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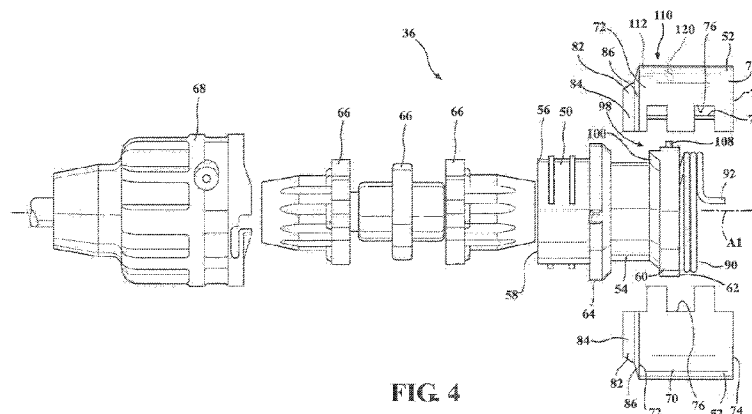
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(54) **Title:** MOTION TRANSMITTING REMOTE CONTROL ASSEMBLY FOR COUPLING WITH A BRACKET OF A VEHICLE

**FIG. 4**

(57) **Abstract:** A motion transmitting remote control assembly (36) including a body (50) extending longitudinally along an axis (A1) and has a first portion (54) and a second portion (56) extending from the first portion with the first portion of the body presenting a first engagement element (98). The motion transmitting remote control assembly includes a collar (52) at least partially disposed about the first portion of the body and presenting a second engagement element (110) for selectively engaging the first engagement element. The collar has a spaced position in which the engagement elements are radially spaced from each other about the axis with the collar being axially movable along the axis when in the spaced position. The collar rotatable about the axis to an aligned position in which the engagement elements are axially aligned with each other along the axis to resist axial movement of the collar along the axis away from the second portion of the body.

MOTION TRANSMITTING REMOTE CONTROL ASSEMBLY FOR COUPLING WITH A BRACKET OF A VEHICLE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The subject patent application claims priority to and all the benefits of U.S. Provisional Patent Application No. 61/835,020, which was filed on June 14, 2013 with the United States Patent and Trademark Office.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention generally relates to a motion transmitting remote control assembly mountable to a bracket of a vehicle. In particular, the subject invention includes a motion transmitting remote control assembly with a body and a collar movable along and about the body.

2. Description of Related Art

[0003] A motion transmitting remote control assembly is used in a vehicle for transmitting motion along the vehicle. For example, the motion transmitting remote control assembly can be used to transmit motion of a gear shifter to a transmission for changing between a plurality of gears. The motion transmitting remote control assembly includes a body mountable to a bracket of the vehicle. The bracket defines a cavity with the body disposable in the cavity. One of the bracket and the motion transmitting remote control assembly includes engagement elements to secure the body of the motion transmitting remote control assembly to the bracket of the vehicle.

[0004] Although motion transmitting remote control assemblies are used in many vehicles, design constraints in a vehicular setting are restrictive and limit the open area around the bracket for installing the motion transmitting remote control assembly. The limited open area in the vehicle can create difficulties for an operator to operate the engagement elements of the motion transmitting remote control assembly during installation into the bracket. For example, the operator may only be able to use one hand during installation. The limited open area in the vehicle can also prevent the operator from visually observing the movement of the engagement elements of the motion transmitting remote control assembly and the installation of the motion transmitting remote control assembly into the bracket to ensure the motion transmitting remote control assembly is properly seated in the bracket. Therefore, there remains an opportunity for an improved motion transmitting remote control assembly.

SUMMARY OF THE INVENTION AND ADVANTAGES

[0005] The subject invention includes a motion transmitting remote control assembly for coupling with a bracket of a vehicle. The motion transmitting remote control assembly includes a body extending longitudinally along an axis and has a first portion and a second portion extending from the first portion with the first portion of the body presenting a first engagement element. The motion transmitting remote control assembly includes a collar at least partially disposed about the first portion of the body and presenting a second engagement element for selectively engaging the first engagement element. The collar has a spaced position in which the engagement elements are radially spaced from each other about the axis with the collar being axially movable along the axis when in the spaced position. The collar is rotatable about the axis to an aligned position in which the engagement elements are axially aligned with each other along the axis to resist axial movement of the collar along the axis away from the second portion of the body for securing the motion transmitting remote control assembly to the bracket of the vehicle.

[0006] Advantageously, since the engagement elements are incorporated into the body and the collar, the overall size of the motion transmitting remote control assembly is reduced. In other words, the incorporation of the engagement elements into the body and the collar provides a relatively compact design. Further, when the motion transmitting remote control assembly is disposed in the bracket, the collar requires minimal rotation to align the engagement elements to secure the collar against the bracket and anchor the motion transmitting remote control assembly in the bracket.

[0007] A cable coupling system including the motion transmitting remote control assembly is disclosed. A method of coupling the motion transmitting remote control assembly to the bracket of the vehicle is also disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Other advantages of the present invention will be readily appreciated, as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings.

[0009] Figure 1 is a perspective view of a first embodiment and a second embodiment of a motion transmitting remote control assembly coupled to a shifter assembly of a vehicle.

[0010] Figure 2A is a perspective view of the first embodiment of the motion transmitting remote control assembly coupled to a bracket of the vehicle

[0011] Figure 2B is a perspective view of the bracket the vehicle.

[0012] Figure 2C is an elevational view of the bracket the vehicle.

[0013] Figure 3 is perspective view of the first embodiment of the motion transmitting remote control assembly.

[0014] Figure 4 is an exploded assembly view of the first embodiment of the motion transmitting remote control assembly.

[0015] Figure 5A is a plan view of a first portion of a body of the first embodiment of the motion transmitting remote control assembly with a first boss and a second boss radially spaced from each other and a collar shown in a spaced position in phantom.

[0016] Figure 5B is a plan view of a first portion of a body of an alternative of the first embodiment of the motion transmitting remote control assembly with a protrusion shown in a pre-installed position and a collar shown in a spaced position in phantom.

[0017] Figure 6 is a top view of the first portion of the body with a first boss and a second boss axially aligned with each other along an axis.

[0018] Figure 7 is a perspective view of the first portion of the body with a portion of a collar shown in cross-section.

[0019] Figure 8 is a side view of the first embodiment of the motion transmitting remote control assembly and the bracket aligned for insertion with the collar in the spaced position.

[0020] Figure 9 is another side view of the first embodiment of the motion transmitting remote control assembly partially disposed in the bracket with the collar in the spaced position.

[0021] Figure 10 is a side view of the first embodiment of the motion transmitting remote control assembly with the collar moved along the axis and about the axis away from the bracket.

[0022] Figure 11 is a side view of the first portion of the body with the protrusion shown in a first intermediate position and the collar shown in phantom.

[0023] Figure 12 is a side view of the first embodiment of the motion transmitting remote control assembly with the collar moved along the axis and about the axis towards the bracket.

[0024] Figure 13 is a side view of the first portion of the body with the protrusion shown in a second intermediate position and the collar shown in phantom.

[0025] Figure 14 is a side view of the first embodiment of the motion transmitting remote control assembly with the collar disposed the bracket.

[0026] Figure 15 is a side view of the first portion of the body with the protrusion shown in an installed position and the collar shown in an aligned position in phantom.

[0027] Figure 16 is a top view of the portion of the motion transmitting remote control assembly disposed in the bracket with the protrusion aligned with an aperture.

[0028] Figure 17 is a perspective view of a second embodiment of the motion transmitting remote control assembly disposed in the bracket with the motion transmitting remote control assembly having an arm and a tab extending from the arm.

[0029] Figure 18 is a side view of the second embodiment of the motion transmitting remote control assembly and the bracket aligned for insertion with the collar in the spaced position.

[0030] Figure 19 is a perspective view of a portion of the collar and the first portion of a body of the second embodiment of the motion transmitting remote control assembly with a biasing member hidden.

[0031] Figure 20 is a perspective cross-sectional view of a portion of the arm and a slot of the second embodiment of the motion transmitting remote control assembly.

[0032] Figure 21 is a perspective view of the collar with the slot of the second embodiment of the motion transmitting remote control assembly.

[0033] Figure 22 is another side view of the second embodiment of the motion transmitting remote control assembly partially disposed in the bracket with the collar in the spaced position.

[0034] Figure 23 is a side view of the second embodiment of the motion transmitting remote control assembly with the collar moved along the axis and about the axis away from the bracket.

[0035] Figure 24 is a side view of the second embodiment of the motion transmitting remote control assembly with the collar moved along the axis and about the axis towards the bracket.

[0036] Figure 25 is a side view of the second embodiment of the motion transmitting remote control assembly with the collar disposed the bracket.

[0037] Figure 26 is a view of a third embodiment of the motion transmitting remote control assembly disposed in the bracket with the collar disposed around the second portion of the body.

[0038] Figure 27 is an exploded perspective view of the third embodiment of the motion transmitting remote control assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0039] Referring to the Figures wherein like numerals indicate like or corresponding parts throughout the several views, a cable coupling assembly 30 for installation within a vehicle (not shown) is generally shown in Figure 1. Specifically, the cable coupling assembly 30 is coupled to a shifter assembly 32. The cable coupling assembly 30 includes a bracket 34 capable of being coupled to a vehicle (not shown) and a first embodiment of a motion transmitting remote control assembly 36 coupled to the bracket 34. It is to be appreciated that the motion transmitting remote control assembly 36 may be coupled to any suitable type of bracket 34 between components of a vehicle for transferring motion between the components.

[0040] As shown in Figures 2A, 2B, 2C, and 22, the bracket 34 defines a c-shaped cavity 38 with the motion transmitting remote control assembly 36 disposed in the c-shaped cavity 38 of the bracket 34 for anchoring the motion transmitting remote control assembly 36 to the vehicle. The bracket 34 has a pair of arms 40 spaced from each other with the c-shaped cavity 38 defined

between the pair of arms 40. The pair of arms 40 each have a finger 42 extending towards each other and further defining the c-shaped cavity 38 for engaging the motion transmitting remote control assembly 36 and preventing movement of the motion transmitting remote control assembly 36 transverse to the axis A1. The bracket 34 has a chamfer 44 for guiding the motion transmitting remote control assembly 36 into the c-shaped cavity 38. The chamfer 44 has a chamfer surface 46 with an angled configuration. It is to be appreciated that the c-shaped cavity 38 may be any alternatively suitable configuration such as a L-shaped configuration. It is to be appreciated that the chamfer surface 46 may be any alternatively suitable configuration such as an arcuate configuration.

[0041] As shown in Figure 3, a first embodiment of the motion transmitting remote control assembly 36 includes a conduit 48 and a core element (not shown) movably disposed within the conduit 48. The conduit 48 extends along the vehicle between two components, for example the shifter assembly 32 and a transmission (not shown). The core element is connected to the two components and transfers motion between the two components within the conduit 48.

[0042] As shown in Figure 4, the motion transmitting remote control assembly 36 includes a body 50 extending longitudinally along an axis A1 and a collar 52 at least partially disposed about the body 50. The collar 52 is movable axially along the axis A1 and about the axis A1 from a spaced position to an aligned position. The spaced and aligned positions, as well as the movement of the collar 52, as set forth below.

[0043] The body 50 has a first portion 54 and a second portion 56 extending from the first portion 54. The first and second portions 54, 56 have cylindrical configurations along the axis A1. The body 50 defines a body chamber 58 along the axis A1 through the first and second portions 54, 56. The core element is disposed in the body chamber 58.

[0044] The body 50 includes a shoulder 60 radially extending from the first portion 54 of the body 50. The shoulder 60 is spaced along the axis A1 from the second portion 56 of the body 50. The shoulder 60 has a cylindrical configuration and extends away from the first portion 54 of the body 50 about the axis A1.

[0045] The first portion 54 of the body 50 includes an end 62. Specifically, the end 62 is defined on the first portion 54 of the body 50 and the shoulder 60 of the body 50. The end 62 is transverse to the axis A1 and faces away from the second portion 56 of the body 50. The body chamber 58 of the body 50 extends through the end 62.

[0046] The second portion 56 of the body 50 has a bracket shoulder 64 spaced along the axis A1 from the shoulder 60 of the first portion 54 of the body 50. The bracket shoulder 64 has a cylindrical configuration and extends away from the second portion 56 of the body 50 about the axis A1.

[0047] The motion transmitting remote control assembly 36 includes a plurality of damping components 66 disposed within the body chamber 58 for absorbing vibration of the conduit 48 and core element. The motion transmitting remote control assembly 36 further includes a cover 68 disposed around the damping components 66 and the second portion 56 of the body 50.

[0048] As shown in Figures 3 and 4, the collar 52 is at least partially disposed about the first portion 54 of the body 50. The collar 52 has a cylindrical configuration and extends about the first portion 54 of the body 50 along the axis A1. The collar 52 has a pair of halves 70 which are joined together to present the collar 52 with the cylindrical configuration. Typically, the collar 52 has a first end 72 and a second end 74 spaced from the first end 72 along the axis A1.

[0049] The collar 52 extends beyond the end 62 of the body 50 with a collar chamber 76 defined between the first and second ends 72, 74 of the collar 52. Specifically, the collar 52 has a chamber surface 78 defining the collar chamber 76. The collar 52 has a collar lip 80 extending into the collar chamber 76 toward the axis A1 at the second end 74. The end 62 of the first portion 54 of the body 50 and the shoulder 60 of the body 50 are disposed within the collar chamber 76.

[0050] As shown in Figure 4, the collar 52 includes a flange 82 extending towards the second portion 56 of the body 50 for engaging the bracket 34 when the collar 52 is in the aligned position for anchoring the motion transmitting remote control assembly 36 to the bracket 34. Specifically, the flange 82 engages the chamfer 44 of the bracket 34 during installation of the motion transmitting remote control assembly 36 to move the collar 52 along the axis A1 and the flange 82 engages the fingers 42 of the bracket 34 after installation of the motion transmitting remote control assembly 36 to prevent movement of the motion transmitting remote control assembly 36 transverse to the axis A1. The flange 82 extends from the first end 72 of the collar 52. The flange 82 has a flange surface 84 with an angled configuration corresponding to the angled configuration of the chamfer surface 46 of the chamfer 44.

[0051] The collar 52 moves along the axis A1 as the motion transmitting remote control assembly 36 is coupled to the bracket 34. Specifically, the flange 82 engages the c-shaped cavity 38 of the bracket 34 when the collar 52 is in the aligned position for preventing movement of the motion transmitting remote control assembly 36 in the bracket 34 transverse to the axis A1. The flange surface 84 of the flange 82 abuts and engages the chamfer surface 46 of the bracket 34.

[0052] The collar 52 includes a collar surface 86 spaced from and facing the second portion 56 of the body 50 with a groove 88 defined between the collar surface 86 of the collar 52 and the second portion 56 of the body 50 for receiving the bracket 34. Specifically, the groove 88 is defined between the collar surface 86 of the collar 52 and the bracket shoulder 64 of the body

50. The collar surface 86 is transverse to the axis A1 with the flange 82 of the collar 52 extending into the groove 88 from the collar 52.

[0053] As shown in Figure 4, the motion transmitting remote control assembly 36 may include a biasing member 90 coupled to the collar 52 and the first portion 54 of the body 50 for biasing the collar 52 toward the aligned position. The biasing member 90 is disposed in the collar chamber 76 about the axis A1 between the end 62 of the body 50 and the collar lip 80 of the collar 52. The biasing member 90 has a pair of stems 92. In reference to Figure 18, the shoulder 60 of the body 50 defines a first end aperture 94 extending through the end 62 and the collar lip 80 defines a second end aperture 96. Turning to Figures 3 and 5, one of the pair of stems 92 is disposed in the first end aperture 94 of the shoulder 60 and the other one of the pair of stems 92 is disposed in the second end aperture 96 of the collar lip 80. The body 50 remains static and the biasing member 90 biases the collar 52 to rotate about the axis A1 and the body 50. The biasing member 90 is further defined as a torsion spring coupled to the collar 52 and the first portion 54 of the body 50 for rotatably biasing the collar 52 about the axis A1.

[0054] As shown in Figures 4 and 5A, the first portion 54 of the body 50 presents a first engagement element 98. The first engagement element 98 of the body 50 is further defined as a first boss 100 extending from the first portion 54 of the body 50. The first boss 100 is disposed in the collar chamber 76 of the collar 52 about the axis A1 at a first radius between the axis A1 and the first boss 100. Specifically, the first boss 100 is coupled to and extends from the shoulder 60 towards the second portion 56 of the body 50. The first boss 100 extends from the shoulder 60 along the axis A1 away from the end 62 of the first portion 54 of the body 50 towards the bracket shoulder 64 of the body 50. In reference to Figure 7, in an alternative to the first embodiment of the motion transmitting remote control assembly 36, the first boss 100 may be further defined as a pair of first bosses 100 spaced radially from each other about the axis A1. It is to be appreciated that the first boss 100 can be any number of bosses.

[0055] As shown in figure 4 and 5A, the first boss 100 includes a first contact surface 102 facing the second portion 56 of the body 50. The first contact surface 102 is transverse to the axis A1 and spaced from the shoulder 60. The first boss 100 includes a first ramp 104 extending from the first boss 100. Specifically, the first ramp 104 extends from the first boss 100 and the shoulder 60. The first ramp 104 has a first surface 106 with an angled configuration extending from the shoulder 60 to the first contact surface 102 of the first boss 100. It is to be appreciated that the first surface 106 can have any suitable configuration such as an arcuate configuration.

[0056] The motion transmitting remote control assembly 36 may include a protrusion 108 extending from the first portion 54 of the body 50. The protrusion 108 has a cylindrical configuration and extends transverse to the axis A1. Specifically, the protrusion 108 extends

from the shoulder 60 towards the collar 52 for positioning the protrusion 108 relative to the collar 52. The protrusion 108 extends transverse to the first boss 100. It is to be appreciated that the protrusion 108 can have any suitable configuration such as a cuboid configuration.

[0057] The protrusion 108 is described as moving between a plurality of positions as the collar 52 moves between the spaced and aligned positions. It is to be appreciated that the protrusion 108 and the body 50 remain static and the collar 52 moves relative to the protrusion 108 and the body 50. The plurality of positions describe the position of the protrusion 108 relative to the collar 52 as the collar 52 rotates about the axis A1 and moves axially along the axis A1, as set forth further below.

[0058] As shown in Figures 5A and 6-7, the collar 52 presents a second engagement element 110 for selectively engaging the first engagement element 98. The second engagement element 110 of the collar 52 is further defined as a second boss 112 extending from the collar 52 towards the first portion 54 of the body 50 with the second boss 112 selectively engaging the first boss 100 for preventing axial movement of the collar 52 away from the second portion 56 of the body 50. The second boss 112 extends from the collar 52 into the collar chamber 76 transverse to the axis A1. The second boss 112 is spaced from the axis A1 at a second radius and rotates about the axis A1 at the second radius as the collar 52 rotates about the axis A1. Specifically, the second boss 112 rotates away from and towards the first boss 100 about the axis A1 at the second radius. In reference to Figure 7, in an alternative to the first embodiment of the motion transmitting remote control assembly 36, the second boss 112 may be further defined as a pair of second bosses 112 spaced radially from each other about the axis A1. It is to be appreciated that the second boss 112 can be any number of bosses.

[0059] As shown in Figure 4 and 5A, the second boss 112 includes a second contact surface 114 facing the first contact surface 102 of the first boss 100 when the collar 52 is in the aligned position with the first and second contact surfaces 102, 112 engaging each other for preventing the collar 52 from moving along the axis A1 away from the second portion 56 of the body 50 when the collar 52 is in the aligned position. The second contact surface 114 is transverse to the axis A1 and the chamber surface 78. The second radius is spaced from the axis A1 such that the second contact surface 114 overlaps the first contact surface 102 as the second boss 112 rotates about the axis A1 and aligns axially along the axis A1 with the first boss 100.

[0060] The second boss 112 includes a second ramp 116 extending from the second boss 112 with the first and second ramps 104, 116 configured to guide the first and second bosses 100, 112 into axial alignment as the collar 52 rotates to the aligned position. The second ramp 116 extends from the second boss 112 and the collar 52. The second ramp 116 has a second surface 118 with an angled configuration inversely corresponding to the angled configuration of the first

surface 106. The angled configuration of the second surface 118 of the second ramp 116 extends from the collar 52 to the second contact surface 114 of the second boss 112. It is to be appreciated that the second surface 118 can have any suitable configuration such as an arcuate configuration.

[0061] The engagement elements 98, 110 are radially spaced from each other about the axis A1 with the collar 52 being axially movable along the axis A1 when in the spaced position. Specifically, the second boss 112 is positioned about the axis A1 at the second radius such that the first and second contact surfaces 102, 114 are spaced from each other allowing the collar 52 to move along the axis A1 away from the bracket 34.

[0062] The collar 52 is rotatable about the axis A1 to the aligned position in which the engagement elements 98, 110 are axially aligned with each other along the axis A1 to resist axial movement of the collar 52 along the axis A1 away from the second portion 56 of the body 50 for securing the motion transmitting remote control assembly 36 to the bracket 34 of the vehicle. The second boss 112 is rotated about the axis A1 at the second radius such that the first and second bosses 100, 112 overlap with the first boss 100 spaced from the axis A1 at the first radius. Specifically, the first and second contact surfaces 102, 114 abut preventing axial movement of the collar 52 along the axis A1 away from the bracket 34.

[0063] In reference to Figure 5A and , the collar 52 may define a channel 120 with the protrusion 108 disposed in the channel 120 and movable within the channel 120 for guiding the collar 52 between the spaced and aligned positions. The protrusion 108 has a pre-installed position which corresponds to the spaced position of the collar 52 and an installed position corresponding to the aligned position of the collar 52. The protrusion 108 engages the collar 52 within the channel 120 when in the installed position to prevent axial movement of the collar 52 away from the second portion 56 of the body 50. The channel 120 is defined in the chamber surface 78 in communication with the collar chamber 76 facing the first portion 54 of the body 50. The plurality of positions describing the position of the protrusion 108 relative to the collar 52 more specifically describes the position of the protrusion 108 in the channel 120.

[0064] The channel 120 presents a first pathway 122. The collar 52 defines the first pathway 122 having a first axis A2 with the first pathway 122 in communication with the collar chamber 76. The first axis A2 may be transverse to the axis A1. The protrusion 108 is disposed in the first pathway 122 in the pre-installed position when the collar 52 is in the spaced position.

[0065] The channel 120 presents a second pathway 124 extending transverse to and in communication with the first pathway 122. The collar 52 defines the second pathway 124 having a second axis A3 transverse to the axis A1 with the second pathway 124 in communication with the collar chamber 76. The first and second pathways 122, 124 have a

substantially v-shaped configuration.

[0066] The protrusion 108 is disposed in the first pathway 122 in the pre-installed position and moves along the first pathway 122 to a first intermediate position at an intersection 126 of the first and second pathways 122, 124 as the collar 52 moves axially along said axis A1 away from the second portion 56 of said body 50. The protrusion 108 is disposed in the channel 120 at the intersection 126 in the first intermediate position when the collar 52 is between the spaced and aligned positions.

[0067] The channel 120 further presents a third pathway 128 extending transverse to and in communication the second pathway 124. The collar 52 defines the third pathway 128 having a third axis A4 transverse to the axis A1 with the third pathway 128 in communication with the collar chamber 76. The second and third pathways 124, 128 intersect each other at a second intersection 130.

[0068] The protrusion 108 moves along the second pathway 124 from the first intermediate position to a second intermediate position as the collar 52 rotates about the axis A1 and also moves axially along the axis A1. The protrusion 108 is disposed in the channel 120 at the second intersection 130 in the second intermediate position when the collar 52 is between the spaced and aligned positions.

[0069] The protrusion 108 is movable from the second intermediate position along the third pathway 128 to the installed position as the collar 52 rotates about the axis A1 to the aligned position. The protrusion 108 is disposed in the third pathway 128 in the installed position when the collar 52 is in the aligned position.

[0070] As shown in Figure 5B, in an alternative to the first embodiment of the motion transmitting remote control assembly 36, it is to be contemplated that the protrusion 108 and the channel 120 can act as the engagement elements 98, 110 in place of the first and second bosses 100, 112. Said differently, the first engagement element 98 of the body 50 maybe further defined as the protrusion 108 extending from the first portion 54 of the body 50. The second engagement element 110 of the collar 52 maybe further defined as the channel 120 with the protrusion 108 disposed in the channel 120 and movable within the channel 120 for guiding the collar 52 between the spaced and aligned positions.

[0071] The collar 52 has a second wall 140 partially defining the third pathway 128. The second wall 140 is transverse to the axis A1 and extends along the third axis A4 from the second pathway 124 towards the second end 74 of the collar 52. The second engagement element 110 may be further defined as the third pathway 128 of the channel 120. Specifically, the second wall 140 extending along the third pathway 128 is the second engagement element 110.

[0072] The collar 52 includes a lip 132 extending into the channel 120. The lip 132 extends into

the channel 120 between the first and second pathways 122, 124. The lip 132 has a lip surface 134 facing the first pathway 122 and has a cylindrical configuration corresponding to the cylindrical configuration of the protrusion 108. The protrusion 108 abuts the lip 132 for retaining the collar 52 in the spaced position when the protrusion 108 is in the pre-installed position. The protrusion 108 moves along the channel 52 to clear the lip 132 as the collar 52 moves away from the second portion 56 of the body 50. Specifically, the protrusion 108 moves along the lip surface 134 to clear the lip 132 as the collar 52 moves axially away from the second portion 56 of the body 50. It is to be appreciated that the lip surface 134 can have any suitable configuration such as a cuboid configuration.

[0073] As shown in Figure 16, the collar 52 defines an aperture 136 in communication with the channel 120. The collar 52 defines the aperture 136 with a stadium configuration in communication with the collar chamber 76. The protrusion 108 aligns with the aperture 136 when the collar 52 is in one of the spaced and aligned positions for confirming the collar 52 has moved between the spaced and aligned positions. Specifically, the protrusion 108 aligns with the aperture 136 when the collar 52 is in the aligned position for confirming the collar 52 has moved from the spaced position to the aligned position and the protrusion 108 is in the installed position. It is to be appreciated that the aperture 136 can have any suitable configuration such as a cylindrical configuration.

[0074] Prior to installation of the motion transmitting remote control assembly 36 into the vehicle, the collar 52 is in the spaced position with the engagement elements 98, 110 radially spaced from each other. In reference to Figure 5A, the collar 52 is in the spaced position with the first and second bosses 100, 112 radially spaced from each other about the axis A1.

[0075] If the protrusion 108 and the channel 120 are present, the protrusion 108 is disposed in the first pathway 122 in the pre-installed position. The protrusion 108 abuts the lip surface 134 of the lip 132 with the arcuate configuration of the lip surface 134 engaging the corresponding cylindrical configuration of the protrusion 108 to retain the collar 52 in the spaced position for installation of the motion transmitting remote control assembly 36 into the vehicle.

[0076] As shown in Figures 8 and 9, the motion transmitting remote control assembly 36 is aligned with the bracket 34 for installation. Specifically, the groove 88 of the motion transmitting remote control assembly 36 is aligned with the bracket 34. The first portion 54 of the body 50 is aligned with the c-shaped cavity 38 of the bracket 34 between the fingers 42 of the pair of arms 40. As shown in Figure 10, the motion transmitting remote control assembly 36 is partially disposed in the c-shaped cavity 38 of the bracket 34. The first portion 54 of the body 50 is partially disposed between the fingers 42 of the pair of arms 40 of the bracket 34.

[0077] As the motion transmitting remote control assembly 36 is inserted into the c-shaped

cavity 38 of the bracket 34, the collar 52 is forced to move axially away from the second portion 56 of the body 50 along the axis A1. The flange 82 engages the chamfer 44 of the bracket 34. Specifically, the flange surface 84 of the flange 82 slidably abuts the chamfer surface 46 of the chamfer 44. The corresponding angled configurations of the chamfer surface 46 and flange surface 84 moves the collar 52 along the axis A1 away from the second portion 56 of the body 50 and moves the engagement elements 98, 110 towards each other.

[0078] In reference to Figure 11, the collar 52 moves axially along the axis A1 such that the first and second contact surfaces 102, 114 of the first and second bosses 100, 112 are axially spaced along the axis A1 and radially spaced about the axis A1. Specifically, the second contact surface 114 is spaced further from the second portion 56 of the body 50 along the axis A1 than the first contact surface 102. The second boss 112 rotates about the axis A1 at the second radius such that the first and second contact surfaces 102, 114 are spaced from each other and the first and second ramps 104, 116 abut each other.

[0079] If the protrusion 108 and the channel 120 are present, the protrusion 108 moves along the first axis A2 in the first pathway 122 to the intersection 126 and the first intermediate position. The protrusion 108 engages the lip 132 and moves along the lip surface 134 of the collar 52. The protrusion 108 moves along the first pathway 122 transverse to the axis A1 and rotates the collar 52 about the axis A1. The collar 52 moves along the axis A1 and about the axis A1 between the spaced and aligned positions.

[0080] As shown in Figure 12, the flange 82 of the collar 52 enters the c-shaped cavity 38 of the bracket 34 and the collar 52 moves axially toward the bracket 36. The collar 52 is rotated about the axis A1 to axially align the engagement elements 98, 110.

[0081] In reference to Figure 13, the first ramp 104 of the first boss 98 engages the second ramp 116 of the second boss 110 and moves the collar 52 along the axis A1 towards the second portion 56 of the body 50. Specifically, the first surface 106 of the first ramp 104 slides along the second surface 118 of the second ramp 116. The corresponding inverse angled configurations of the first and second surfaces 106, 118 of the first and second ramps 104, 116 moves the collar 52 along the axis A1 and about the axis A1 axially aligning the first and second contact surfaces 102, 114 of the first and second bosses 98, 110.

[0082] The second contact surface 114 of the second boss 110 is spaced equally from the second portion 56 of the body 50 along the axis A1 as the first contact surface 102 of the first boss 98. The first and second contact surfaces 102, 114 of the first and second bosses 98, 110 are radially spaced about the axis A1. The second ramp 116 faces the first contact surface 102 of the first boss 100 and the second contact surface 114 of the second boss 110 faces the first ramp 104.

[0083] If the protrusion 108 and the channel 120 are present, the protrusion 108 moves along the

second axis A3 in the second pathway 124 from the intersection 126 to the second intersection 130 and the second intermediate position. The protrusion 108 engages and slides along the first wall 138 of the collar 52 in the second pathway 124. The angled configuration of the first wall 138 rotates the collar 52 as the protrusion 108 slides along the first wall 138 in the second pathway 124 towards the third pathway 128. The protrusion 108 moves along the second axis A3 in the second pathway 124 from the intersection 126 towards the second intersection 130 to the second intermediate position as the collar 52 moves along the axis A1 and rotates about the axis A1 between the spaced and aligned positions.

[0084] As shown in Figures 2A and 14, the motion transmitting remote control assembly 36 is disposed in the c-shaped cavity 38 of the bracket 34 with the bracket 34 disposed in the groove 88 between the collar surface 86 and the bracket shoulder 64. The flange 82 of the collar 52 is disposed in the c-shaped cavity 38 of the bracket 34. The flange 82 engages the fingers 42 of the bracket 34 and prevents movement of the motion transmitting remote control assembly 36 transverse to the axis A1. The engagement elements 98, 110 are axially and radially aligned with the second engagement element 110 selectively engaging the first engagement element 98 for securing the motion transmitting remote control assembly 36 to the bracket 34 of the vehicle.

[0085] In reference to Figure 15, the second contact surface 114 of the second boss 110 axially and radially aligns with the first contact surface 102 of the first boss 98. Specifically, the first contact surface 102 abuts the second contact surface 114 for preventing the collar 52 moving out of the c-shaped cavity 38 of the bracket 34 to ensure the motion transmitting remote control assembly 36 remains seated in the c-shaped cavity 38. It is to be appreciated that the first and second contact surfaces 102, 114 may be spaced from each other with the first and second contact surfaces 102, 114 abutting when the collar 52 is moves along the axis A1 away from the bracket 34.

[0086] If the protrusion 108 and the channel 120 are present, the protrusion 108 moves from the second intersection 130 along the third pathway 128 to the installed position. If the protrusion 108 and the channel 120 are present as the engagement elements 98, 110, the second wall 140 of the collar 52 abuts the protrusion 108 allowing rotational movement of the collar 52 and preventing axial movement of the collar 52. It is to be appreciated that the protrusion 108 may not continually abut the second wall 140 and may be spaced from the second wall 140 only to abut the second wall 140 as the collar 52 is moved along the axis A1 away fro the bracket 34.

[0087] If present, the biasing member 90 automatically moves the collar 52 axially toward the second portion 56 of the body 50 and rotates the engagement elements 98, 110 into alignment. Specifically, the biasing member 90 biases the collar 52 to rotate about the axis A1 from the spaced position to the aligned position.

[0088] If removal motion transmitting remote control assembly 36 is necessary, an operator can remove the motion transmitting remote control assembly 36 from the bracket 34. For example, if the motion transmitting remote control assembly 36 needs to be replaced, the motion transmitting remote control assembly 36 is removed by rotating the collar 52 about the axis A1 in an opposite direction then installation to radially and axially space the engagement elements 98, 110.

[0089] As shown in Figure 1, a second embodiment of the motion transmitting remote control assembly 236 is shown and described below. Common features between the first and second embodiments of the motion transmitting remote control assembly 36, 236 have the same reference number. Reference numerals of analogous components with the first embodiment of the motion transmitting remote control assembly 36 have been increased by one hundred.

[0090] As shown in Figure 17, the motion transmitting remote control assembly 236 includes a body 250 extending longitudinally along an axis A1 and a collar 252 at least partially disposed about the body 250. The collar 252 is movable axially along the axis A1 and about the axis A1 from a spaced position to an aligned position. The spaced and aligned positions, as well as the movement of the collar 252, as set forth below.

[0091] The body 250 has a first portion 254 and a second portion 56 extending from the first portion 254. The first and second portions 254, 56 have cylindrical configurations along the axis A1. The body 250 defines a body chamber 58 along the axis A1 through the first and second portions 254, 56. The core element is disposed in the body chamber 58.

[0092] The body 250 includes a shoulder 260 radially extending from the first portion 254 of the body 250. The shoulder 260 is spaced along the axis A1 from the second portion 56 of the body 250. The shoulder 260 has a cylindrical configuration and extends away from the first portion 254 of the body 250 about the axis A1.

[0093] The first portion 254 of the body 250 includes an end 62. Specifically, the end 62 is defined on the first portion 254 of the body 250 and the shoulder 260 of the body 250. The end 62 is transverse to the axis A1 and faces away from the second portion 56 of the body 250. The body chamber 58 of the body 250 extends through the end 62.

[0094] The second portion 56 of the body 250 has a bracket shoulder 64 spaced along the axis A1 from the shoulder 260 of the first portion 254 of the body 250. The bracket shoulder 64 has a cylindrical configuration and extends away from the second portion 56 of the body 250 about the axis A1.

[0095] As shown in Figure 18, the collar 252 is at least partially disposed about the first portion 254 of the body 250. The collar 252 has a cylindrical configuration and extends about the first portion 254 of the body 250 along the axis A1. The collar 252 has a pair of halves 270 which

are joined together to present the collar 52 with the cylindrical configuration. Typically, the collar 252 has a first end 72 and a second end 74 spaced from the first end 72 along the axis A1.

[0096] The collar 252 extends beyond the end 62 of the body 250 with a collar chamber 276 defined between the first and second ends 72, 74 of the collar 252. Specifically, the collar 52 has a chamber surface 278 defining the collar chamber 276. The collar 252 has a collar lip 80 extending into the collar chamber 276 toward the axis A1 at the second end 74. The end 62 of the first portion 254 of the body 250 and the shoulder 260 of the body 250 are disposed within the collar chamber 276.

[0097] As shown in Figure 18, the collar 252 includes a flange 82 extending towards the second portion 56 of the body 250 for engaging the bracket 34 when the collar 252 is in the aligned position for anchoring the motion transmitting remote control assembly 236 to the bracket 34. Specifically, the flange 82 engages the chamfer 44 of the bracket 34 during installation of the motion transmitting remote control assembly 236 to move the collar 252 along the axis A1 and the flange 82 engages the fingers 42 of the bracket 34 after installation of the motion transmitting remote control assembly 236 to prevent movement of the motion transmitting remote control assembly 236 transverse to the axis A1. The flange 82 from the first end 72 of the collar 252. The flange 82 has a flange surface 84 with an angled configuration corresponding to the angled configuration of the chamfer surface 46 of the chamfer 44.

[0098] The collar 252 moves along the axis A1 as the motion transmitting remote control assembly 236 is coupled to the bracket 34. Specifically, the flange 82 engages the c-shaped cavity 38 of the bracket 34 when the collar 252 is in the aligned position for preventing movement of the motion transmitting remote control assembly 236 in the bracket 34 transverse to the axis A1. The flange surface 84 of the flange 82 abuts and engages the chamfer surface 46 of the bracket 34.

[0099] As shown in Figures 17 and 18, the collar 252 includes a collar surface 86 spaced from and facing the second portion 56 of the body 250 with a groove 88 defined between the collar surface 86 of the collar 252 and the second portion 56 of the body 250 for receiving the bracket 34. Specifically, the groove 88 is defined between the collar surface 86 of the collar 252 and the bracket shoulder 64 of the body 250. The collar surface 86 is transverse to the axis A1 with the flange 82 of the collar 252 extending into the groove 88 from the collar 252.

[0100] As shown in Figure 17, the motion transmitting remote control assembly 236 may include a biasing member 90 coupled to the collar 252 and the first portion 254 of the body 250 for biasing the collar 252 toward the aligned position. The biasing member 90 is disposed in the collar chamber 276 about the axis A1 between the end 62 of the body 250 and the collar lip 80 of the collar 252. The biasing member 90 has a pair of stems 92. In reference to Figure 18, the

shoulder 260 of the body 250 defines a first end aperture 94 extending through the end 62 and the collar lip 80 defines a second end aperture 96. Turning to Figures 3 and 5, one of the pair of stems 92 is disposed in the first end aperture 94 of the shoulder 260 and the other of the pair of stems 92 is disposed in the second end aperture 96 of the collar lip 80. The body 250 remains static and the biasing member 90 biases the collar 252 to rotate about the axis A1 and the body 250. The biasing member 90 is further defined as a torsion spring coupled to the collar 252 and the first portion 254 of the body 250 for rotatably biasing the collar 252 about the axis A1.

[0101] The first portion 254 of the body 250 presents a first engagement element 98. The first engagement element 98 of the body 250 is further defined as a first boss 100 extending from the first portion 254 of the body 250. The first boss 100 is disposed in the collar chamber 276 of the collar 252 about the axis A1 at a first radius between the axis A1 and the first boss 100. Specifically, the first boss 100 is coupled to and extends from the shoulder 260 towards the second portion 56 of the body 250. The first boss 100 extends from the shoulder 260 along the axis A1 away from the end 62 of the first portion 254 of the body 250 towards the bracket shoulder 64 of the body 250. The first boss 100 may be further defined as a pair of first bosses 100 spaced radially from each other about the axis A1. It is to be appreciated that the first boss 100 can be any number of bosses.

[0102] The first boss 100 includes a first contact surface 102 facing the second portion 56 of the body 250. The first contact surface 102 is transverse to the axis A1 and spaced from the shoulder 260. The first boss 100 includes a first ramp 104 extending from the first boss 100. Specifically, the first ramp 104 extends from the first boss 100 and the shoulder 260. The first ramp 104 has a first surface 106 with an angled configuration extending from the shoulder 260 to the first contact surface 102 of the first boss 100. It is to be appreciated that the first surface 106 can have any suitable configuration such as an arcuate configuration.

[0103] As shown in Figures 17 and 19-20, the body 250 includes an arm 142 extending from the first portion 254 of the body 250. The arm 142 extends from the body 250 about the axis A1 and is biased away from the body 250. The arm 142 includes a tab 144 at a distal end 62 of the arm 142. The tab 144 has a triangular configuration and extends transverse from the arm 142 and the axis A1 and extends into the collar chamber 276. The tab has a tab surface 146 transverse to the arm 142 and the axis A1.

[0104] The arm 142 and tab 144 are described as moving between a plurality of positions as the collar 252 moves between the spaced and aligned positions. It is to be appreciated that the arm 142, tab 144, and body 250 remain static and the collar 252 moves relative to the arm 142 and tab 144. The plurality of positions describes the position of the arm 142 and tab 144 relative to the collar 252 as the collar 252 rotates about the axis A1 and moves axially along the axis A1 as

set forth below.

[0105] The second boss 112 includes a second contact surface 114 facing the first contact surface 102 of the first boss 100 when the collar 252 is in the aligned position with the first and second contact surfaces 102, 112 engaging each other for preventing the collar 252 from moving along the axis A1 away from the second portion 56 of the body 250 when the collar 252 is in the aligned position. The second contact surface 114 is transverse to the axis A1 and the chamber surface 278. The second radius is spaced from the axis A1 such that the second contact surface 114 overlaps the first contact surface 102 as the second boss 112 rotates about the axis A1 and aligns axially along the axis A1 with the first boss 100.

[0106] The second boss 112 includes a second ramp 116 extending from the second boss 112 with the first and second ramps 104, 116 configured to guide the first and second bosses 100, 112 into axial alignment as the collar 252 rotates to the aligned position. The second ramp 116 extends from the second boss 112 and the collar 252. The second ramp 116 has a second surface 118 with an angled configuration inversely corresponding to the angled configuration of the first surface 106. The angled configuration of the second surface 118 of the second ramp 116 extends from the collar 252 to the second contact surface 114 of the second boss 112. It is to be appreciated the second surface 118 can have any suitable configuration such as an arcuate configuration.

[0107] The engagement elements 98, 110 are radially spaced from each other about the axis A1 with the collar 252 being axially movable along the axis A1 when in the spaced position. Specifically, the second boss 112 is positioned about the axis A1 at the second radius such that the first and second contact surfaces 102, 114 are spaced from each other allowing the collar 252 to move along the axis A1 away from the bracket 34.

[0108] As shown in Figure 17, the collar 252 is rotatable about the axis A1 to the aligned position in which the engagement elements 98, 110 are axially aligned with each other along the axis A1 to resist axial movement of the collar 252 along the axis A1 away from the second portion 56 of the body 250 for securing the motion transmitting remote control assembly 236 to the bracket 34 of the vehicle. The second boss 112 is rotated about the axis A1 at the second radius such that the first and second bosses 100, 112 overlap with the first boss 100 spaced from the axis A1 at the first radius. Specifically, the first and second contact surfaces 102, 114 abut preventing axial movement of the collar 252 along the axis A1 away from the bracket 34.

[0109] As shown in Figures 19-21, the collar 252 defines a slot 148 having a slot axis A5 with the slot 148 receiving the tab 144 of the arm 142 for retaining the collar 52 in the spaced position. The slot 148 is in communication with the collar chamber 276. The collar 252 has a slot wall 150 extending along the slot 148 and slot axis A5 transverse to the axis A1. The tab

144 of the arm 142 is disposed in the slot 148 in a pre-installed position and movable to an installed position with the tab 144 of the arm 142 removed from the slot 148.

[0110] As shown in Figure 21, the collar 252 defines a primary portion 152 of the slot 148 having a constant depth and a secondary portion 154 of the slot 148 having a decreasing depth along the slot axis A5 for forcing the tab 144 out of the slot 148 as the collar 252 moves from the spaced position to the aligned position. The collar 252 has a slot surface 156 defining the primary portion 152 and an angle surface 158 defining the secondary 154. The angle surface 158 extends between and abuts the slot surface 156 and the chamber surface 278 with an angled configuration.

[0111] Prior to installation of the motion transmitting remote control assembly 236 into the vehicle, the collar 252 is in the spaced position with the engagement elements 98, 110 radially spaced from each other. The collar 252 in is the spaced position with the first and second bosses 100, 112 radially spaced from each other about the axis A1. Further referring to Figure 18, the tab 144 of the arm 142 is disposed in the primary portion 152 of the slot 148 and is in the pre-installed position. Specifically, the tab surface 146 of the tab 144 abuts the slot wall 150 of the collar 252. The tab surface 146 retains the collar 252 in the spaced position for installation of the motion transmitting remote control assembly 236 into the vehicle.

[0112] As shown in Figures 18 and 22, the second embodiment of the motion transmitting remote control assembly 236 is aligned with the bracket 34 for installation. Specifically, the groove 88 of the motion transmitting remote control assembly 236 is aligned with the bracket 34. The first portion 254 of the body 250 is aligned with the c-shaped cavity 38 of the bracket 34 between the fingers 42 of the pair of arms 40. As shown in Figure 23, the second embodiment of the motion transmitting remote control assembly 236 of the second embodiment is partially disposed in the c-shaped cavity 38 of the bracket 34. The first portion 254 of the body 250 is partially disposed between the fingers 42 of the pair of arms 40.

[0113] As the motion transmitting remote control assembly 236 is inserted into the c-shaped cavity 38 of the bracket 34, the collar 252 is forced to move axially away from the second portion 256 of the body 250 along the axis A1. The flange 82 engages the chamfer 44 of the bracket 34. Specifically, the flange surface 84 of the flange 82 slidably abuts the chamfer surface 46 of the chamfer 44. The corresponding angled configurations of the chamfer surface 46 and the flange surface 84 moves the collar 252 along the axis A1 away from the second portion 256 of the body 250 and the engagement elements 98, 110 move towards each other.

[0114] The collar 252 moves axially along the axis A1 such that the first and second contact surfaces 102, 114 are axially spaced along the axis A1 and radially spaced about the axis A1. Specifically, the second contact surface 114 is spaced further from the second portion 56 of the

body 250 along the axis A1 than the first contact surface 102. The second boss 112 rotates about the axis A1 at the second radius such that the first and second contact surfaces 102, 114 are spaced from each other and the first and second ramps 104, 116 abut each other.

[0115] As the collar 252 moves along the axis A1 away from the second portion 56 of the body 250, the tab 144 moves along the slot 148. Specifically, the tab 144 slides along the slot surface 156 through the primary portion 152 of the slot 148 to the angle surface 158 of the secondary portion 154 of the slot 148. As the tab 144 moves along the angle surface 158 through the secondary portion 154 of the slot 148, the tab 144 moves towards the chamber surface 278 and away from the slot surface 156. The tab 144 moves along the angle surface 158 until the tab surface 146 is spaced from the slot wall 150 and the tab 144 is removed from the slot 148 and abuts the chamber surface 278.

[0116] As shown in Figure 24, the flange 82 of the collar 252 enters the c-shaped cavity 38 of the bracket 34 and the collar 52 moves axially toward the bracket 36. The collar 52 is rotated about the axis A1 to axially align the engagement elements 98, 110.

[0117] The first ramp 104 of the first boss 98 engages the second ramp 116 of the second boss 110 and moves the collar 252 along the axis A1 towards the second portion 256 of the body 250. Specifically, the first surface 106 of the first ramp 104 slides along the second surface 118 of the second ramp 116. The corresponding inverse angled configurations of the first and second surfaces 106, 118 of the first and second ramps 104, 116 moves the collar 252 along the axis A1 and about the axis A1 axially aligning the first and second contact surfaces 102, 114 of the first and second bosses 98, 110.

[0118] The second contact surface 114 of the second boss 110 is spaced equally from the second portion 56 of the body 250 along the axis A1 as the first contact surface 102 of the first boss 98. The first and second contact surfaces 102, 114 of the first and second bosses 98, 110 are radially spaced about the axis A1. The second ramp 116 faces the first contact surface 102 of the first boss 100 and the second contact surface 114 of the second boss 110 faces the first ramp 104.

[0119] As shown in Figures 17 and 25, the second embodiment of the motion transmitting remote control assembly 236 is disposed in the c-shaped cavity 38 of the bracket 34 with the bracket 34 is disposed in the groove 88 between the collar surface 86 and the bracket shoulder 64. The flange 82 of the collar 252 is disposed in the c-shaped cavity 38 of the bracket 34. The flange 82 engages the fingers 42 of the bracket 34 and prevents movement of the motion transmitting remote control assembly 36 transverse to the axis A1. The engagement elements 98, 110 are axially and radially aligned with the second engagement element 110 selectively engaging the first engagement element 98 for securing the motion transmitting remote control assembly 236 to the bracket 34 of the vehicle.

[0120] In reference to Figure 20, the arm 142 flexes towards the body 250 as the tab 144 of arm 142 moves from the angle surface 158 of the slot 148 to the chamber surface 278 of the collar chamber 276. As the moves to the chamber surface 278 of the collar chamber 276, the collar 252 rotates about the body 250 with the tab 144 slidably abutting the collar surface 86 of the collar 252. The arm 142 and the tab 144 rotate to the installed position in the collar chamber 276.

[0121] As shown in Figure 17, the second contact surface 114 of the second boss 110 axially and radially aligns with the first contact surface 102 of the first boss 98. Specifically, the first contact surface 102 abuts the second contact surface 114 for preventing the collar 52 moving out of the c-shaped cavity 38 of the bracket 34 to ensure the motion transmitting remote control assembly 36 remains seated in the c-shaped cavity 38. It is to be appreciated that the first and second contact surfaces 102, 114 may be spaced from each other with the first and second contact surfaces 102, 114 abutting when the collar 52 is moves along the axis A1 away from the bracket 34.

[0122] If present, the biasing member 90 automatically moves the collar 52 axially toward the second portion 56 of the body 50 and rotates the engagement elements 98, 110 into alignment. Specifically, the biasing member 90 biases the collar 52 to rotate about the axis A1 from the spaced position to the aligned position.

[0123] If removal is necessary, an operator can remove the motion transmitting remote control assembly 36 from the bracket 34. For example, if the motion transmitting remote control assembly 36 needs to be replaced, the motion transmitting remote control assembly 36 is removed by rotating the collar 52 about the axis A1 in an opposite direction then installation to radially and axially space the engagement features 98, 110.

[0124] As shown in Figures 26 and 27, a third embodiment of the motion transmitting remote control assembly 336 is substantially similar to the first embodiment of the motion transmitting remote control assembly 36. The third embodiment of the motion transmitting remote control assembly 336 has a body 350 with a first portion 354 and a second portion 356. The third embodiment of the motion transmitting remote control assembly 336 has a cover 368 and a plurality damping components 66 disposed in the first portion 354 of the body 350.

[0125] The third embodiment of the motion transmitting remote control assembly 336 has a collar 352 and a biasing member 90 disposed about the first portion 354 of the body 350. The third embodiment of the motion transmitting remote control assembly 336 has a shoulder 360 extending from the first portion 354 of the body 350. The body 350 has a first engagement element 98 extending from the shoulder 360. Although not shown, the collar 352 of the third embodiment of the motion transmitting remote control assembly 336 has a similarly configured

second engagement feature as the first embodiment of the motion transmitting remote control assembly 36. The third embodiment of the motion transmitting remote control assembly 336 operates in the same manner as the first embodiment of the motion transmitting remote control assembly 36.

[0126] The subject invention also provides for a method of coupling of the first and second embodiments of the motion transmitting remote control assembly 36, 236 to the bracket 34. As described above, the bracket 34 defines the cavity 38 and the motion transmitting remote control assembly 36, 236 includes the body 50, 250 extending longitudinally along the axis A1 and having the first portion 54, 254 and the second portion 56 extending from the first portion 54, 254 with the first portion 54, 254 of the body 50, 250 presenting the first engagement element 98, the collar 52, 252 at least partially disposed about the first portion 54, 254 of the body 50, 250 and presenting the second engagement element 110.

[0127] The method includes a step of radially spacing the first and second engagement elements 98, 110 from each other, as shown in Figures 5A and 5B. A step of inserting the motion transmitting remote control assembly 36, 236 into the cavity 38 of the bracket 34, as shown in Figures 8-9 and 18, 22. A step of moving the collar 52, 252 axially along the axis A1 away from the second portion 56 of the body 50, 250, as shown in Figures 10 and 23. The step of moving the collar 52, 252 axially along the axis A1 away from the second portion 56 of the body 50, 250 occurs automatically during the step of inserting the motion transmitting remote control assembly 36, 236 into the cavity 38 of the bracket 34.

[0128] A step of rotating the collar 52, 252 about the axis A1 to axially align the first engagement element 98 with the second engagement element 110, as shown in Figures 12 and 24. The step of rotating the collar 52, 252 about the axis A1 is performed after the step of moving the collar 52, 252 axially along the axis A1 away from the second portion 56 of the body 50, 250. The steps of moving the collar 52, 252 axially along the axis A1 away from the second portion 56 of the body 50, 250 and rotating the collar 52, 252 about the axis A1 occur during the step of inserting the motion transmitting remote control assembly 36, 236 into the cavity 38 of the bracket 34.

[0129] The method further includes a step of moving the collar 52, 252 axially along the axis A1 towards the second portion 56 of the body 50, 250. The step of moving the collar 52, 252 axially along the axis A1 towards the second portion 56 of the body 50, 250 during the step of rotating the collar 52, 252 about the axis A1.

[0130] When the first engagement element 98 of the body 50, 250 is further defined as a first boss 100 extending from the first portion 54, 254 of the body 50, 250 and the second engagement element 110 of the collar 52, 252 is further defined as a second boss 112 extending

from the collar 52, 252 towards the first portion 54 of the body 50, 250, as described above, the step of rotating the collar 52, 250 about the axis A1 is further defined as axially aligning the first and second bosses 100, 112.

[0131] When the motion transmitting remote control assembly 36, 236 further includes a protrusion 108 extending from the first portion 54, 254 of the body 50, 250 and the collar 52, 252 defines a channel 120 with the protrusion 108 movably disposed in the channel 120, as described above, the steps of moving the collar 52, 252 axially and rotating the collar 52, 252 about the axis A1 moves the protrusion 108 in the channel 120 from a pre-installed position to an installed position.

[0132] When the channel 120 presents a first pathway 122 and a second pathway 124 extending transverse to and in communication with the first pathway 122 with the protrusion 108 disposed in the first pathway 122 in the pre-installed position, as described above, as described above, the step of moving the collar 52, 252 axially along the axis A1 is further defined as moving the protrusion 108 axially along the first pathway 122 from the pre-installed position to a first intermediate position.

[0133] When the first pathway 122 intersects the second pathway 124 at the first intermediate position, as described above, the step of rotating the collar 52 about the axis A1 is further defined as moving the protrusion 108 along the second pathway 124 from the first intermediate position to a second intermediate position.

[0134] When the channel 120 further presents a third pathway 128 extending transverse to and in communication with the second pathway 124, as described above, the step of rotating the collar 52 about the axis A1 is further defined as moving the protrusion 108 along the third pathway 128 from the second intermediate position to the installed position.

[0135] The invention has been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation. As is now apparent to those skilled in the art, many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, wherein reference numerals are merely for convenience and are not to be in any way limiting, the invention may be practiced otherwise than as specifically described.

CLAIMS

What is claimed is:

1. A motion transmitting remote control assembly for coupling with a bracket of a vehicle, said motion transmitting remote control assembly comprising:

5 a body extending longitudinally along an axis and having a first portion and a second portion extending from said first portion with said first portion of said body presenting a first engagement element; and

a collar at least partially disposed about said first portion of said body and presenting a second engagement element for selectively engaging said first engagement element, said collar
10 having a spaced position in which said engagement elements are radially spaced from each other about said axis with said collar being axially movable along said axis when in said spaced position, and said collar rotatable about said axis to an aligned position in which said engagement elements are axially aligned with each other along said axis to resist axial movement of said collar along said axis away from said second portion of said body for securing
15 said motion transmitting remote control assembly to the bracket of the vehicle.

2. A motion transmitting remote control assembly as set forth in claim 1 further comprising a biasing member coupled to said collar and said first portion of said body for biasing said collar toward said aligned position with said biasing member further defined as a torsion spring coupled to said collar and said first portion of said body for rotatably biasing said collar about
20 said axis.

3. A motion transmitting remote control assembly as set forth in claim 2 with said first portion of said body including an end and said collar extending beyond said end of said body and defining a collar chamber with said biasing member disposed in said collar chamber.

4. A motion transmitting remote control assembly as set forth in claim 1 wherein said first
25 engagement element of said body is further defined as a first boss extending from said first portion of said body and said second engagement element of said collar is further defined as a second boss extending from said collar towards said first portion of said body with said second boss selectively engaging said first boss for preventing axial movement of said collar away from said second portion of said body.

30 5. A motion transmitting remote control assembly as set forth in claim 4 wherein said body includes a shoulder radially extending from said first portion of said body with said first boss coupled to and extending from said shoulder towards said second portion of said body.

6. A motion transmitting remote control assembly as set forth in claim 4 wherein said first boss includes a first contact surface facing said second portion of said body and said second boss
35 includes a second contact surface facing said first contact surface of said first boss when said

collar is in said aligned position, with said first and second contact surfaces engaging each other for preventing said collar from moving along said axis away from said second portion of said body when said collar is in said aligned position.

7. A motion transmitting remote control assembly as set forth in claim 4 wherein said first boss includes a first ramp extending from said first boss and said second boss includes a second ramp extending from said second boss with said first and second ramps configured to guide said first and second bosses into axial alignment as said collar rotates to said aligned position.

8. A motion transmitting remote control assembly as set forth in claim 4 further including a protrusion extending from said first portion of said body and said collar defines a channel with said protrusion disposed in said channel and movable within said channel for guiding said collar between said spaced and aligned positions with said protrusion having a pre-installed position which corresponds to said spaced position of said collar and an installed position corresponding to said aligned position of said collar with said protrusion engaging said collar within said channel when in said installed position to prevent axial movement of said collar away from said second portion of said body.

9. A motion transmitting remote control assembly as set forth in claim 8 wherein said channel presents a first pathway and a second pathway extending transverse to and in communication with said first pathway such that said first and second pathways have a substantially v-shaped configuration.

10. A motion transmitting remote control assembly as set forth in claim 9 wherein said protrusion is disposed in said first pathway in said pre-installed position and moves along said first pathway to a first intermediate position at an intersection of said first and second pathways as said collar moves axially along said axis away from said second portion of said body.

11. A motion transmitting remote control assembly as set forth in claim 10 wherein said protrusion moves along said second pathway from said first intermediate position to a second intermediate position as said collar rotates about said axis and also moves axially along said axis.

12. A motion transmitting remote control assembly as set forth in claim 11 wherein said channel further presents a third pathway extending transverse to and in communication with said second pathway with said protrusion movable from said second intermediate position along said third pathway to said installed position as said collar rotates about said axis to said aligned position.

13. A motion transmitting remote control assembly as set forth in claim 8 wherein said body includes a shoulder radially extending from said first portion of said body with said protrusion extending from said shoulder towards said collar for positioning said protrusion relative to said

collar.

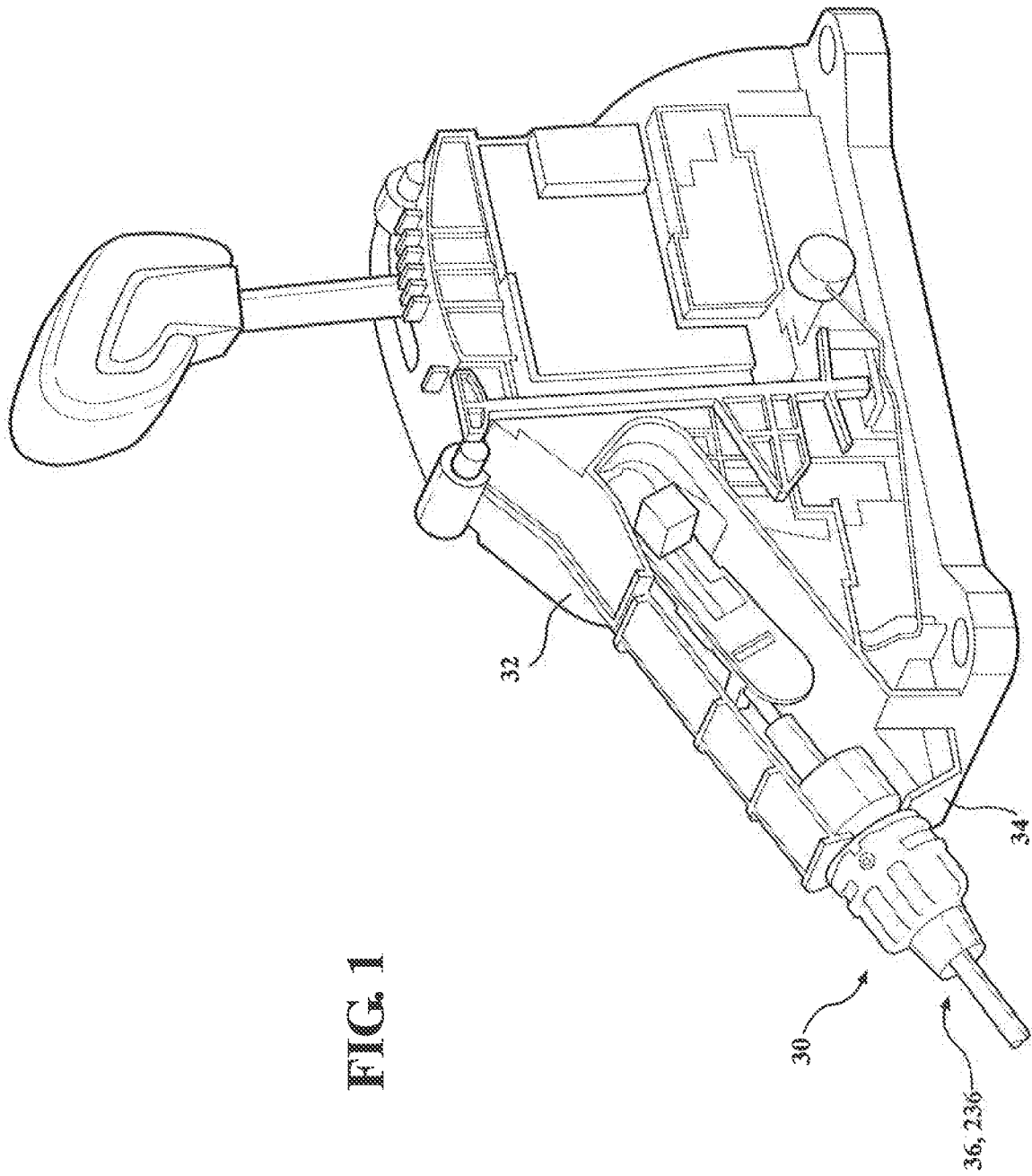
14. A motion transmitting remote control assembly as set forth in claim 8 wherein said collar defines an aperture in communication with said channel, said protrusion aligns with said aperture when said collar is in one of said spaced and aligned positions for confirming said collar has moved between said spaced and aligned positions.

15. A motion transmitting remote control assembly as set forth in claim 8 wherein said collar includes a lip extending into said channel with said protrusion abutting said lip for retaining said collar in said spaced position, with said protrusion moving along said channel to clear said lip as said collar moves away from said second portion of said body.

16. A motion transmitting remote control assembly as set forth in claim 4 wherein said body includes an arm extending from said first portion of said body with said arm including a tab at a distal end of said arm, said collar defining a slot having a slot axis with said slot receiving said tab of said arm for retaining said collar in said spaced position; and wherein said collar defines a primary portion of said slot having a constant depth and a secondary portion of said slot having a decreasing depth along said slot axis for forcing said tab out of said slot as the collar moves from said spaced position to said aligned position.

17. A motion transmitting remote control assembly as set forth in claim 1 wherein said first engagement element of said body is further defined as a protrusion extending from said first portion of said body and said second engagement element of said collar is further defined as a channel with said protrusion disposed in said channel and movable within said channel for guiding said collar between said spaced and aligned positions with said protrusion having a pre-installed position which corresponds to said spaced position of said collar and an installed position corresponding to said aligned position of said collar with said protrusion engaging said collar within said channel when in said installed position to prevent axial movement of said collar away from said second portion of said body.

18. A motion transmitting remote control assembly as set forth in claim 1 wherein said collar includes a collar surface facing said second portion of said body and defines a groove between said collar surface of said collar and said second portion of said body for receiving the bracket.



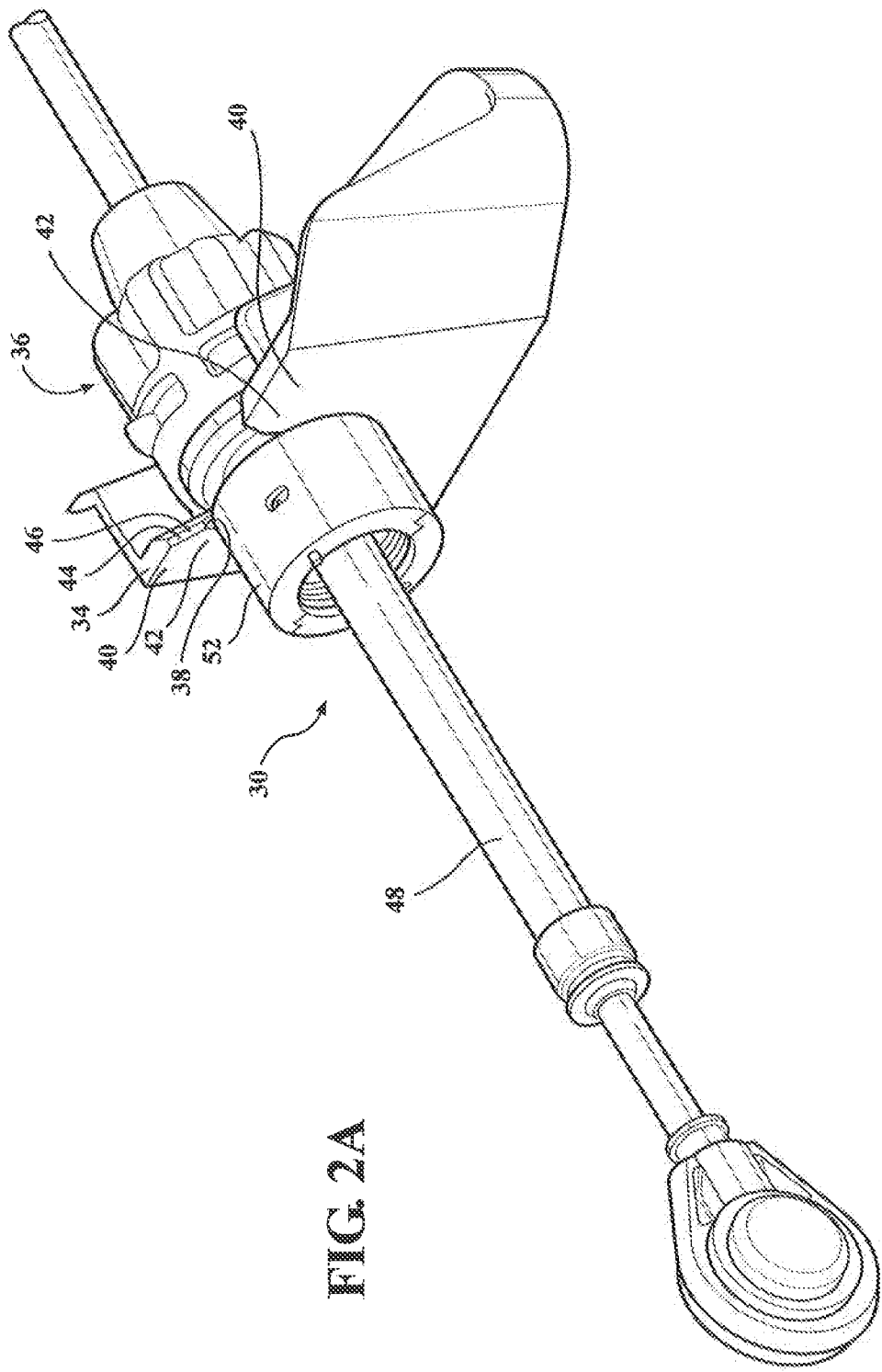


FIG. 2A

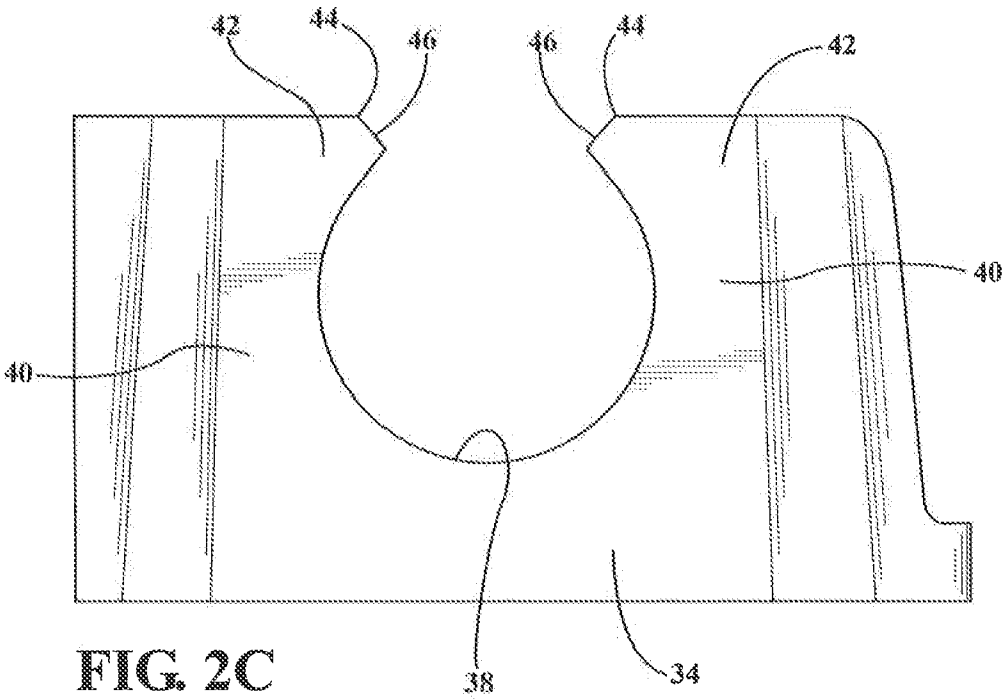
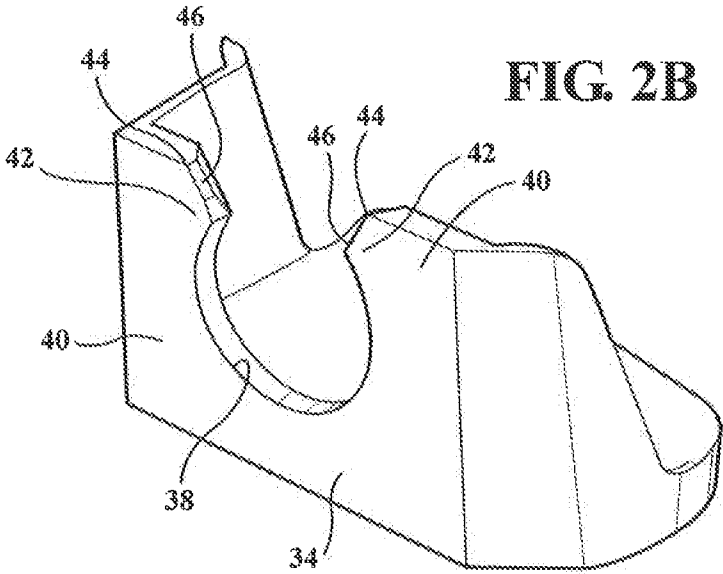


FIG. 3

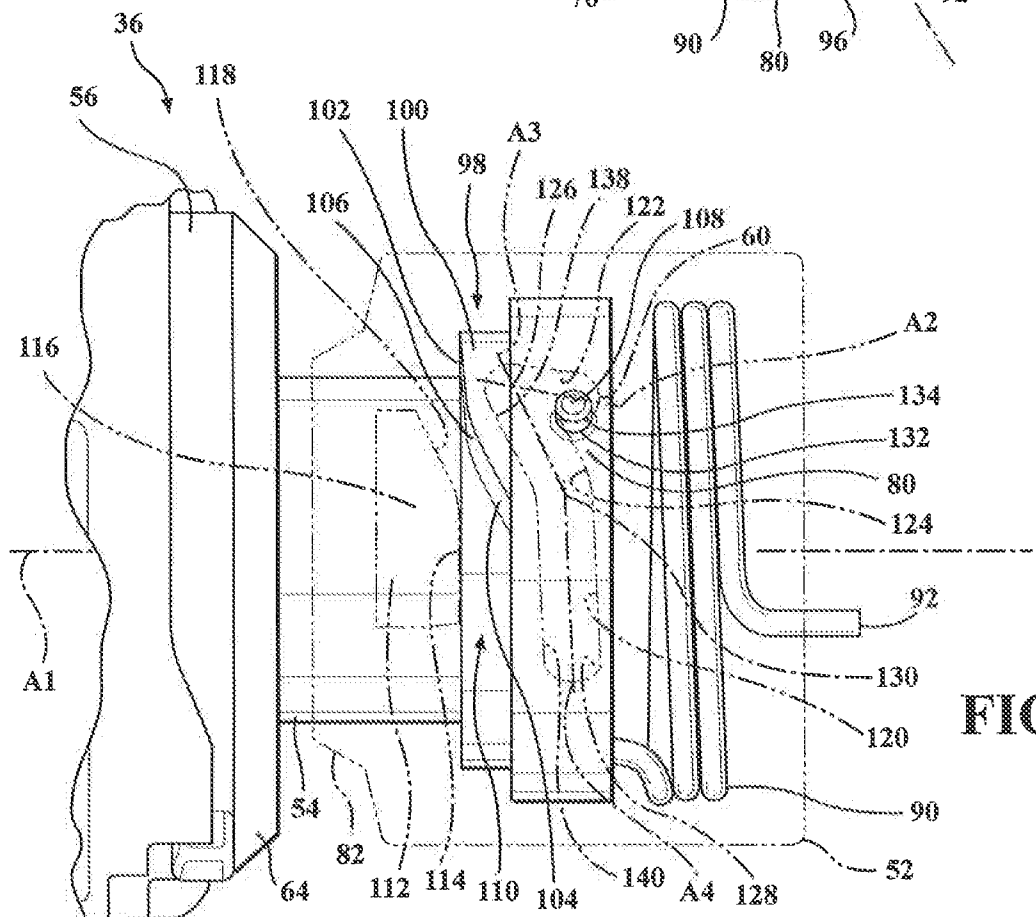
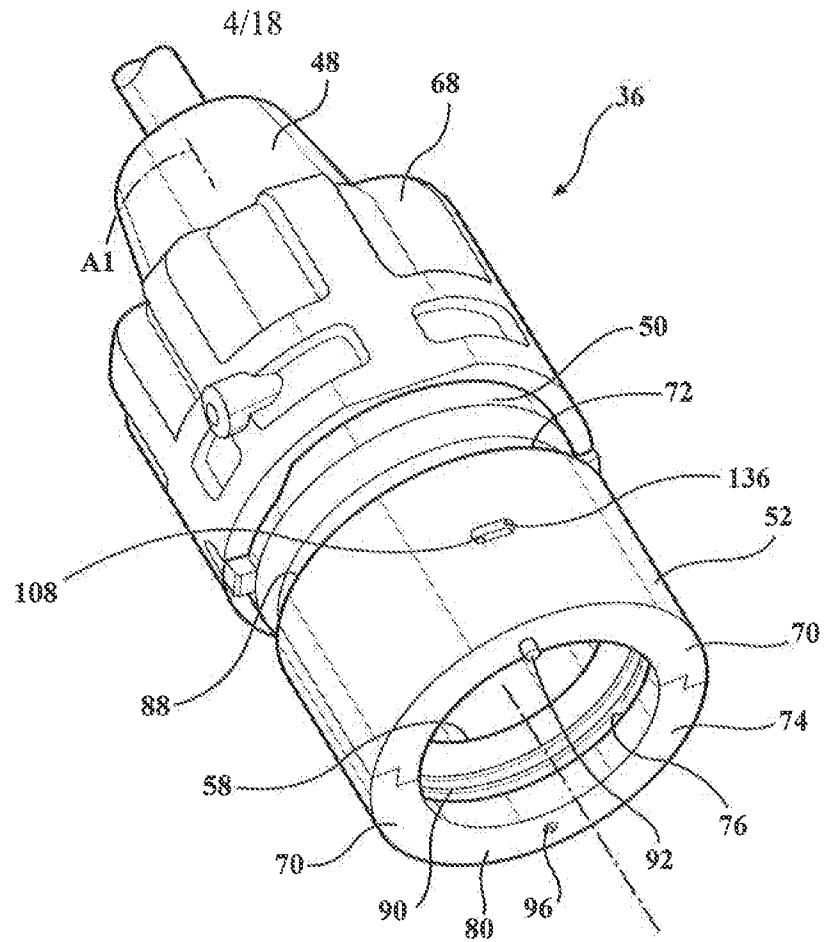
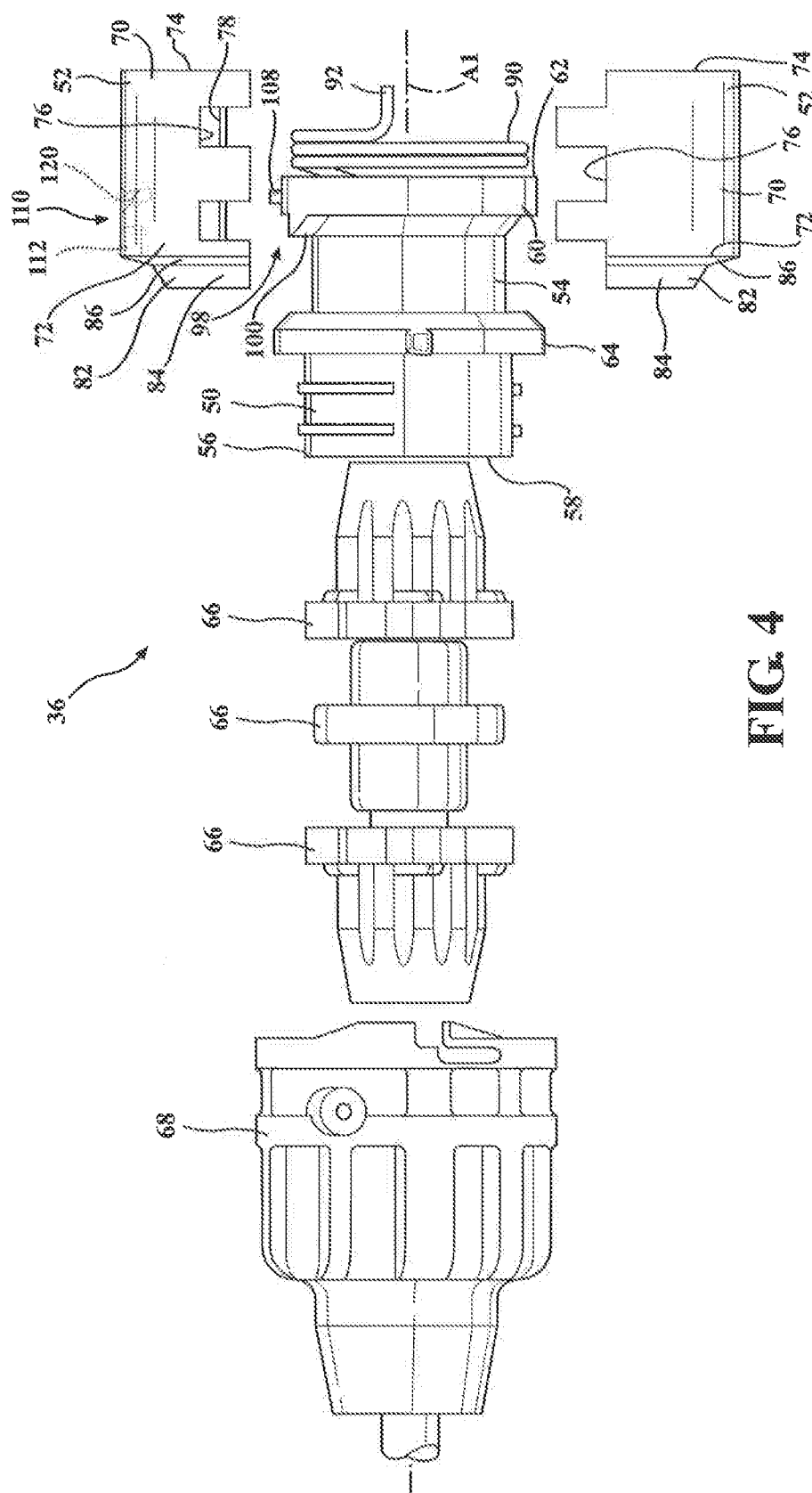


FIG. 5A



FILE

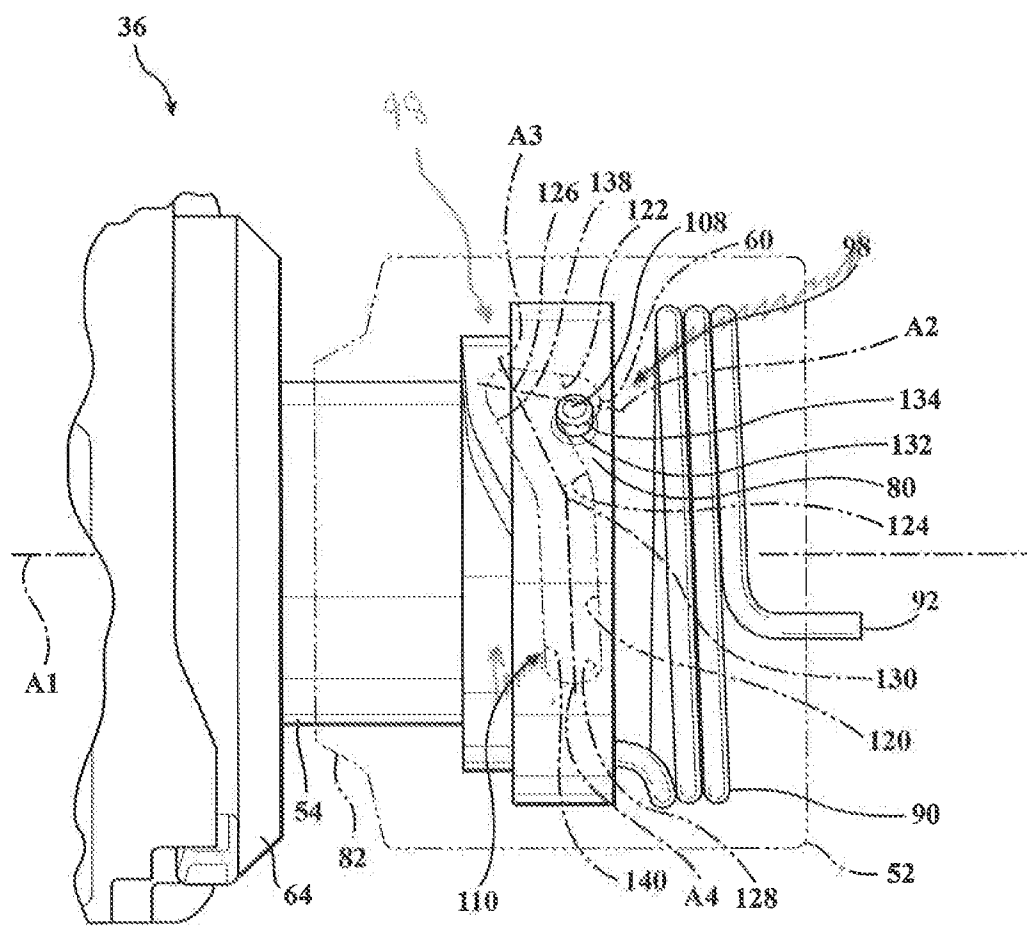


FIG. 5B

7/18

FIG. 6

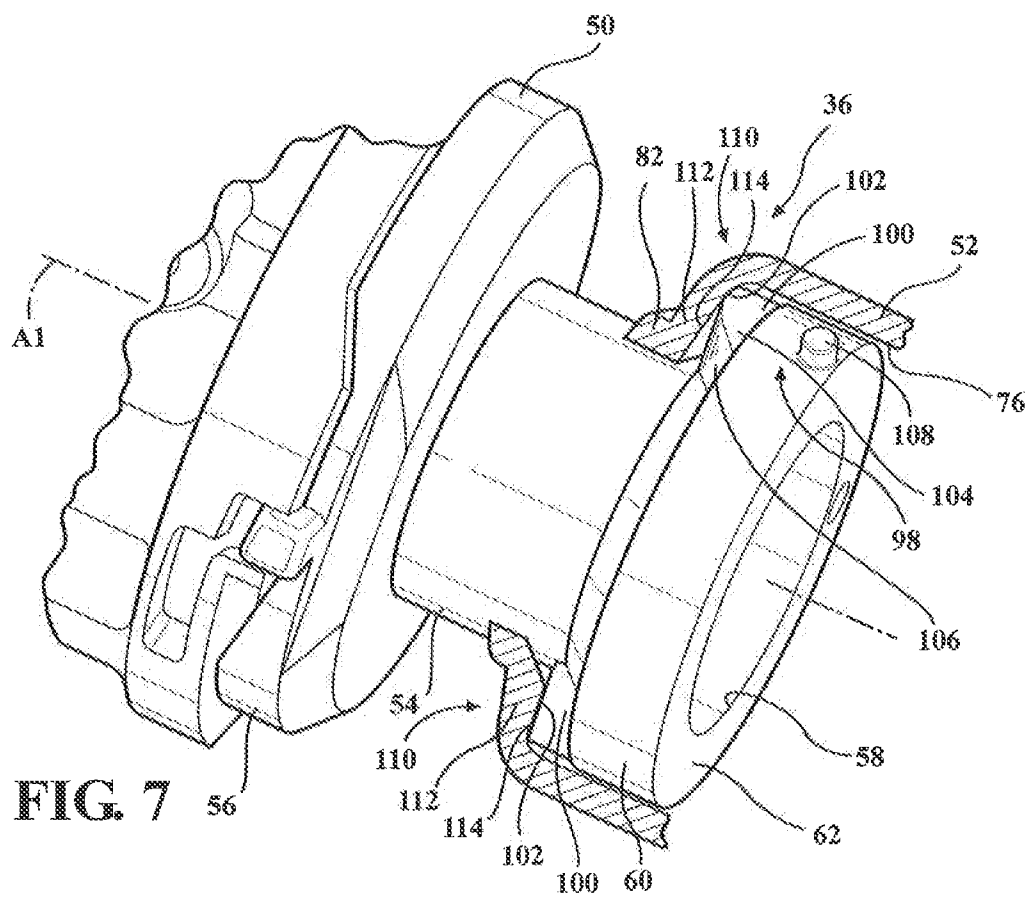
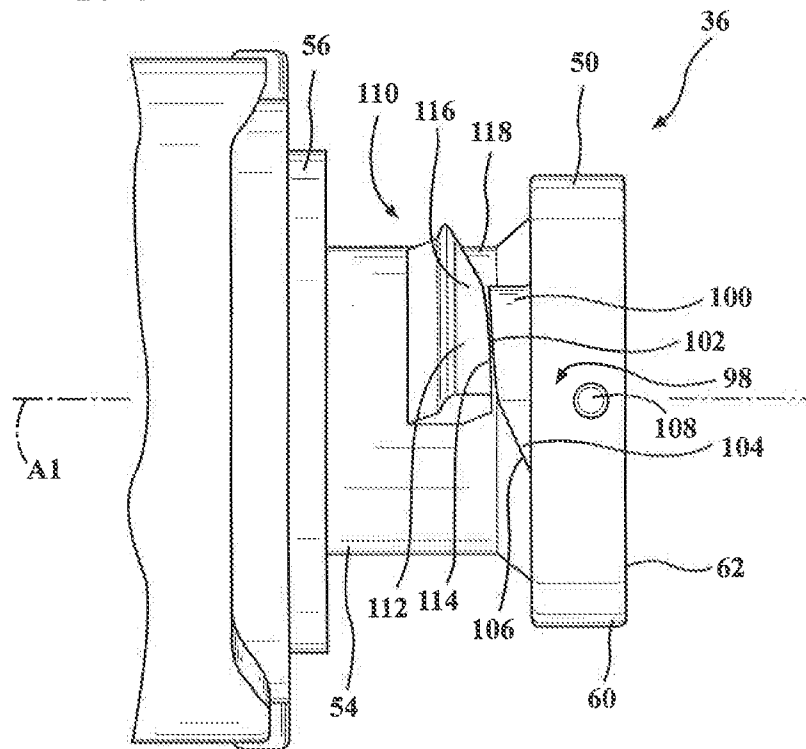


FIG. 7

8/18

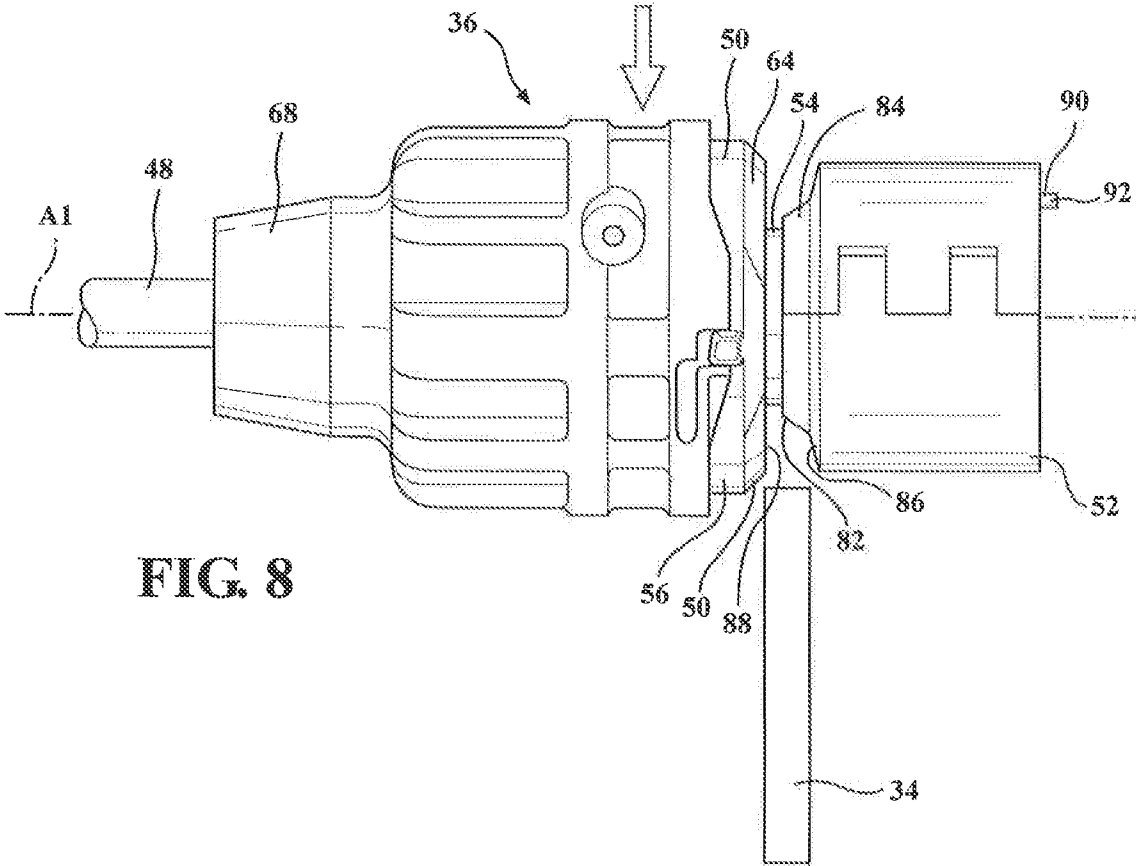


FIG. 8

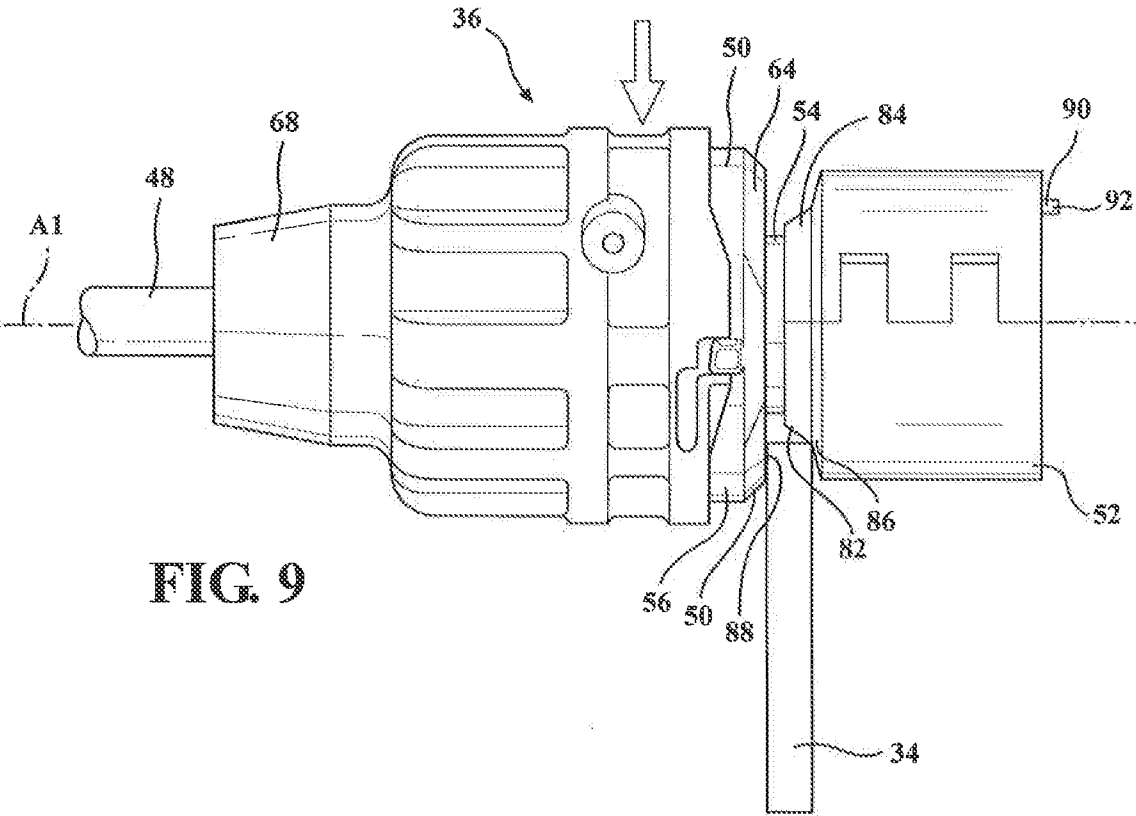


FIG. 9

9/18

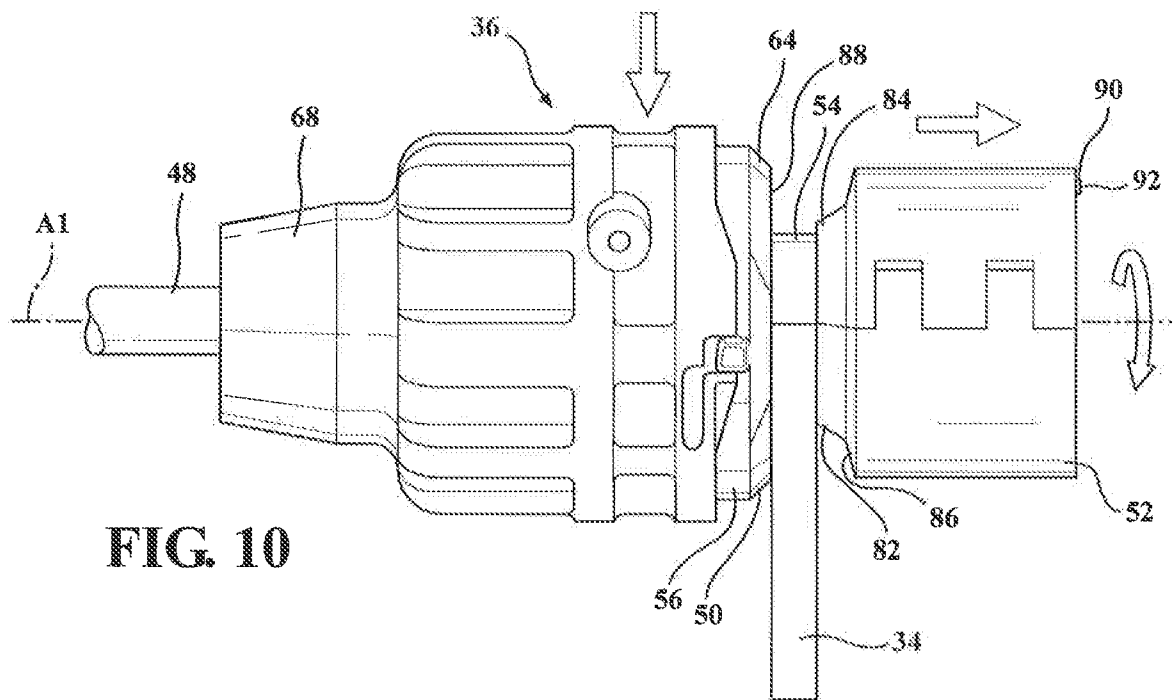
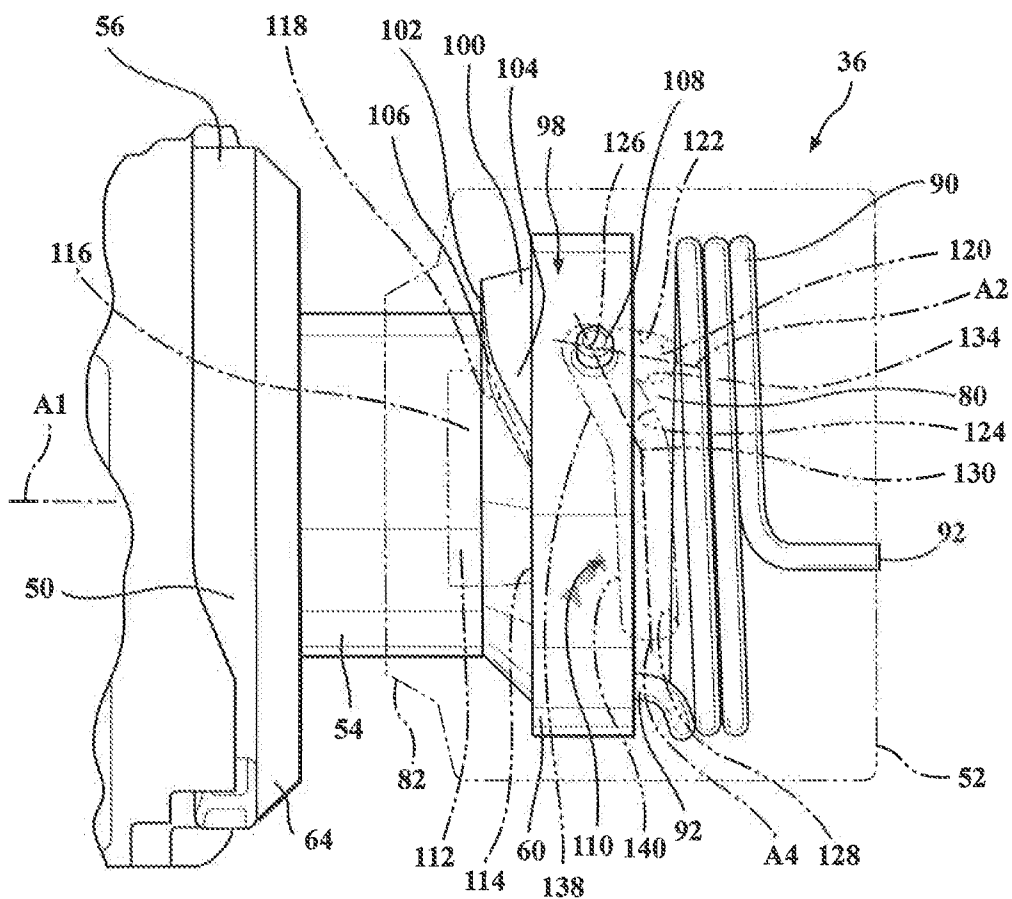


FIG. 10

FIG. 11



10/18

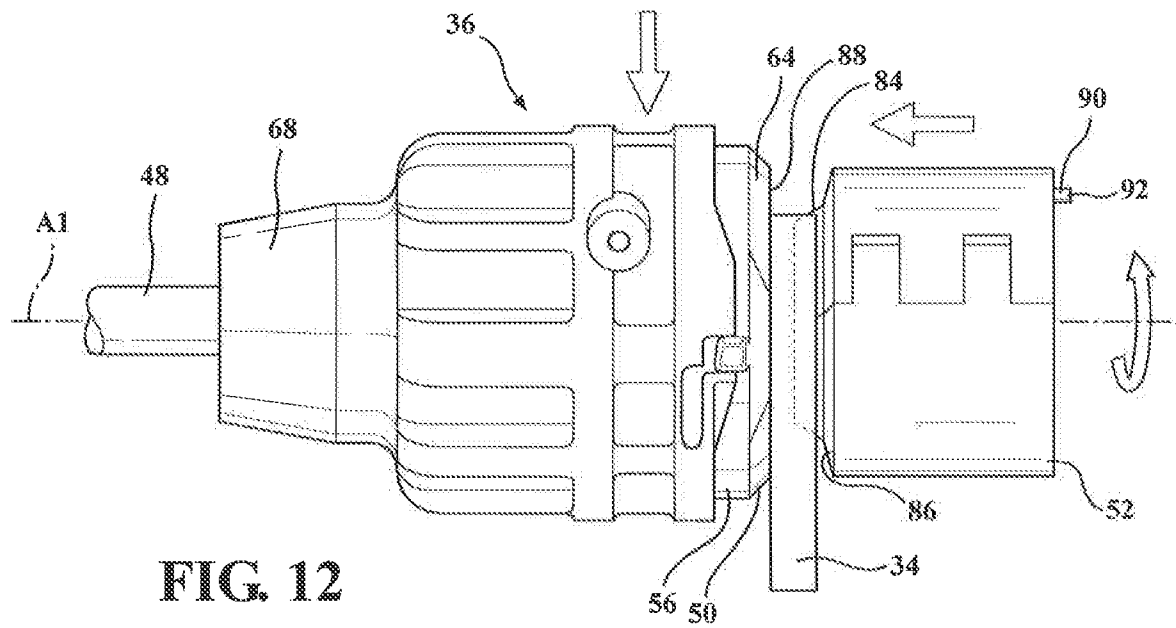
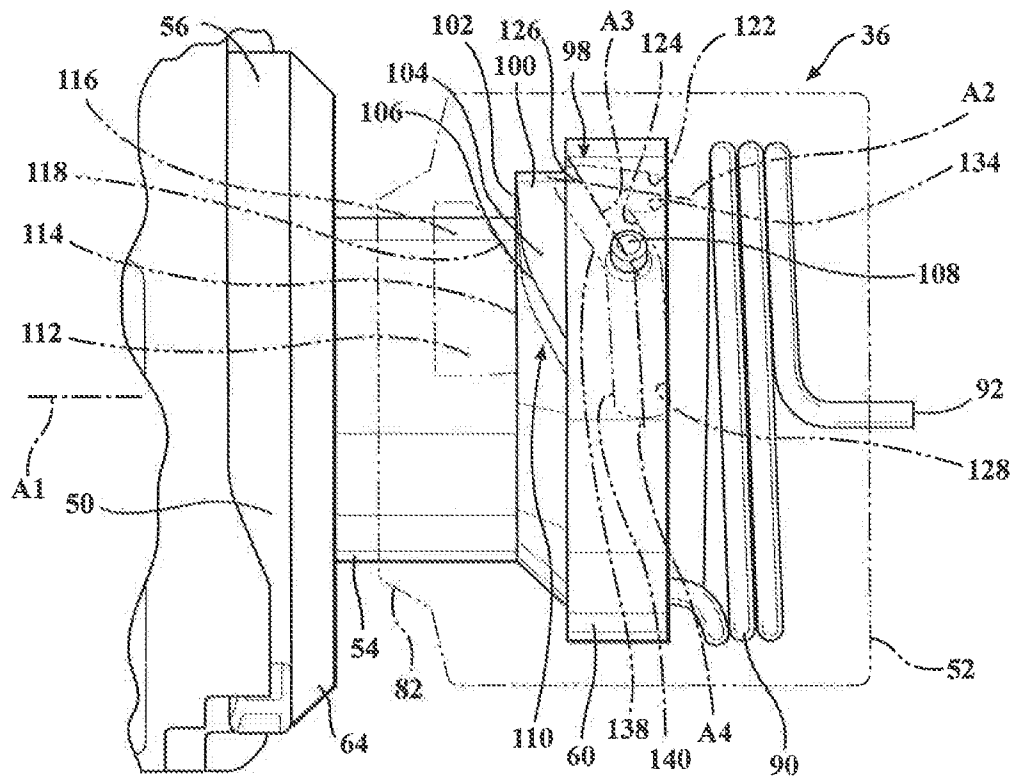
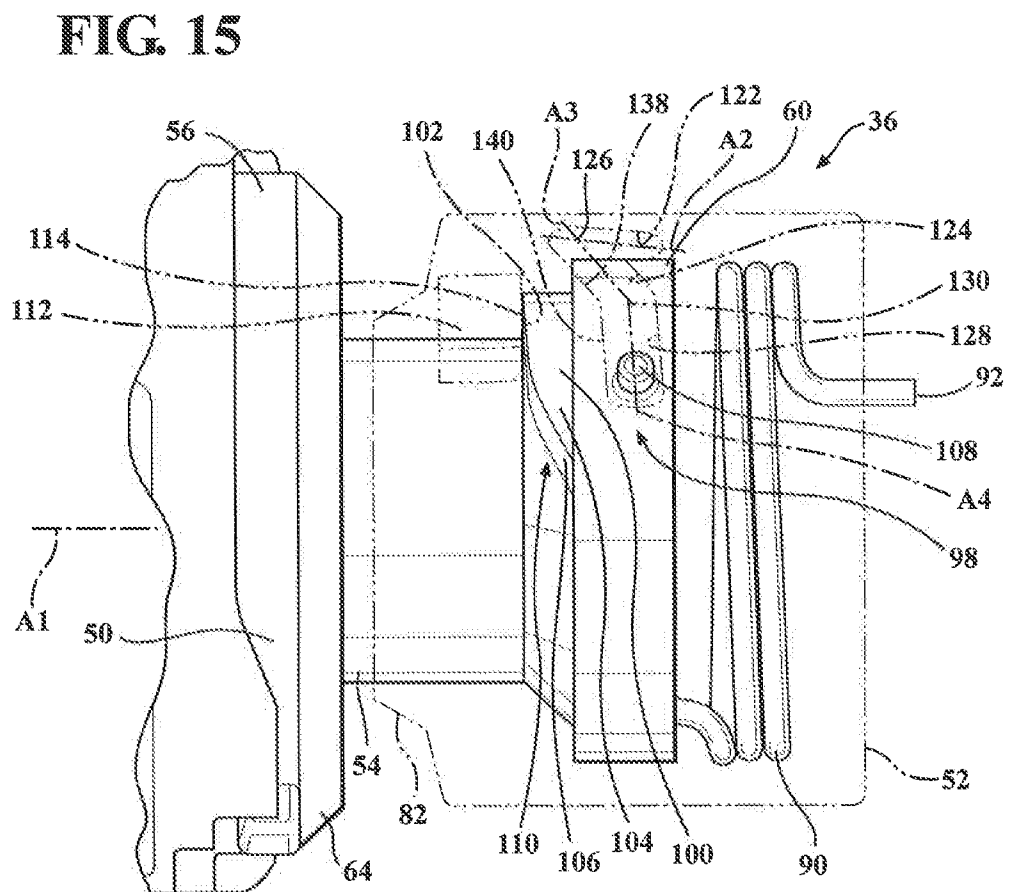
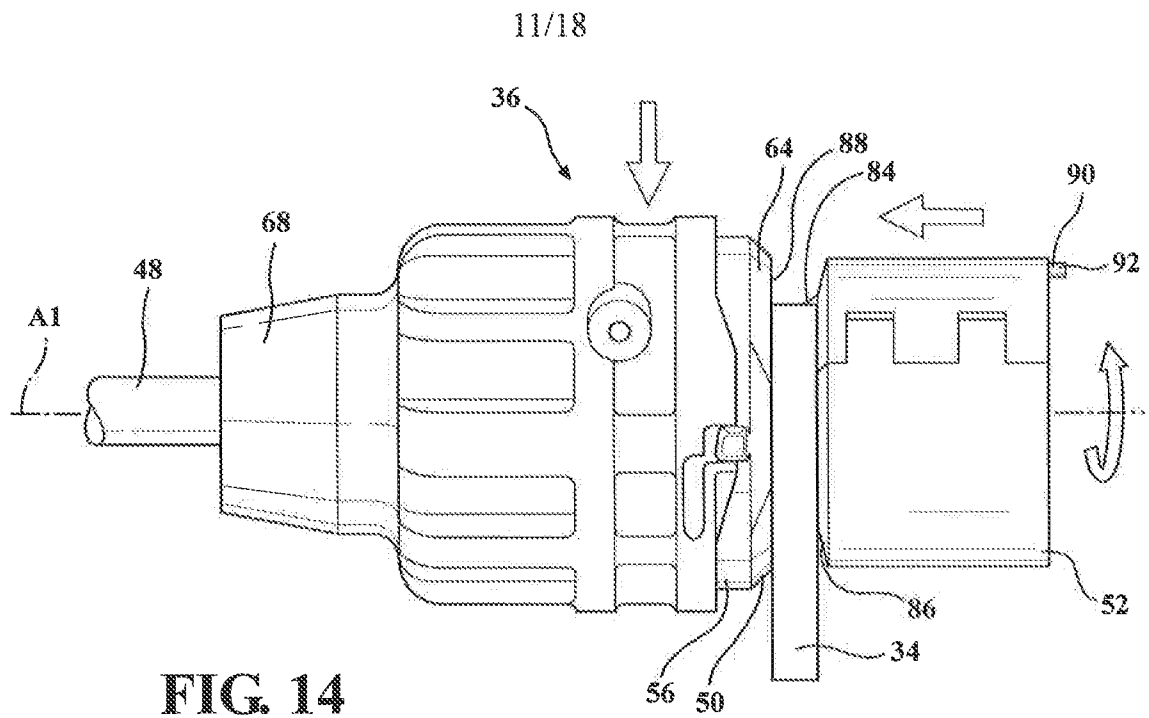


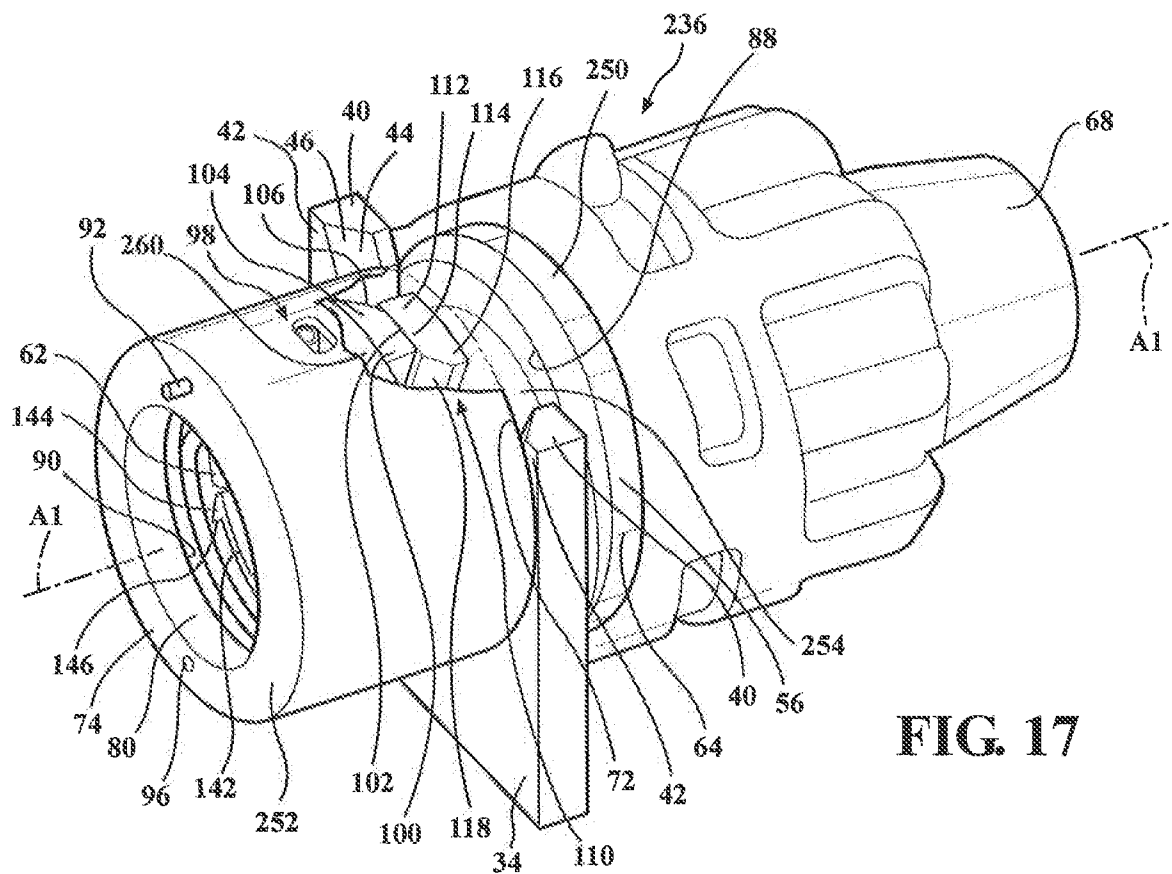
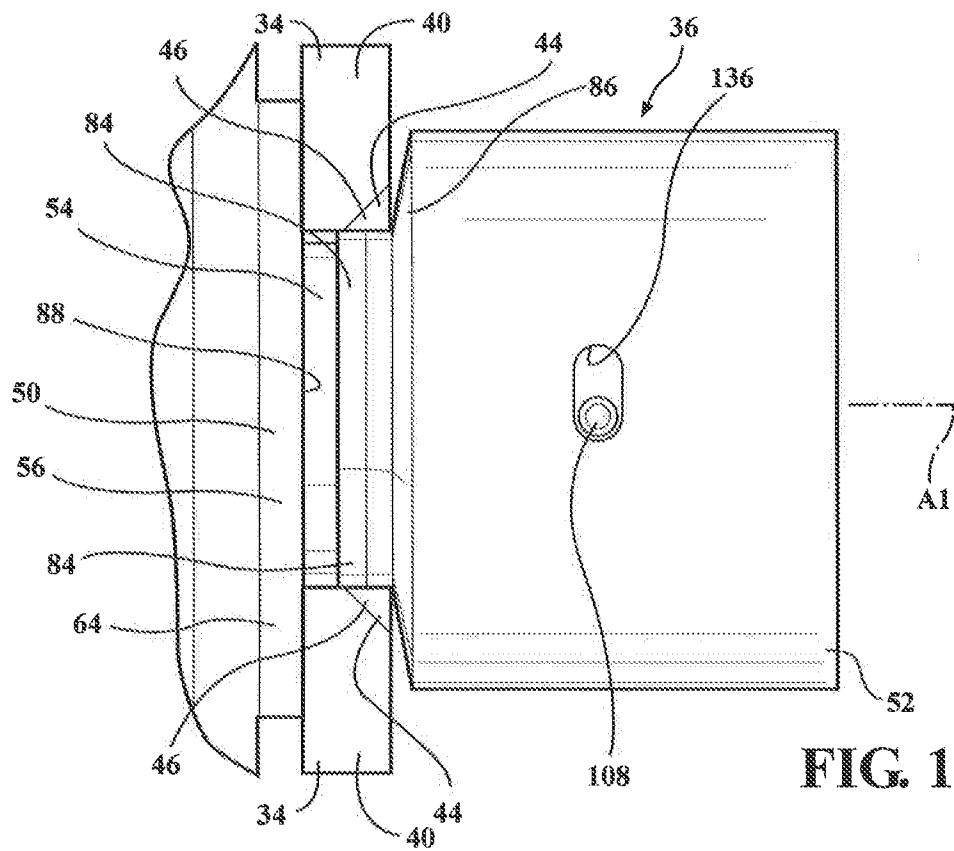
FIG. 12

FIG. 13





12/18



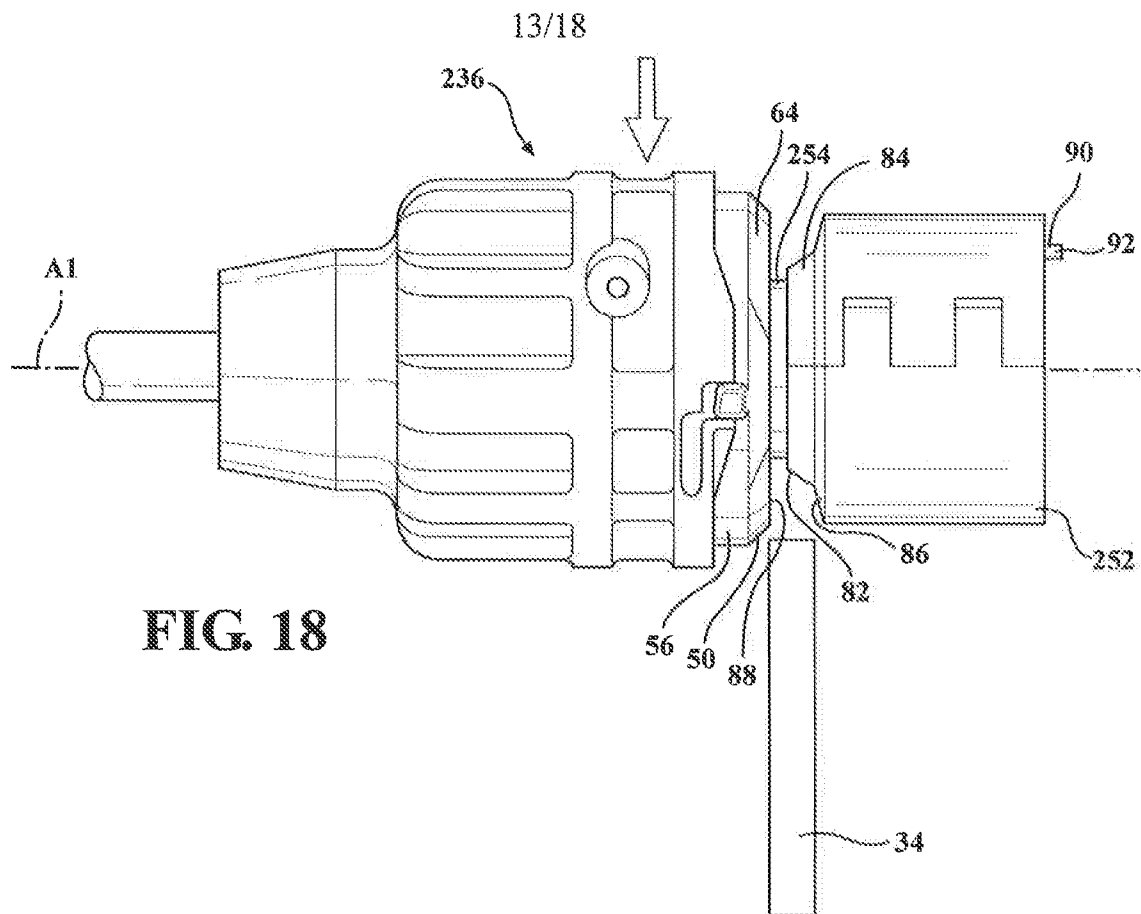


FIG. 18

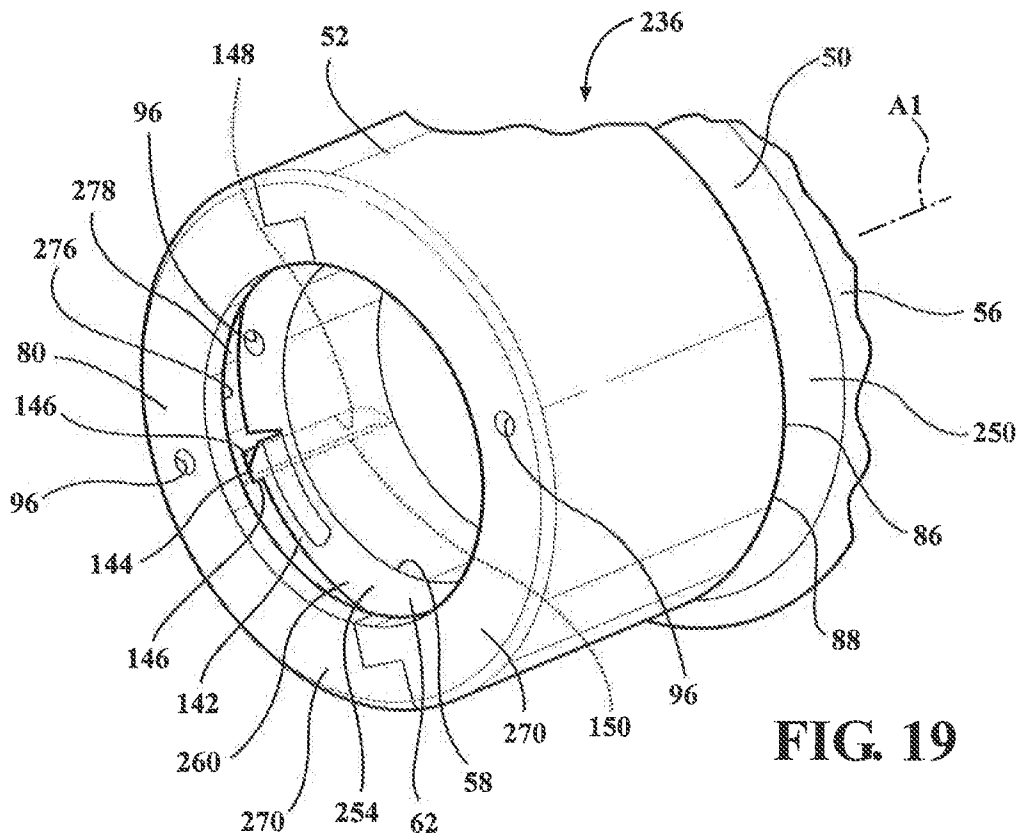
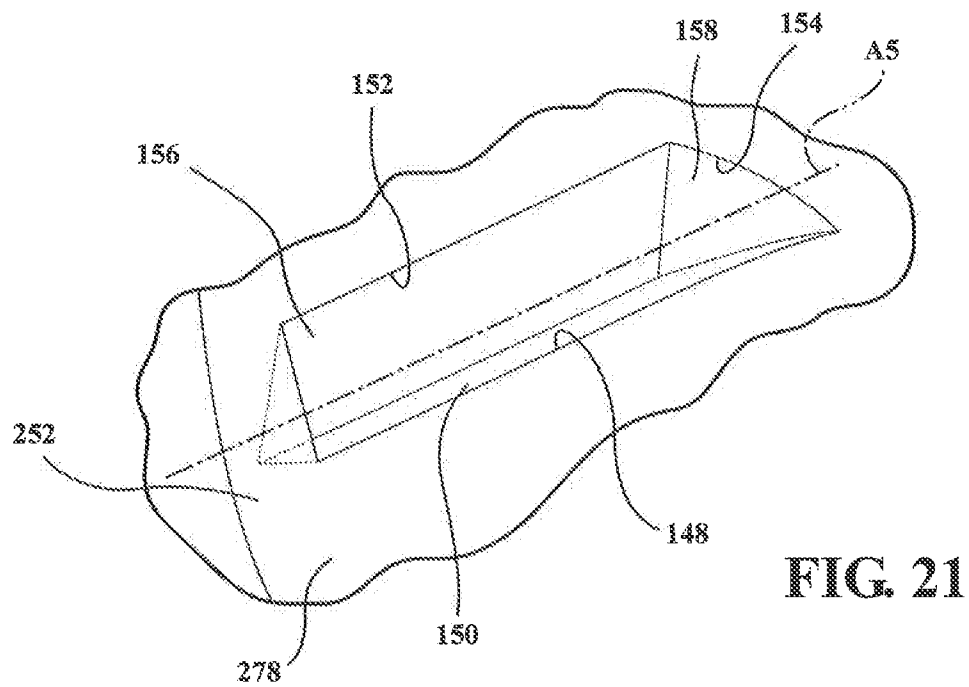
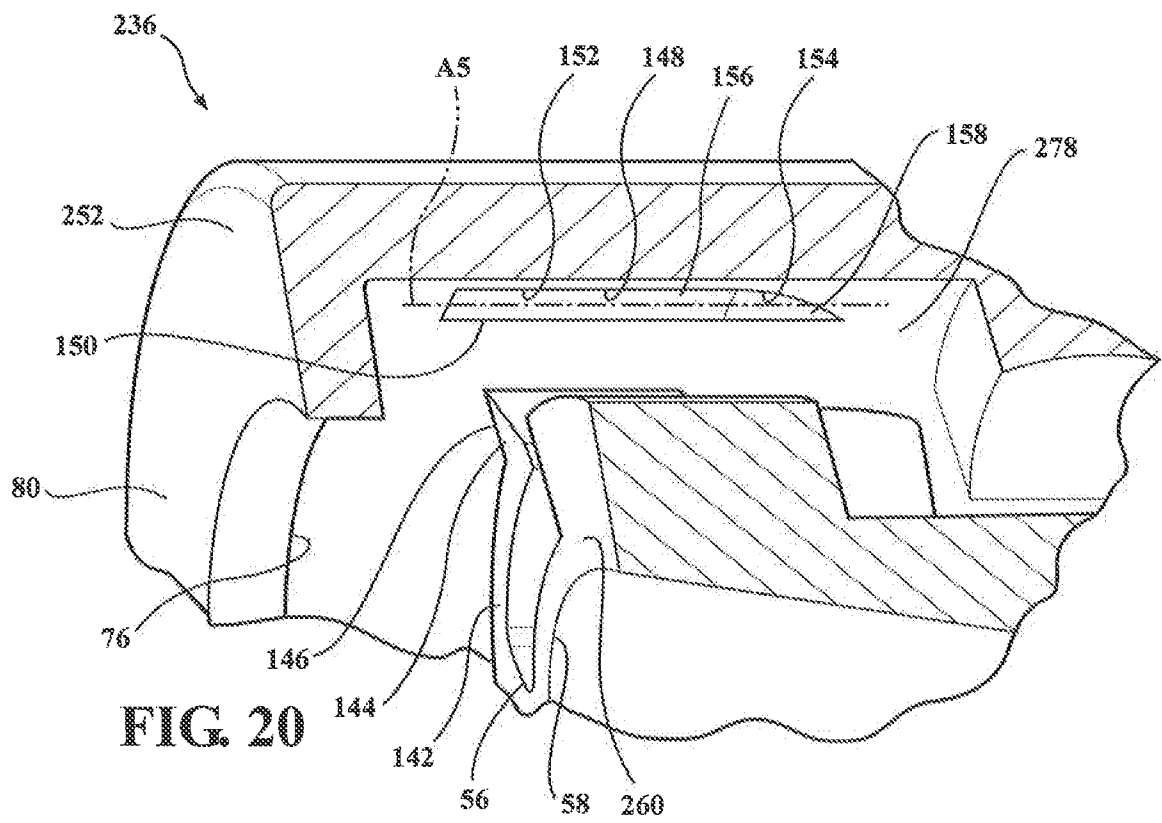
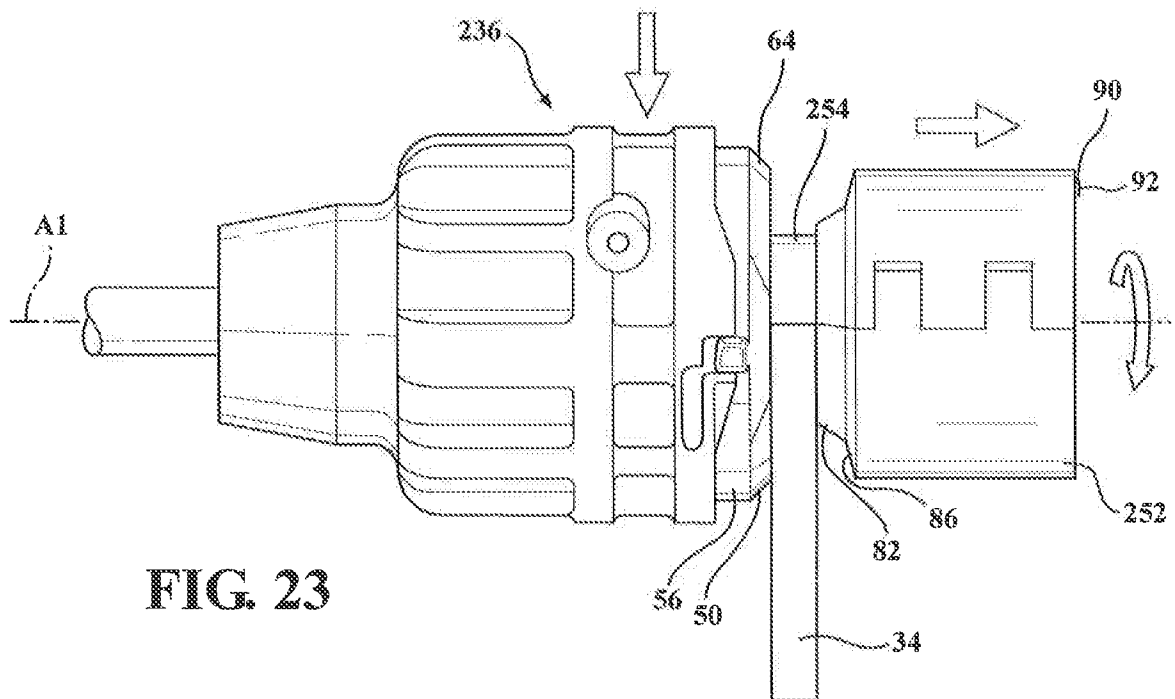
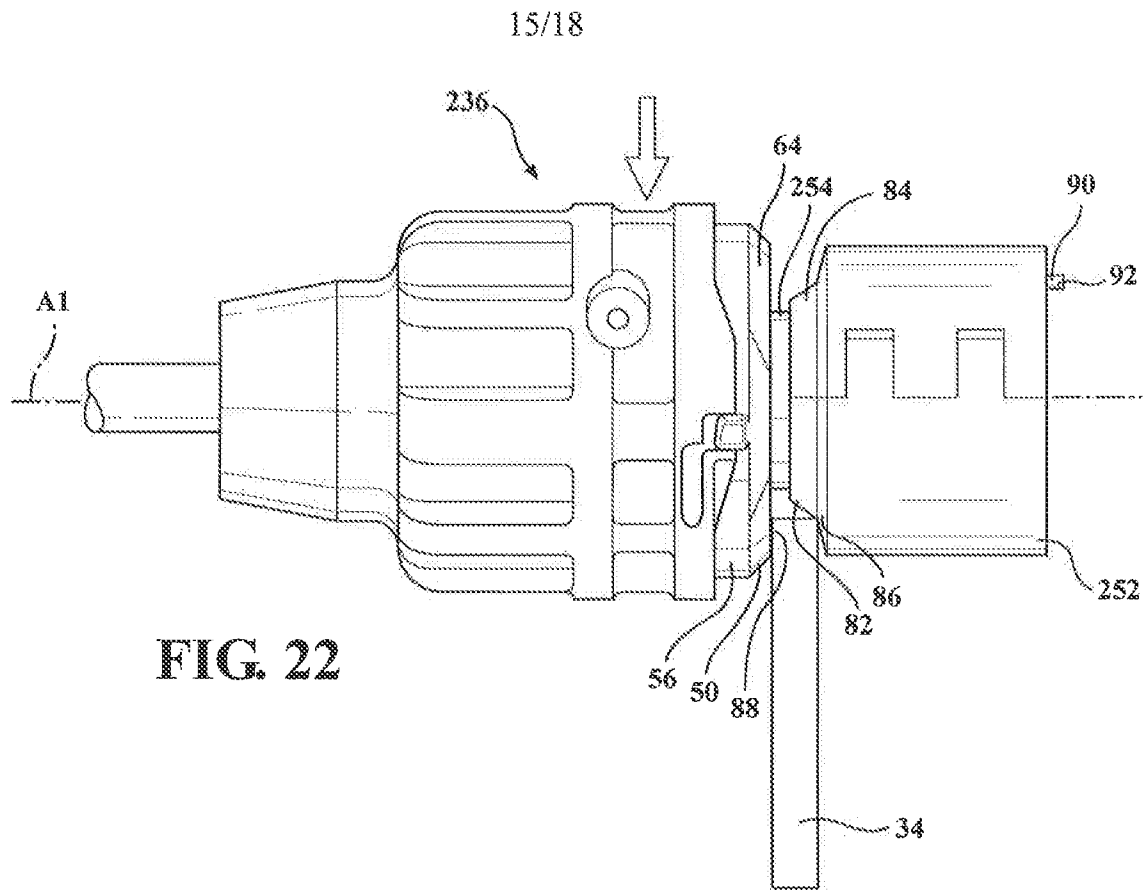


FIG. 19

14/18





16/18

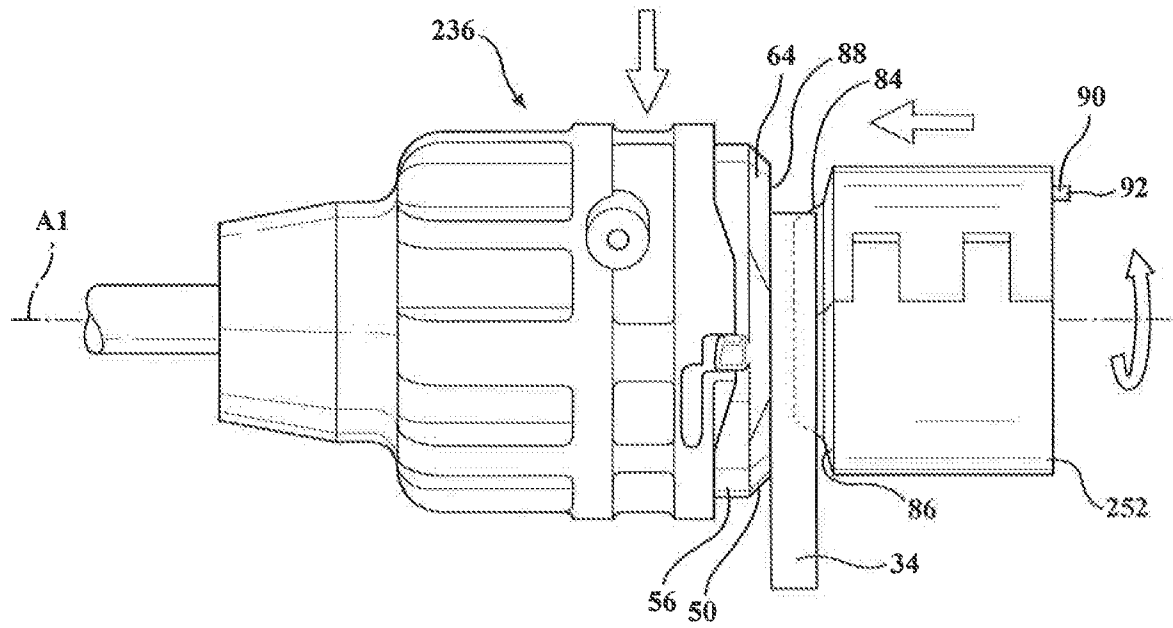


FIG. 24

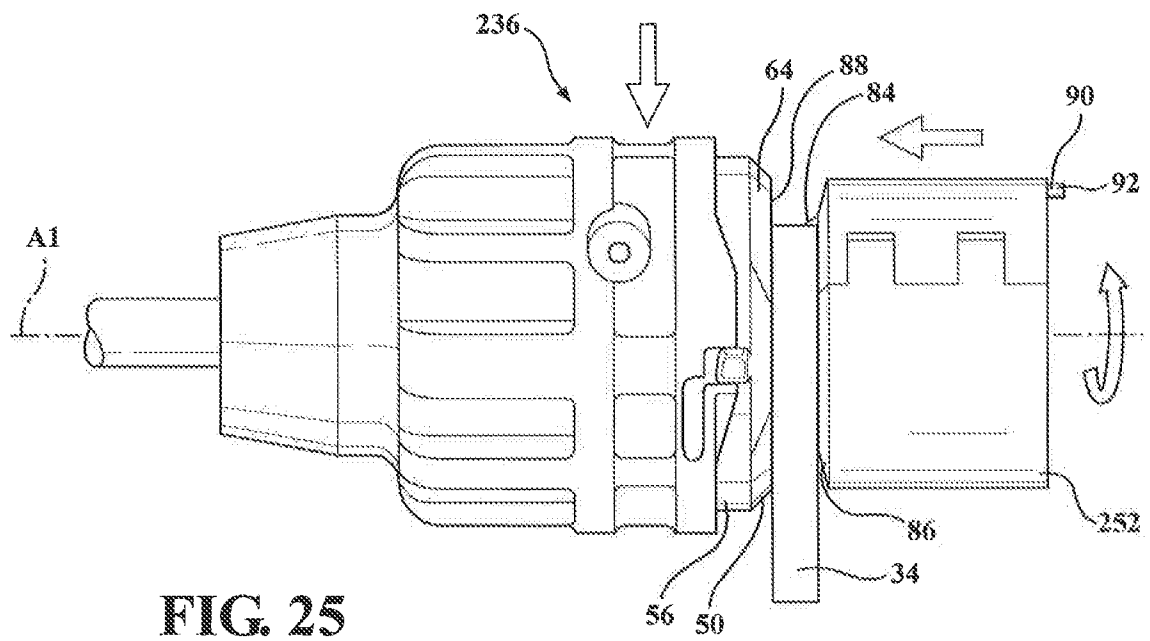
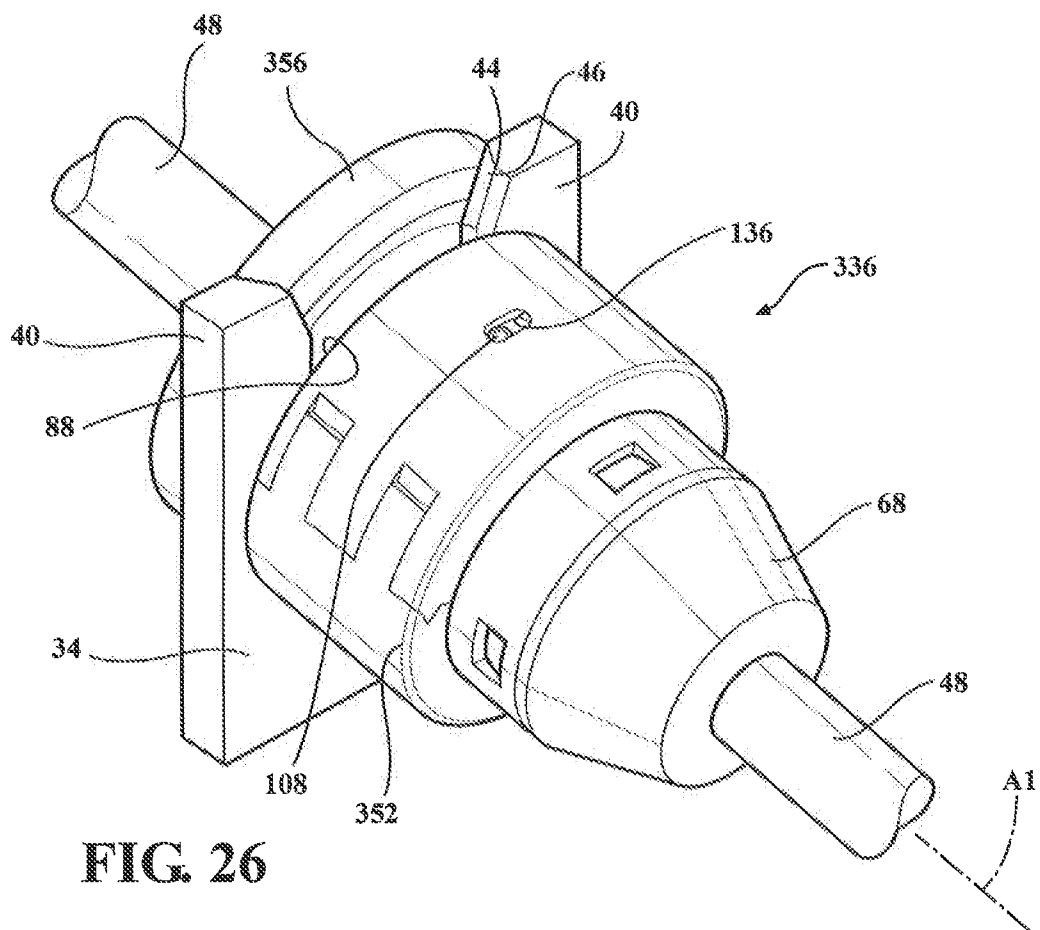


FIG. 25

17/18



18/18

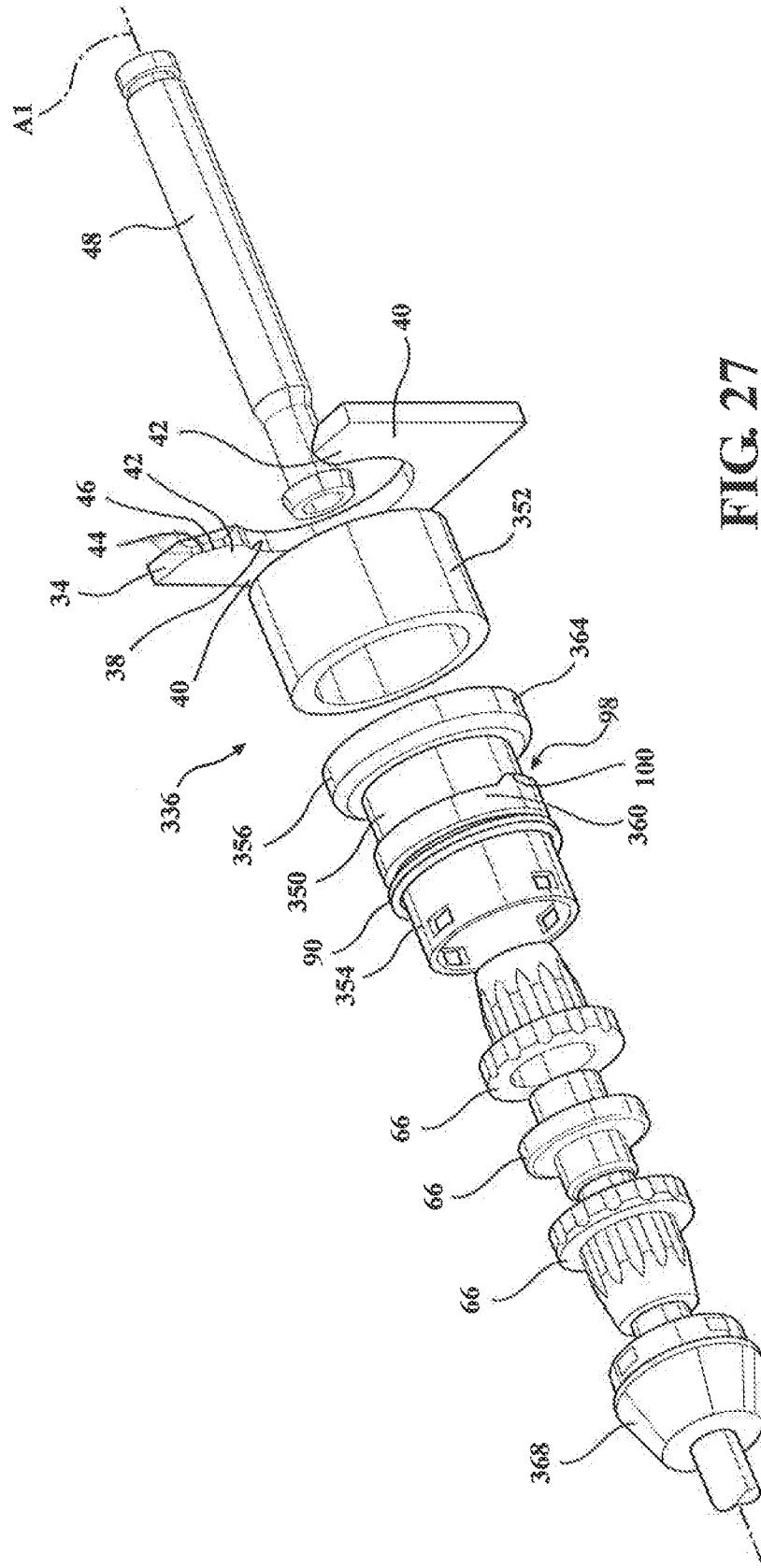


FIG. 27

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2014/001488

A. CLASSIFICATION OF SUBJECT MATTER
 INV. F16C1/10 F16C1/26
 ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 F16C

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	EP 0 987 454 A1 (FICO CABLES SA [ES]) 22 March 2000 (2000-03-22) paragraph [0004] - paragraph [0012]; figures 1-3, 12-15, 26 -----	1-18
A	US 2004/129105 A1 (GORDY DONALD G [US] ET AL) 8 July 2004 (2004-07-08) paragraphs [0008] - [0013], [0053], [0054]; figures -----	1-18
A	EP 2 431 621 A1 (SILA HOLDING INDUSTRIALE SPA [IT]) 21 March 2012 (2012-03-21) paragraph [0004] - paragraph [0012]; figures -----	1-18
A	WO 2010/012291 A1 (KONGSBERG DRIVELINE SYSTEMS SA [FR]; JOLY PASCAL [FR]) 4 February 2010 (2010-02-04) page 2, line 24 - page 6, line 5; figures -----	1-18



Further documents are listed in the continuation of Box C.



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Date of the actual completion of the international search

25 September 2014

Date of mailing of the international search report

07/10/2014

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Authorized officer

Daehnhardt, Andreas

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2014/001488

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