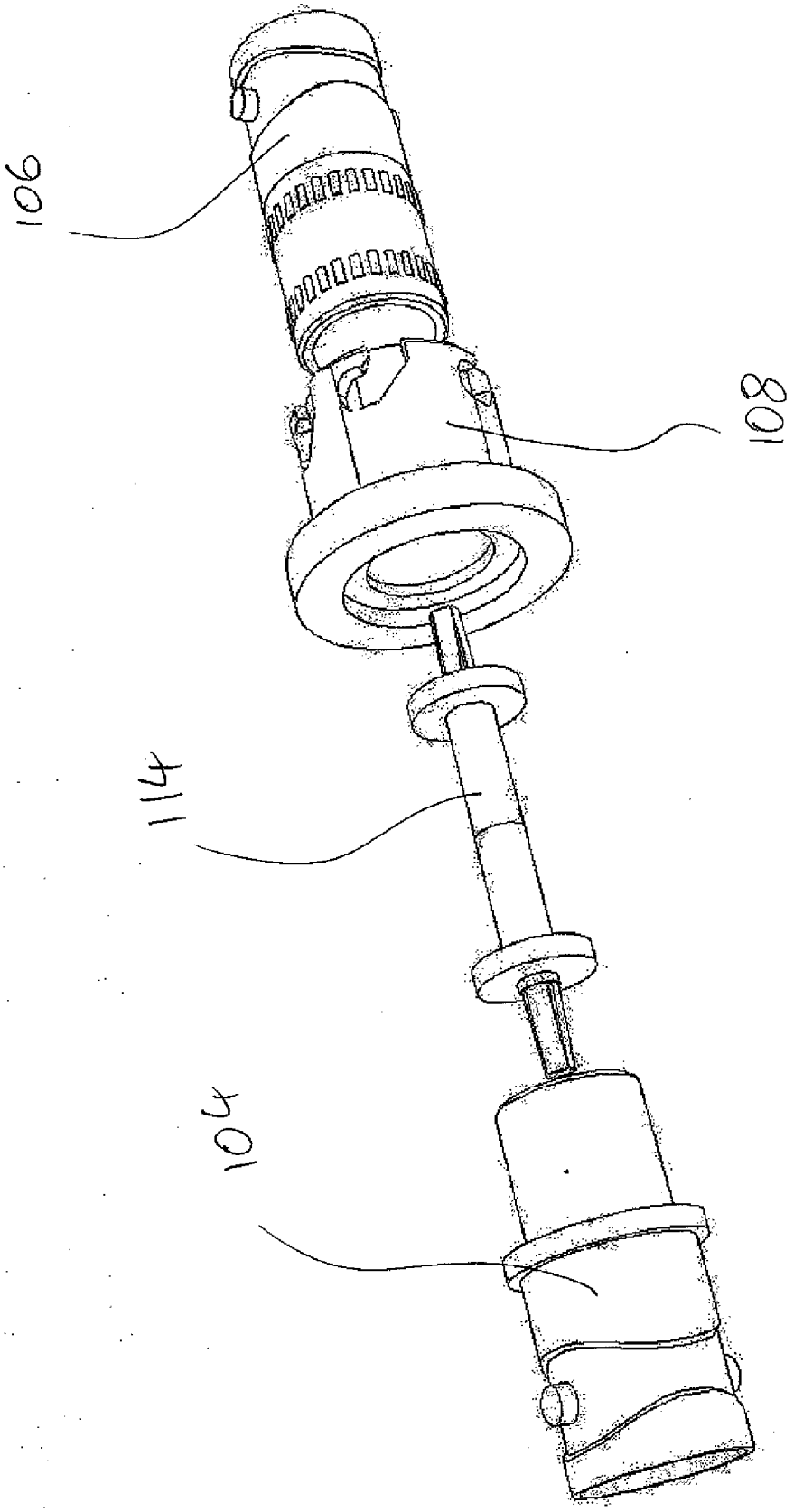

FIGURE 2

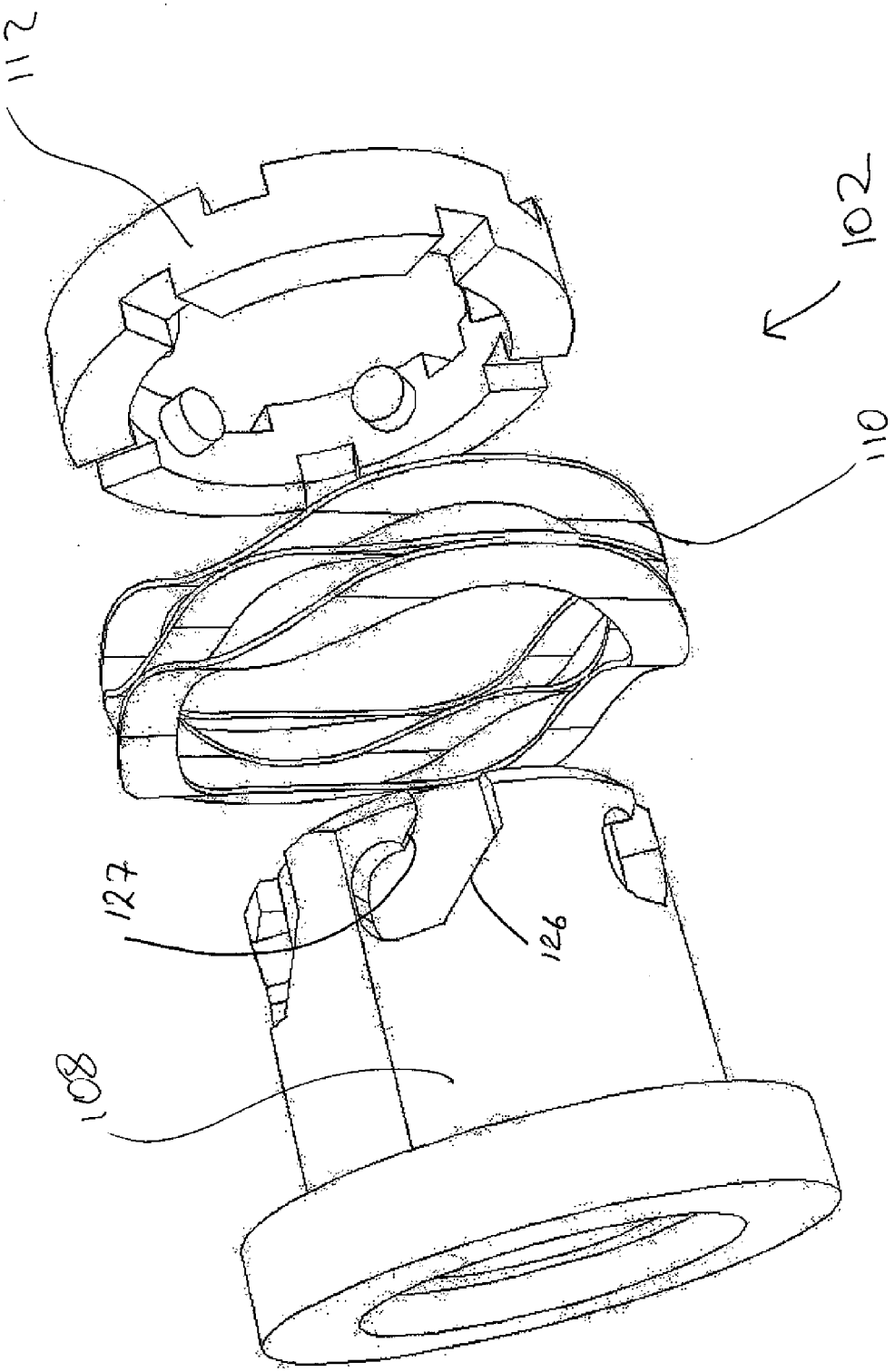

FIGURE 3

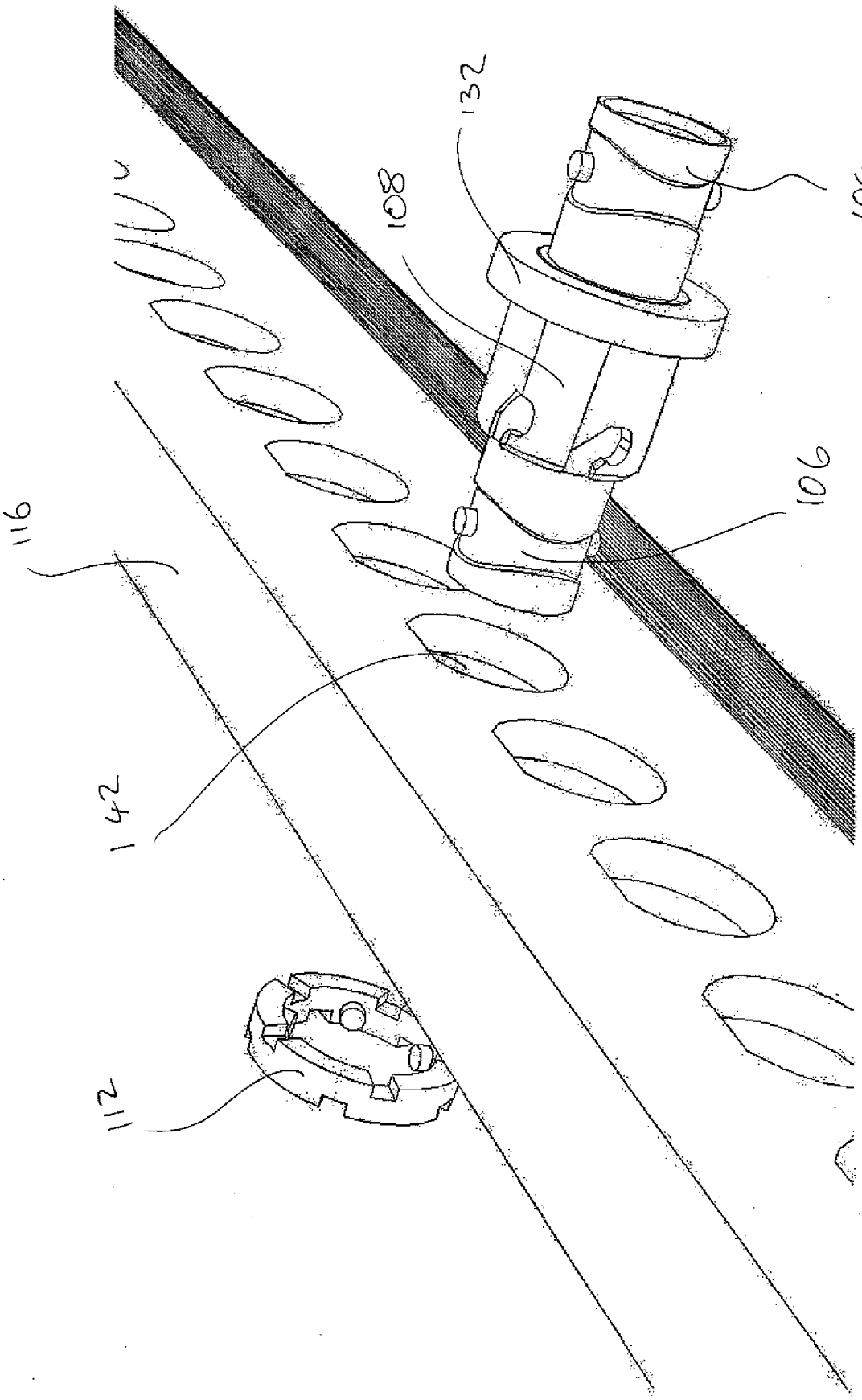

FIGURE 4

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EUROPEAN SEARCH REPORT

Application Number
EP 09 17 9754

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 982 814 A2 (ITT MFG ENTERPRISES INC [US]) 1 March 2000 (2000-03-01) * paragraph [0008] - paragraph [0031]; figures 1,2 *	1-10	INV. H01R13/74
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A	* column 2, line 8 - line 65; figures 1-5 *	4-10	
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A	US 7 455 542 B2 (NORWOOD JOE D [US] ET AL) 25 November 2008 (2008-11-25) * figures 1-9 *	1-10	
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H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 June 2010	Durand, François

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82