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COENEGRACHT et al.

(54) **CABLE FIXATION DEVICES AND ARRANGEMENTS WITH IMPROVED INSTALLATION AND SPACE UTILIZATION AT TELECOMMUNICATIONS ENCLOSURES**

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(73) Assignee: **COMMSCOPE TECHNOLOGIES LLC**, Hickory, NC (US)

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Related U.S. Application Data

(63) Continuation of application No. 18/531,924, filed on Dec. 7, 2023, now Pat. No. 12,292,612, which is a continuation of application No. 17/798,231, filed on Aug. 8, 2022, filed as application No. PCT/US2021/017678 on Feb. 11, 2021, now Pat. No. 11,867,872.

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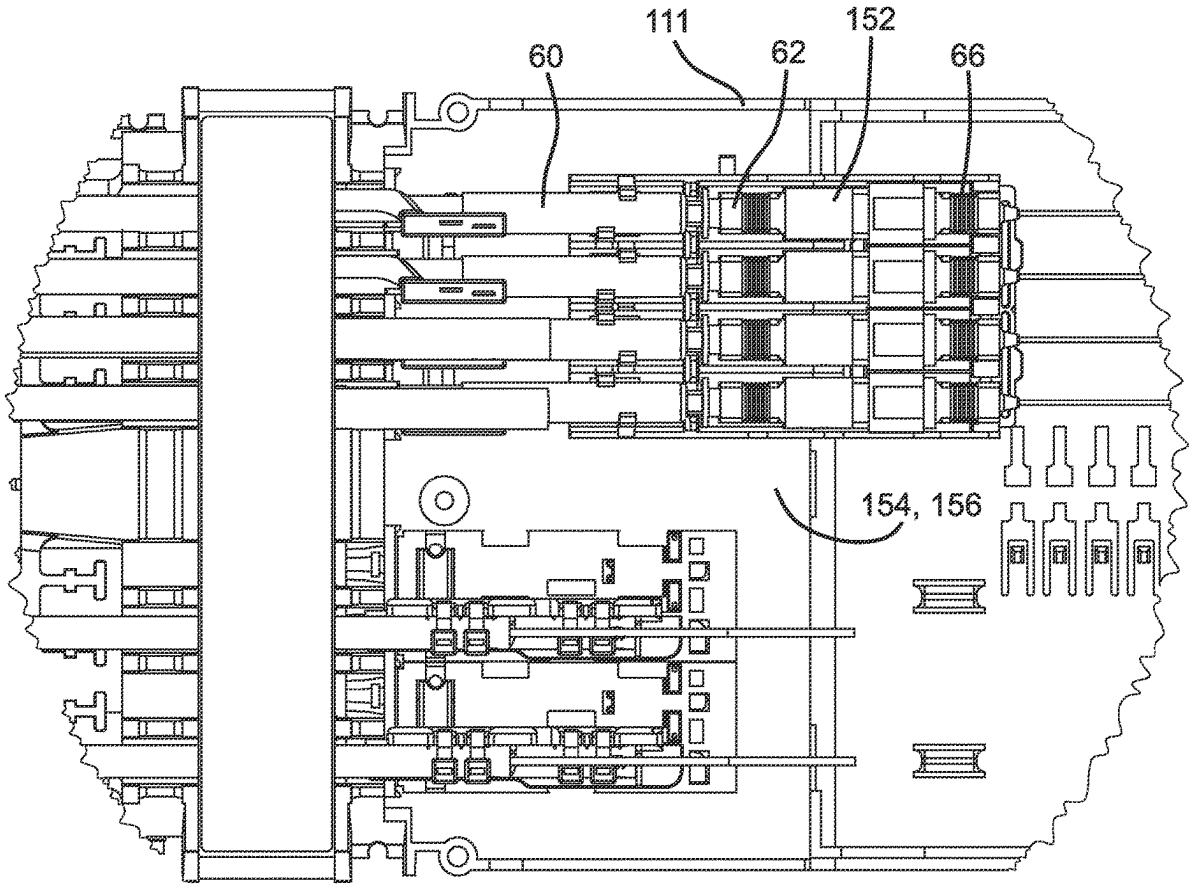
G02B 6/44 (2006.01)

(52) **U.S. Cl.**
CPC ***G02B 6/4477*** (2013.01); ***G02B 6/44765*** (2023.05)

(57) **ABSTRACT**

Devices, arrangements and methods for fixing telecommunications cables relative to a telecommunications closure. Features of the devices and arrangements can make more efficient use of an interior closure volume and enhance a closure's capabilities with respect to handling different types of telecommunications cables and optical fiber routing schemes.



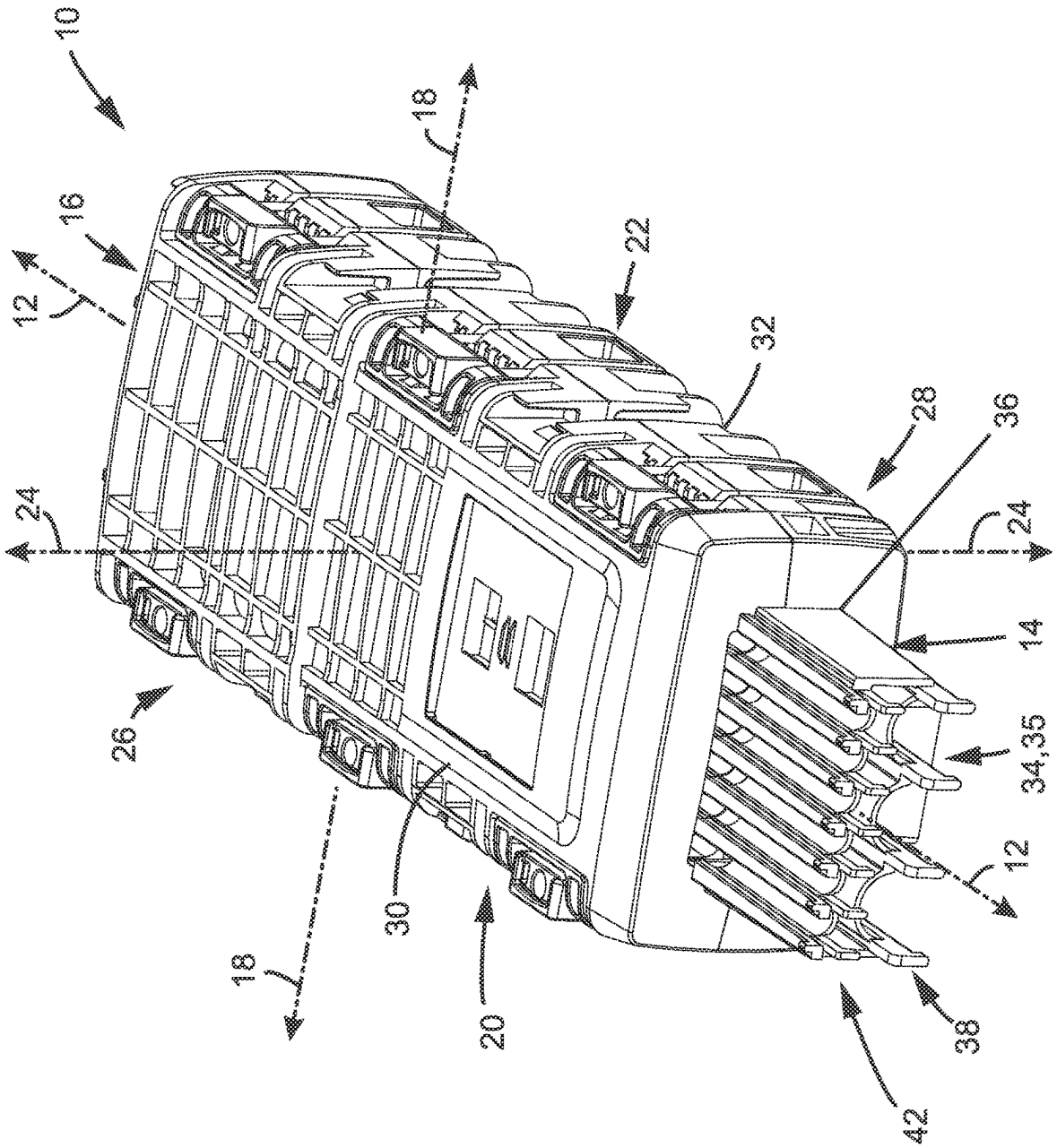


FIG. 1

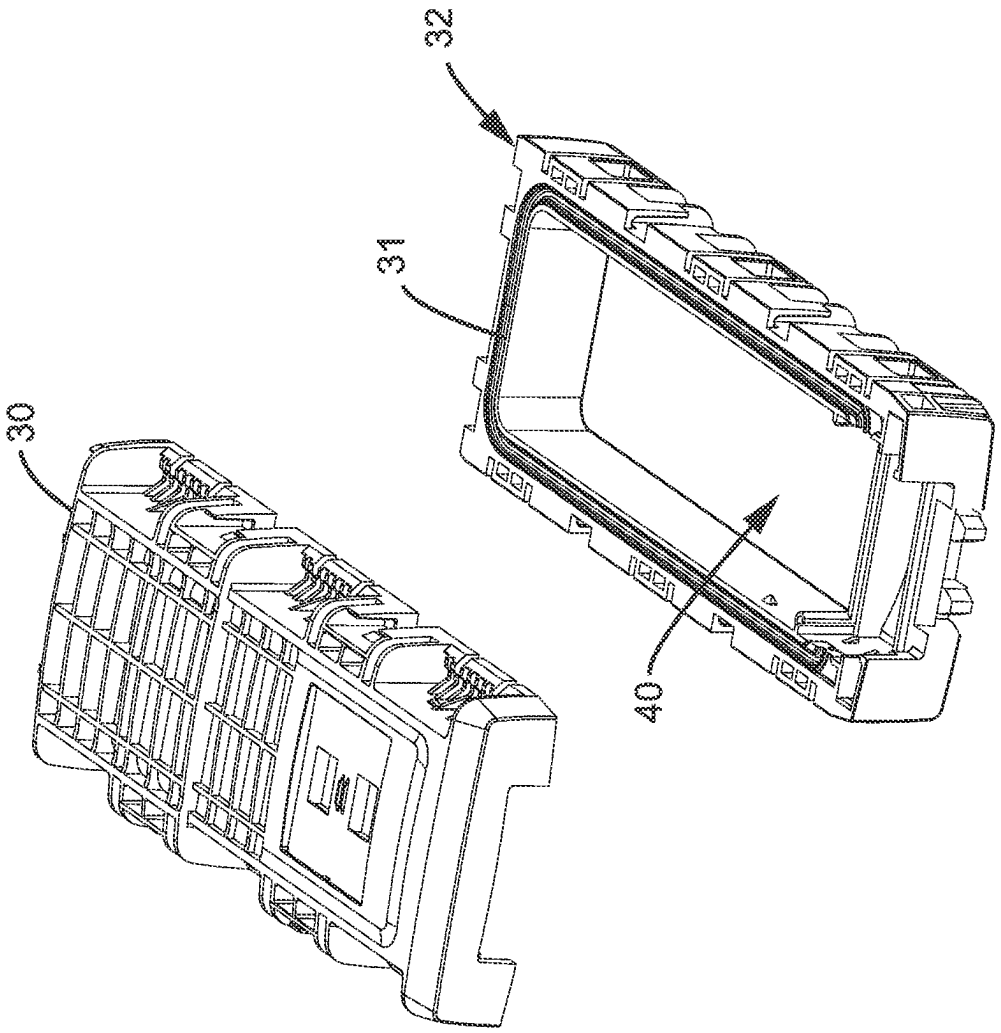


FIG. 2

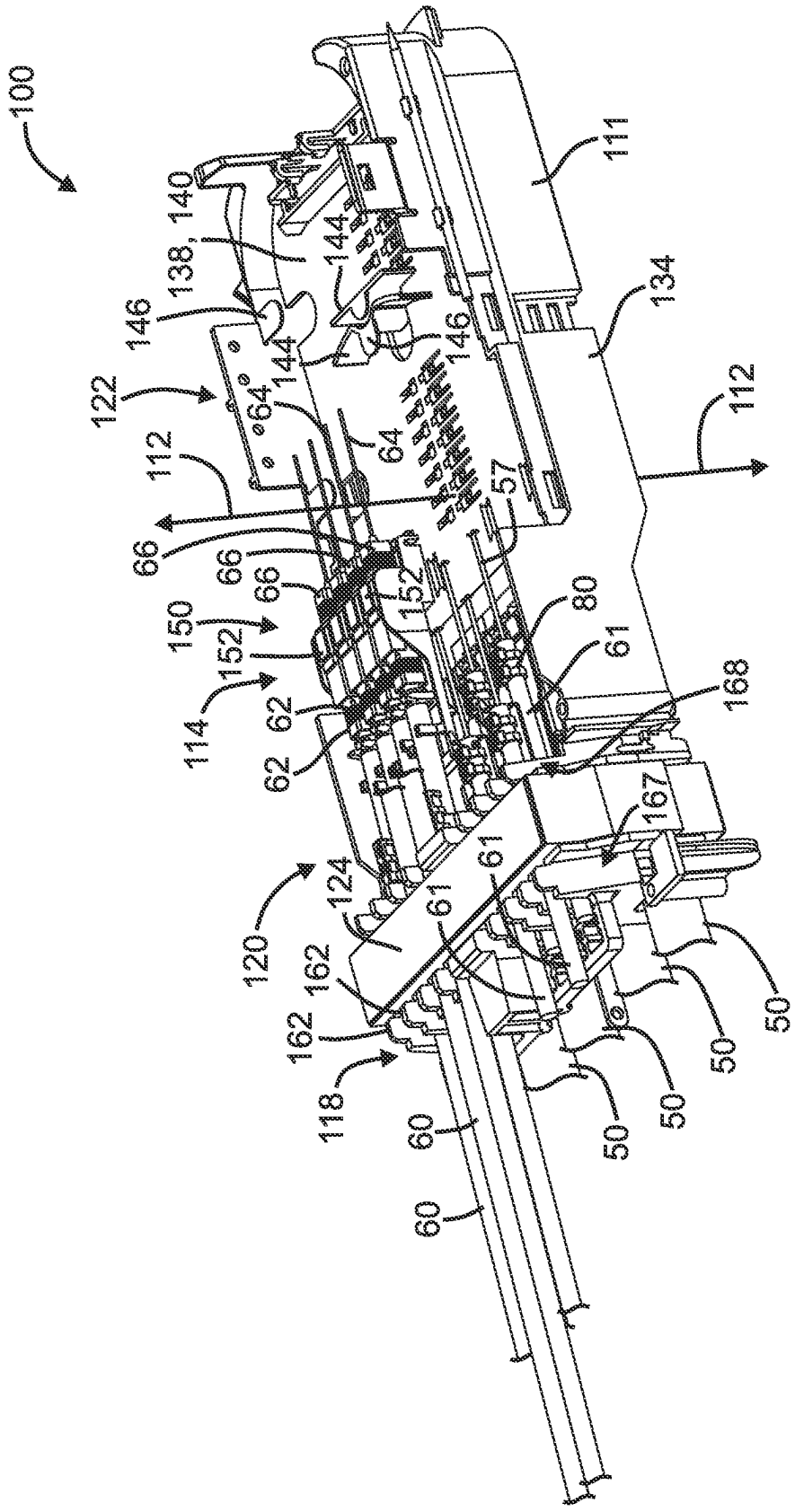

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FIG. 3

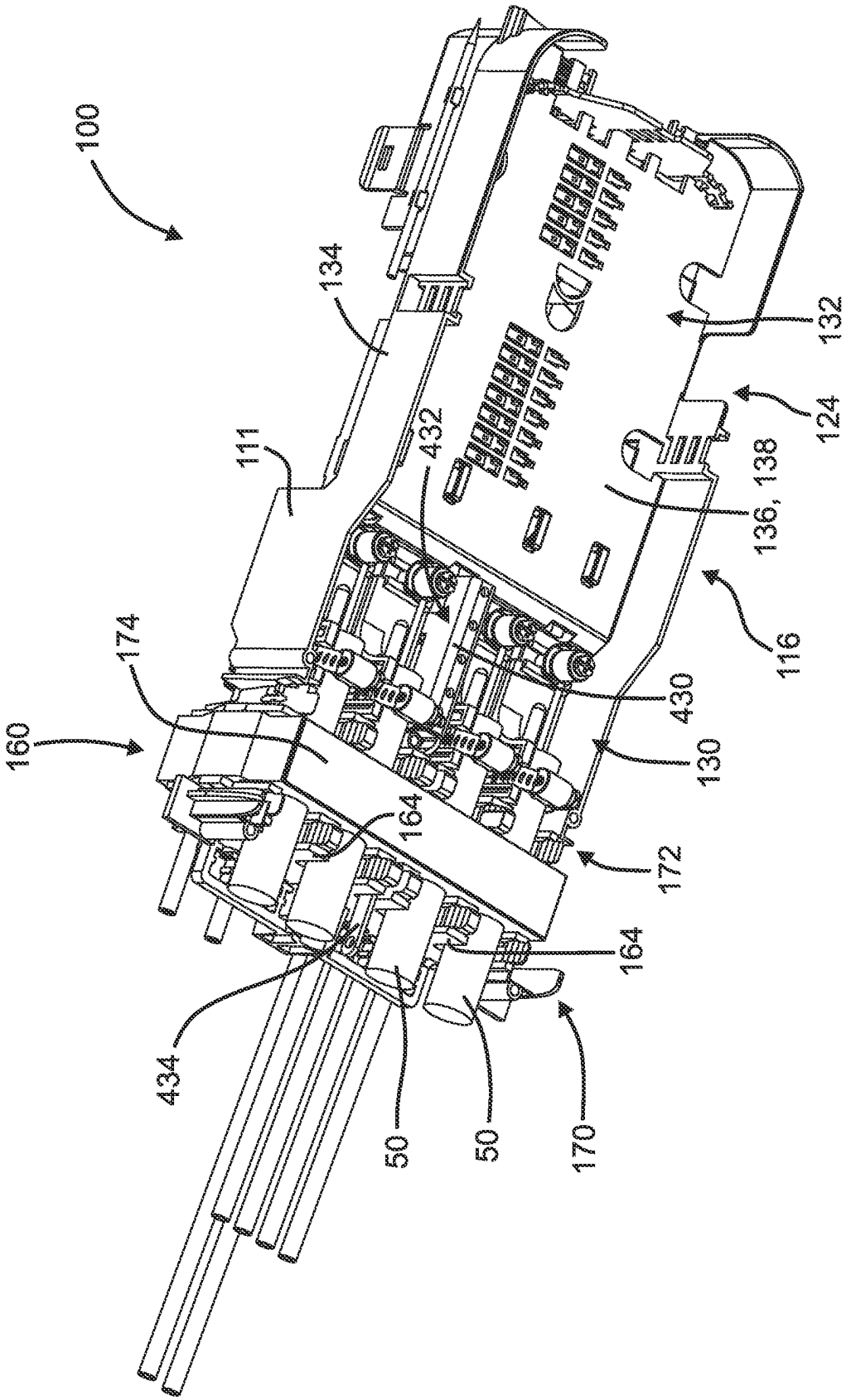
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FIG. 4

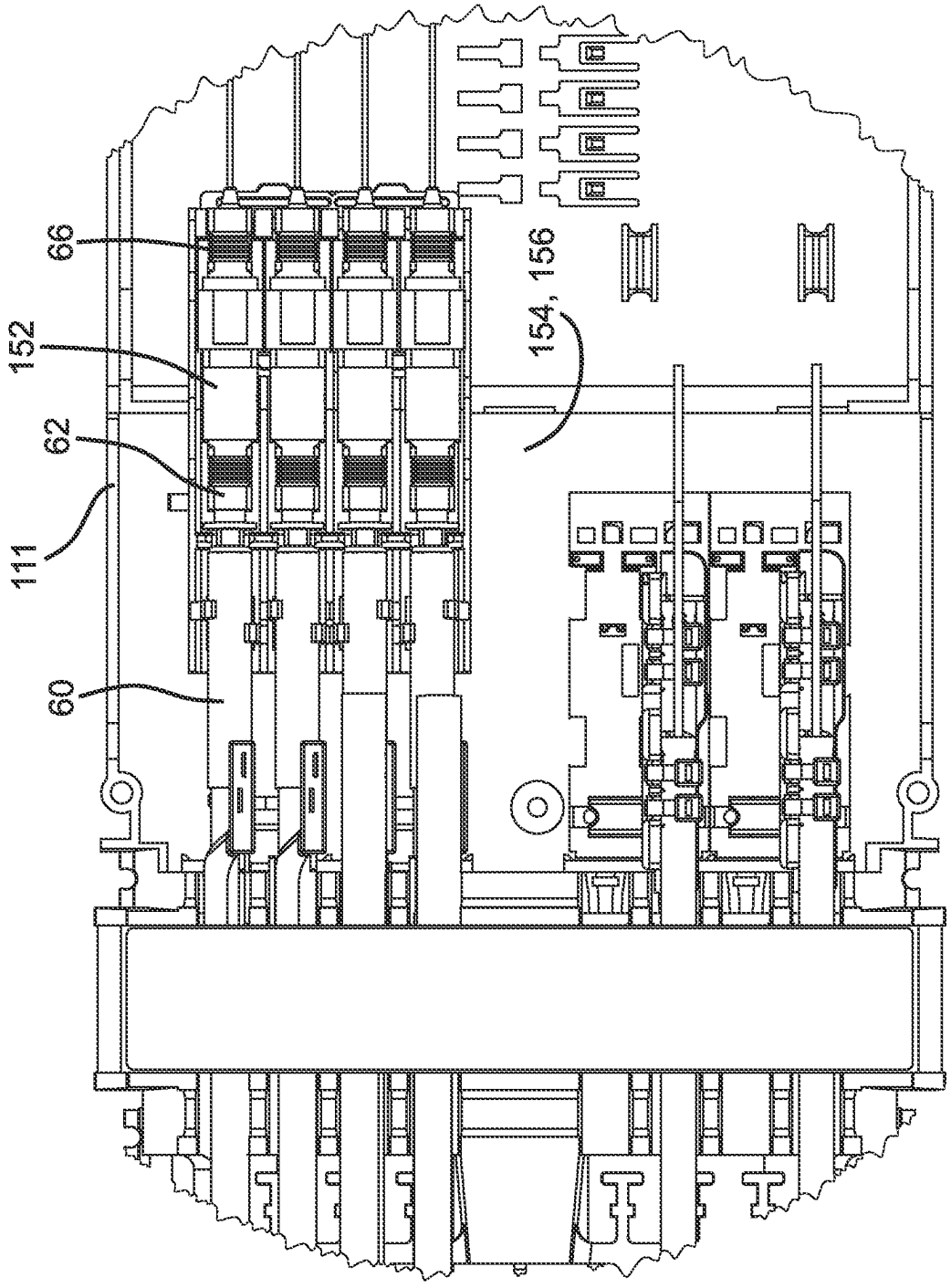

FIG. 5

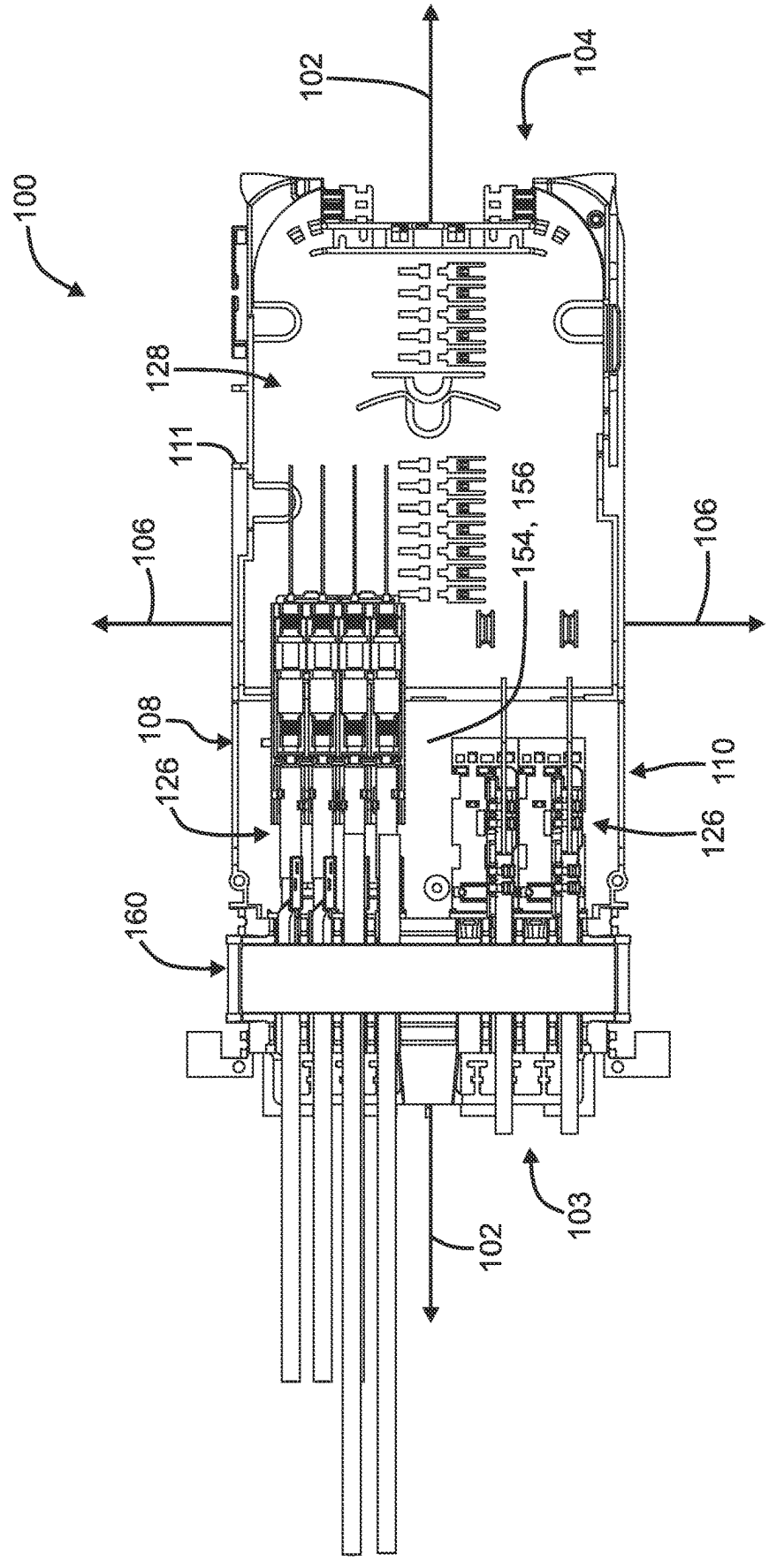

FIG. 6

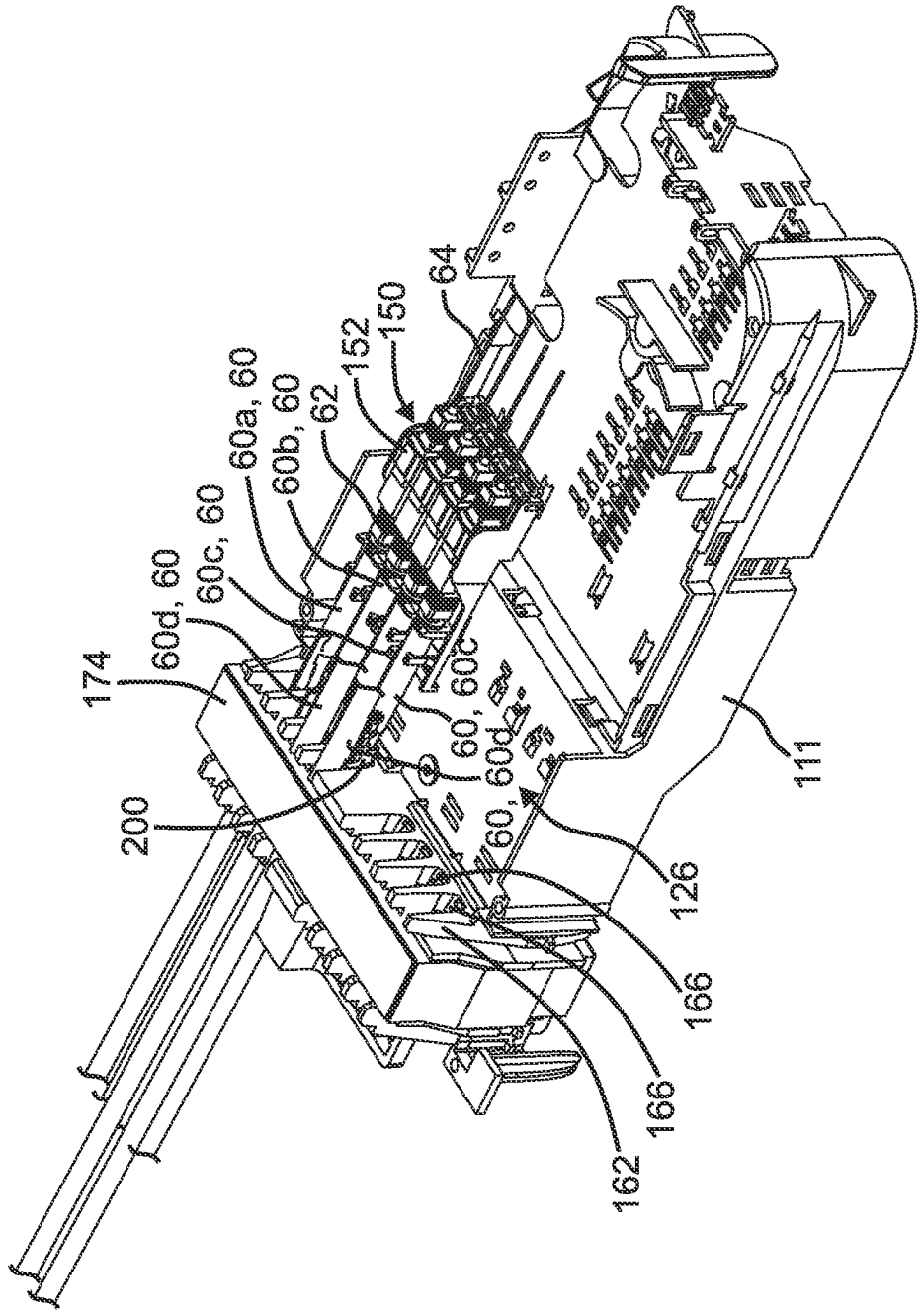
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FIG. 7

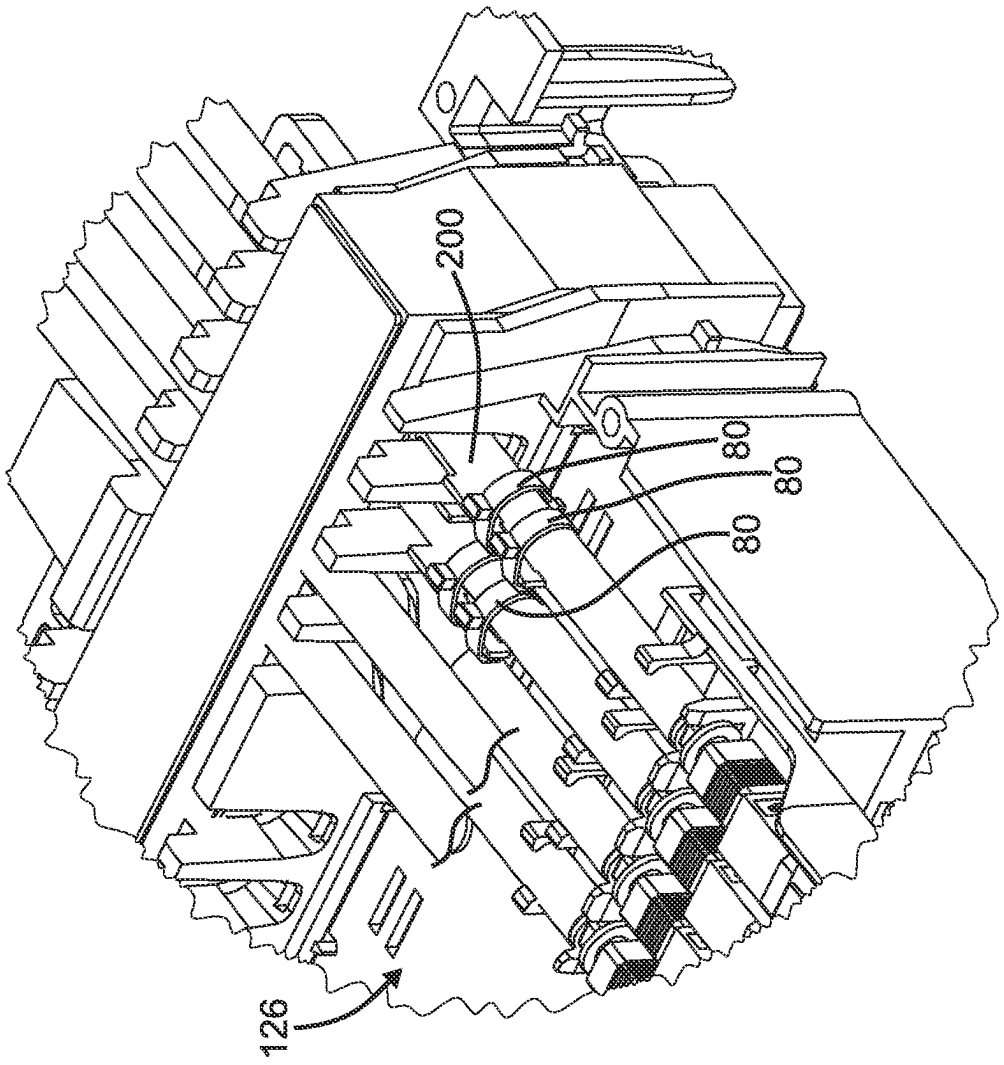

FIG. 8

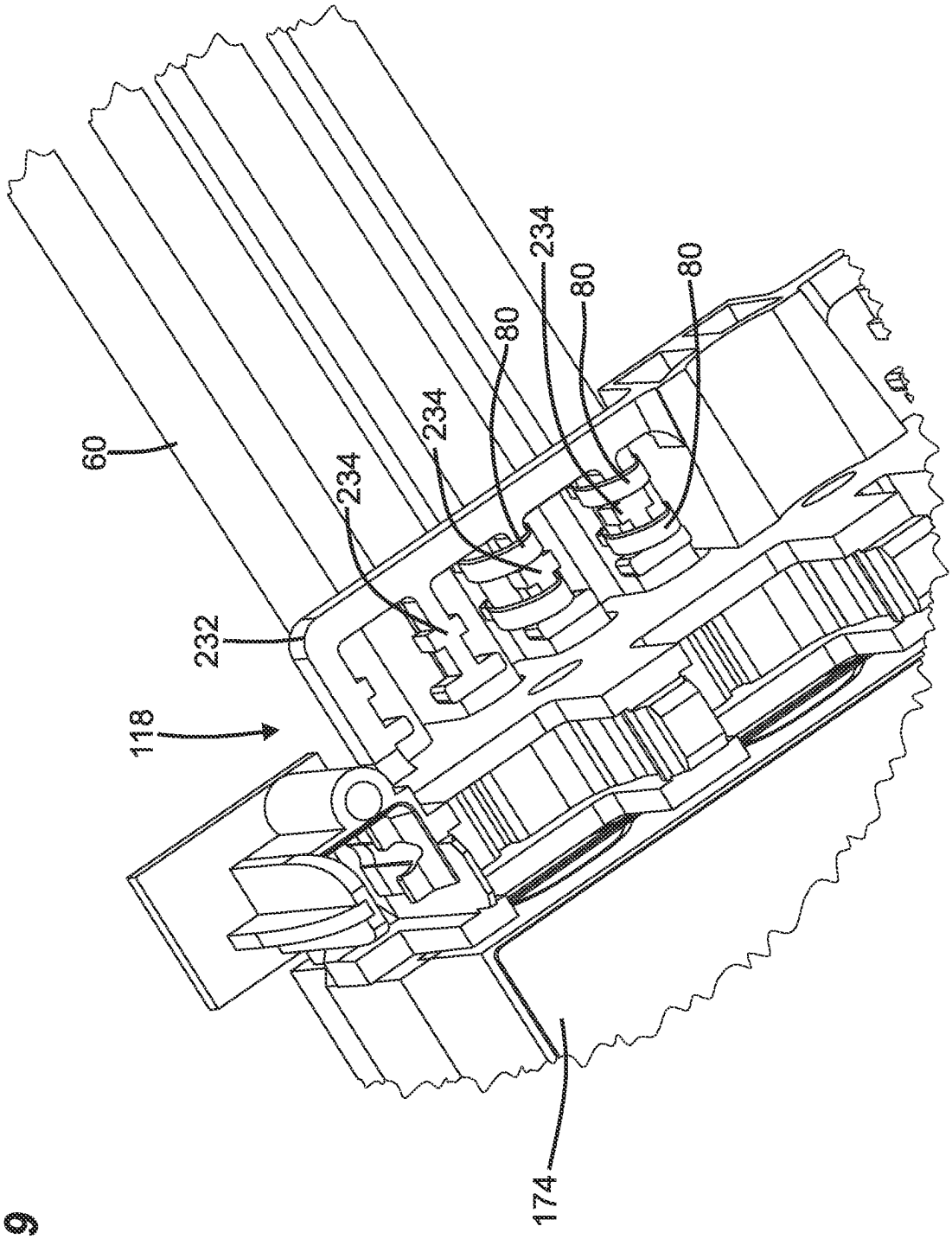

FIG. 9

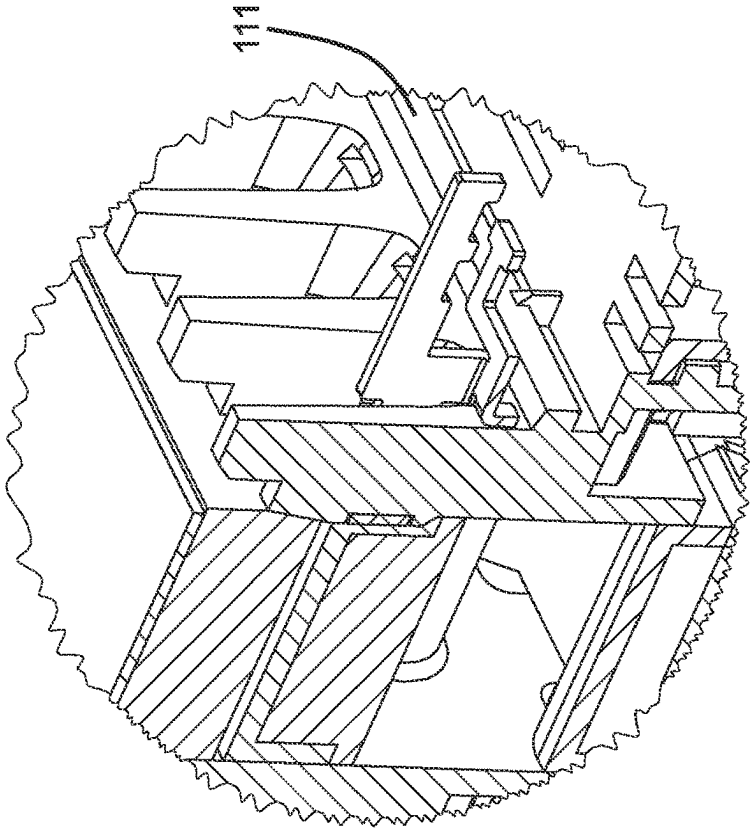

FIG. 11

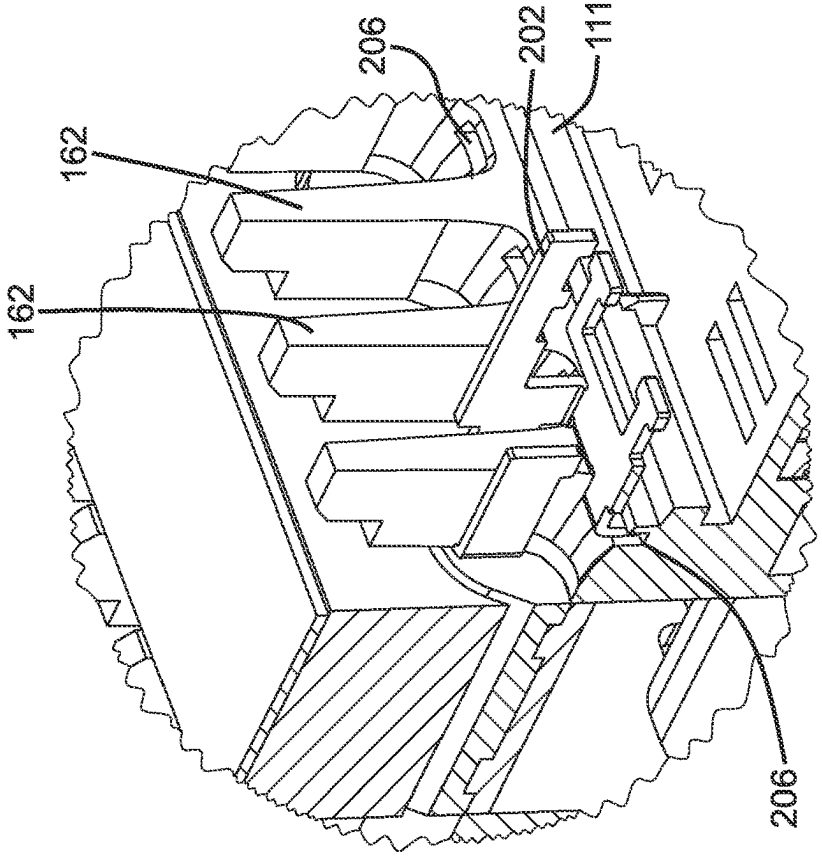

FIG. 10

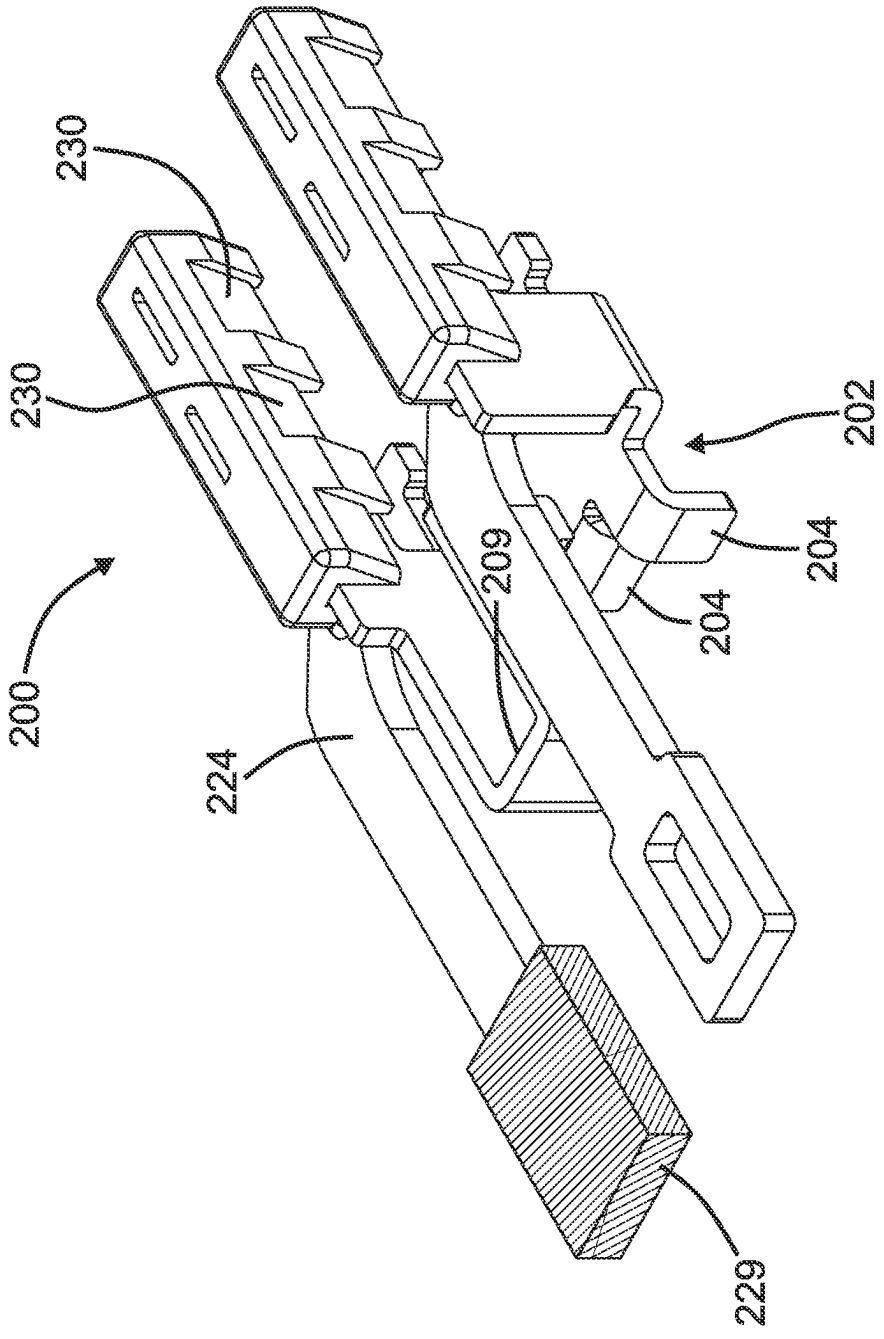

FIG. 12

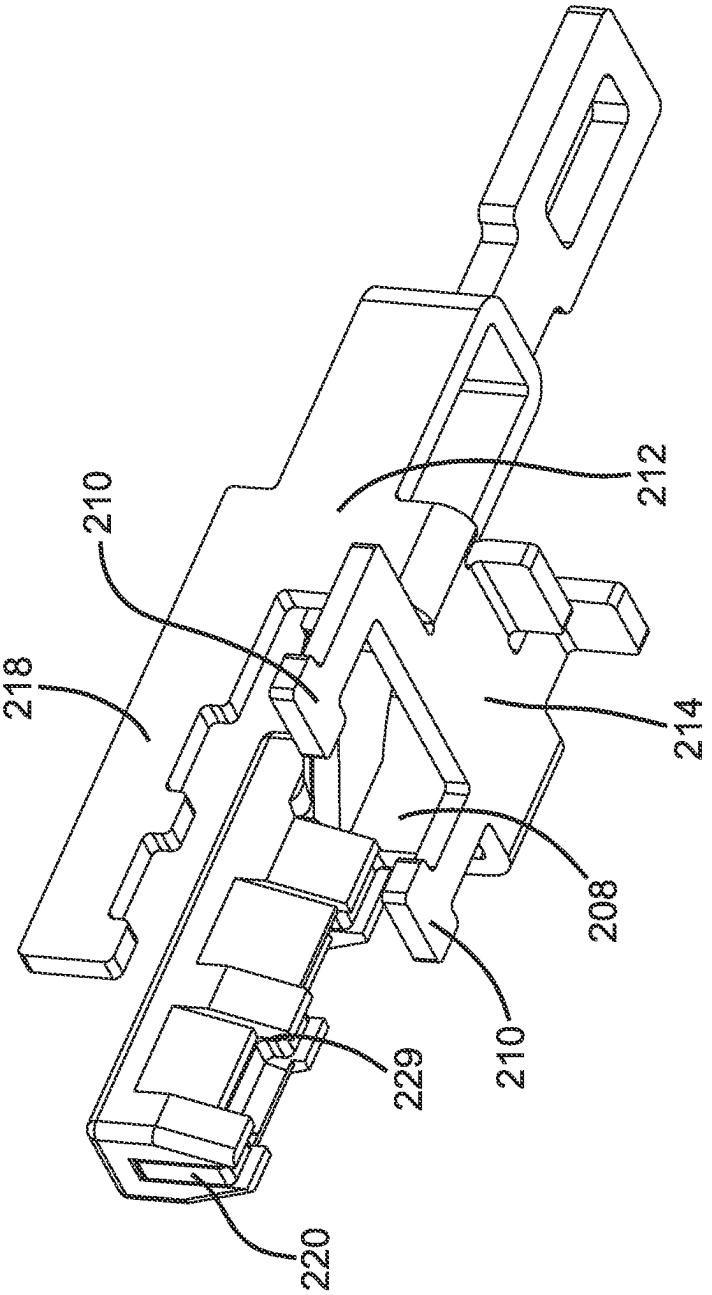

FIG. 13

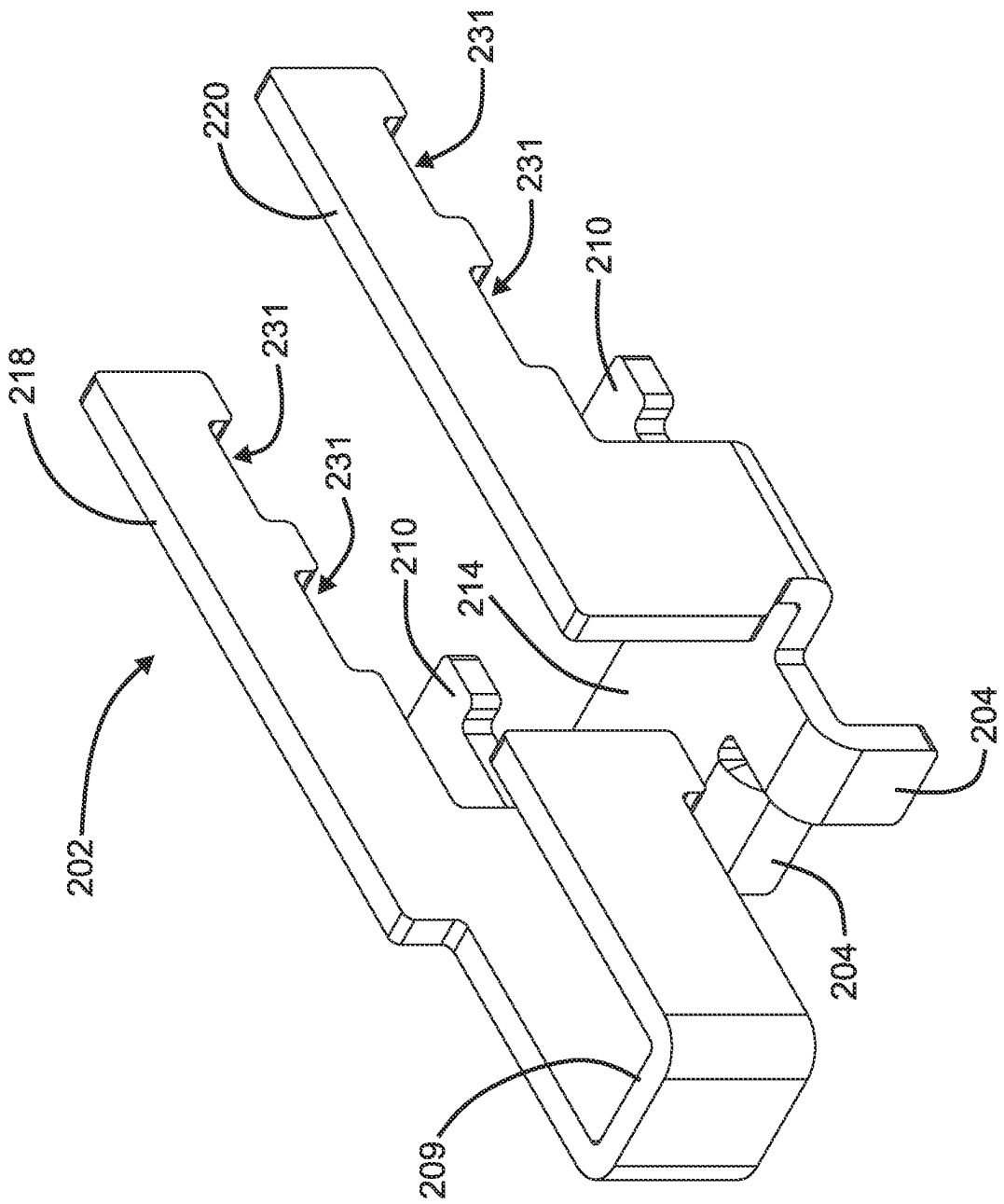

FIG. 14

FIG. 15

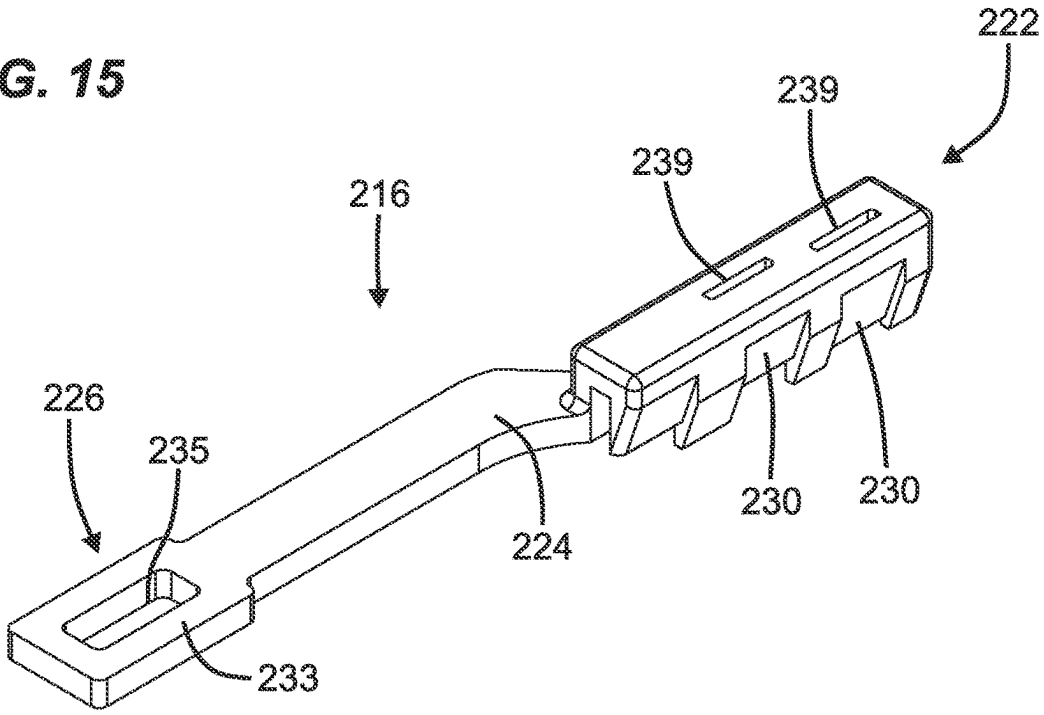
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FIG. 16

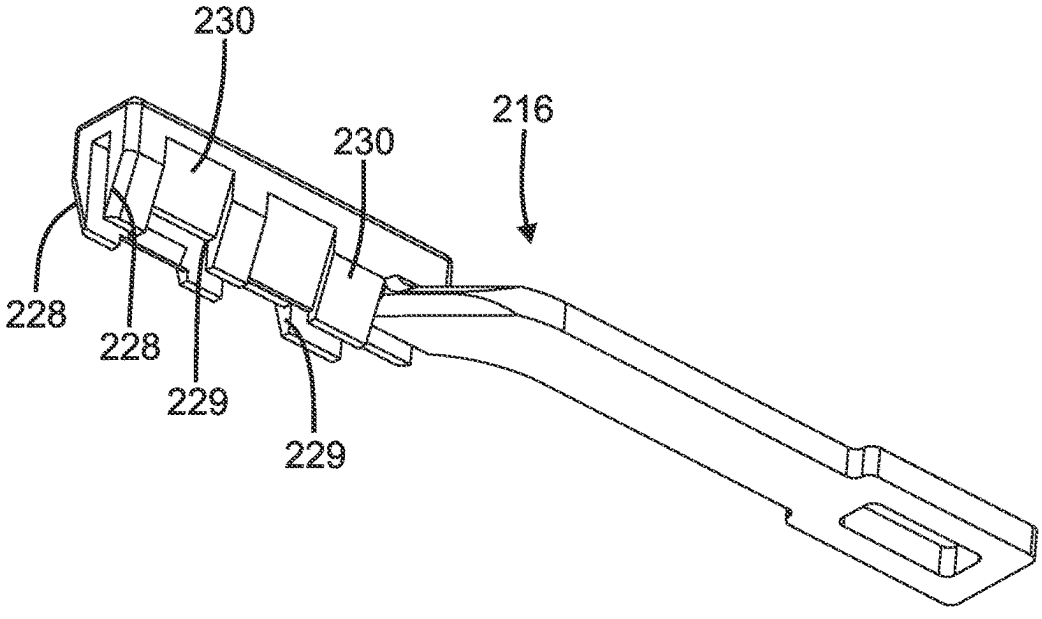
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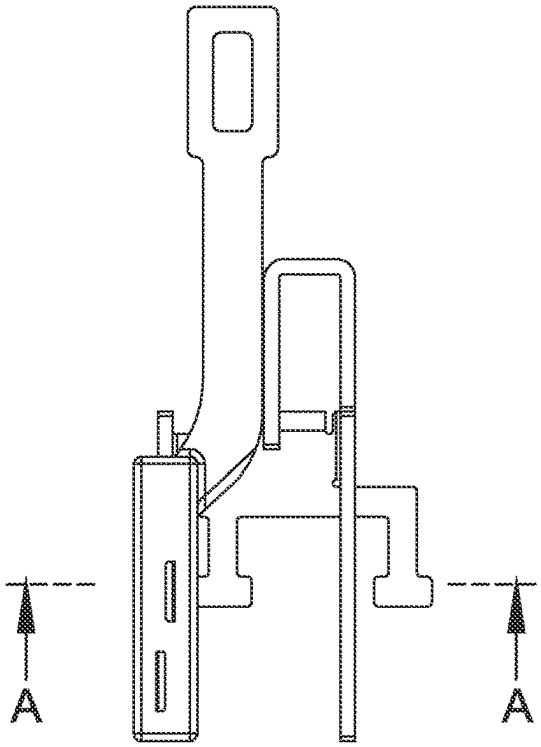
FIG. 17



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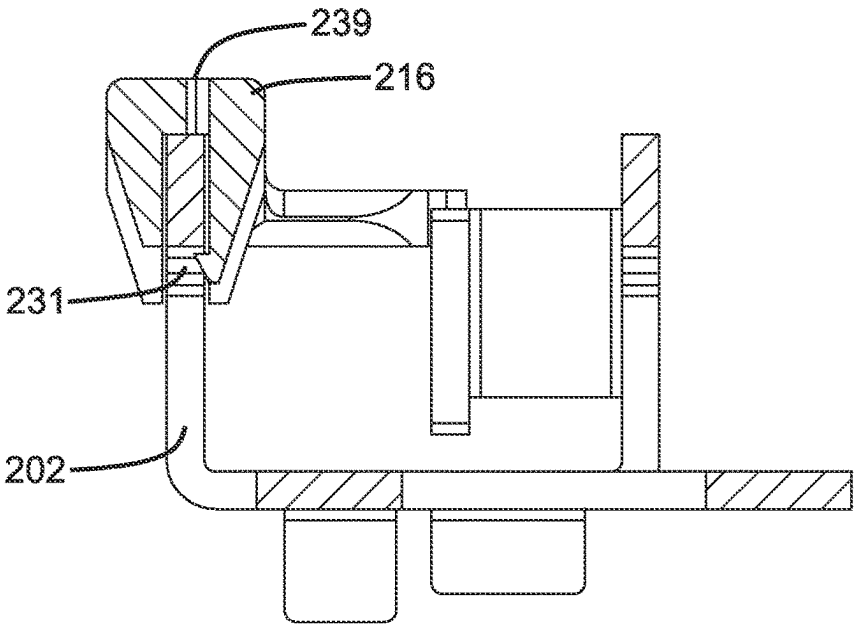

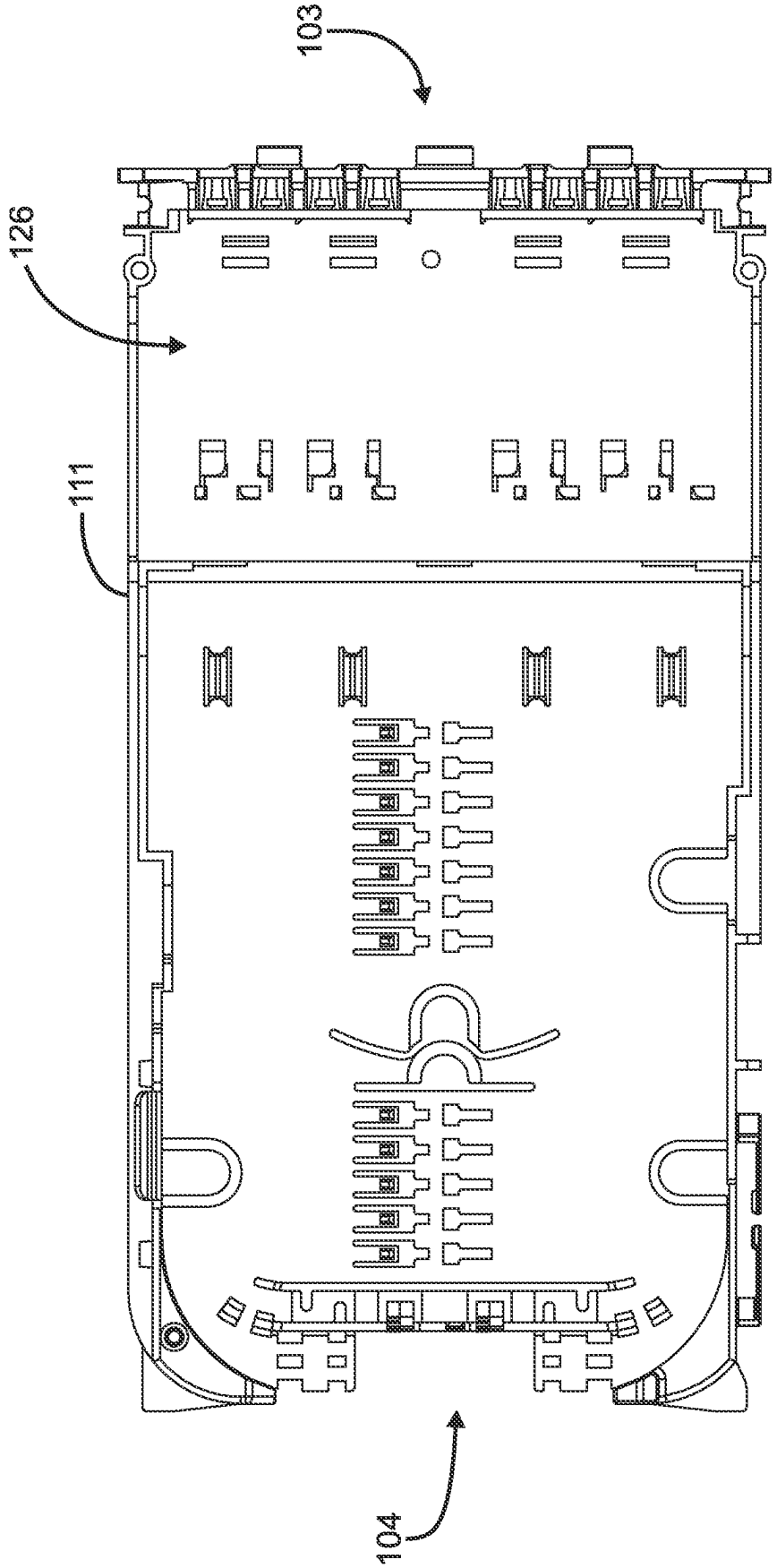

FIG. 19

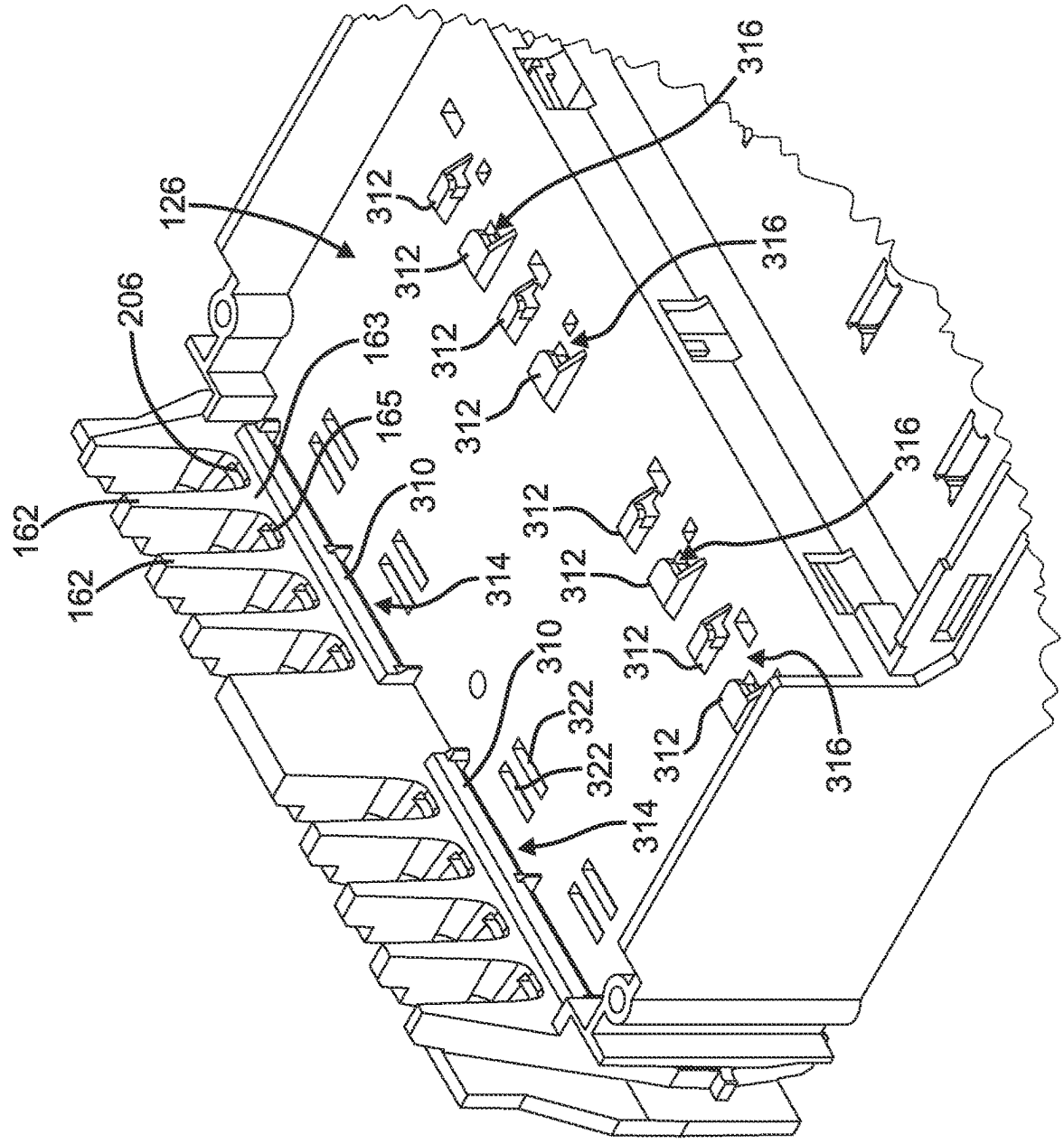
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FIG. 20

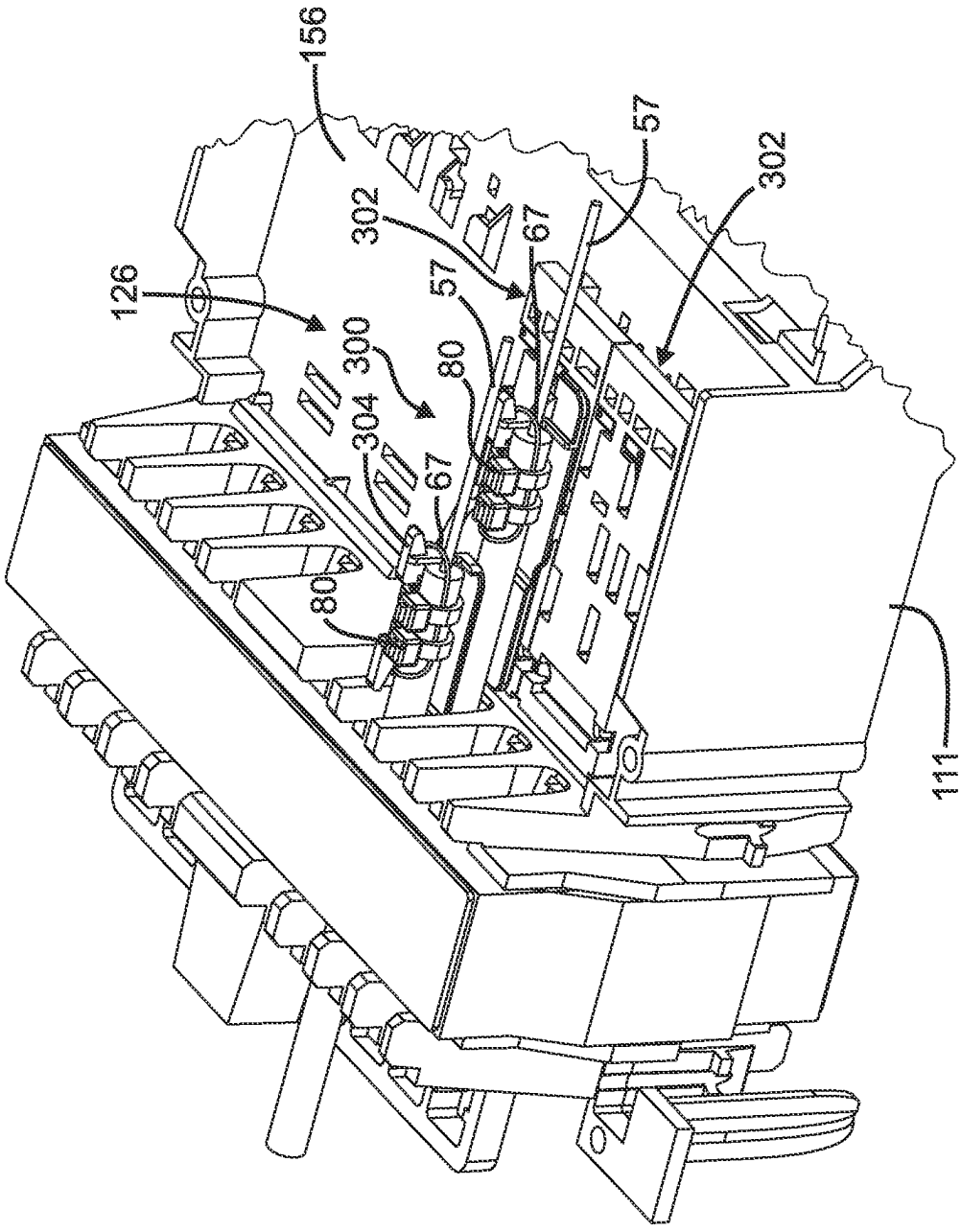

FIG. 21

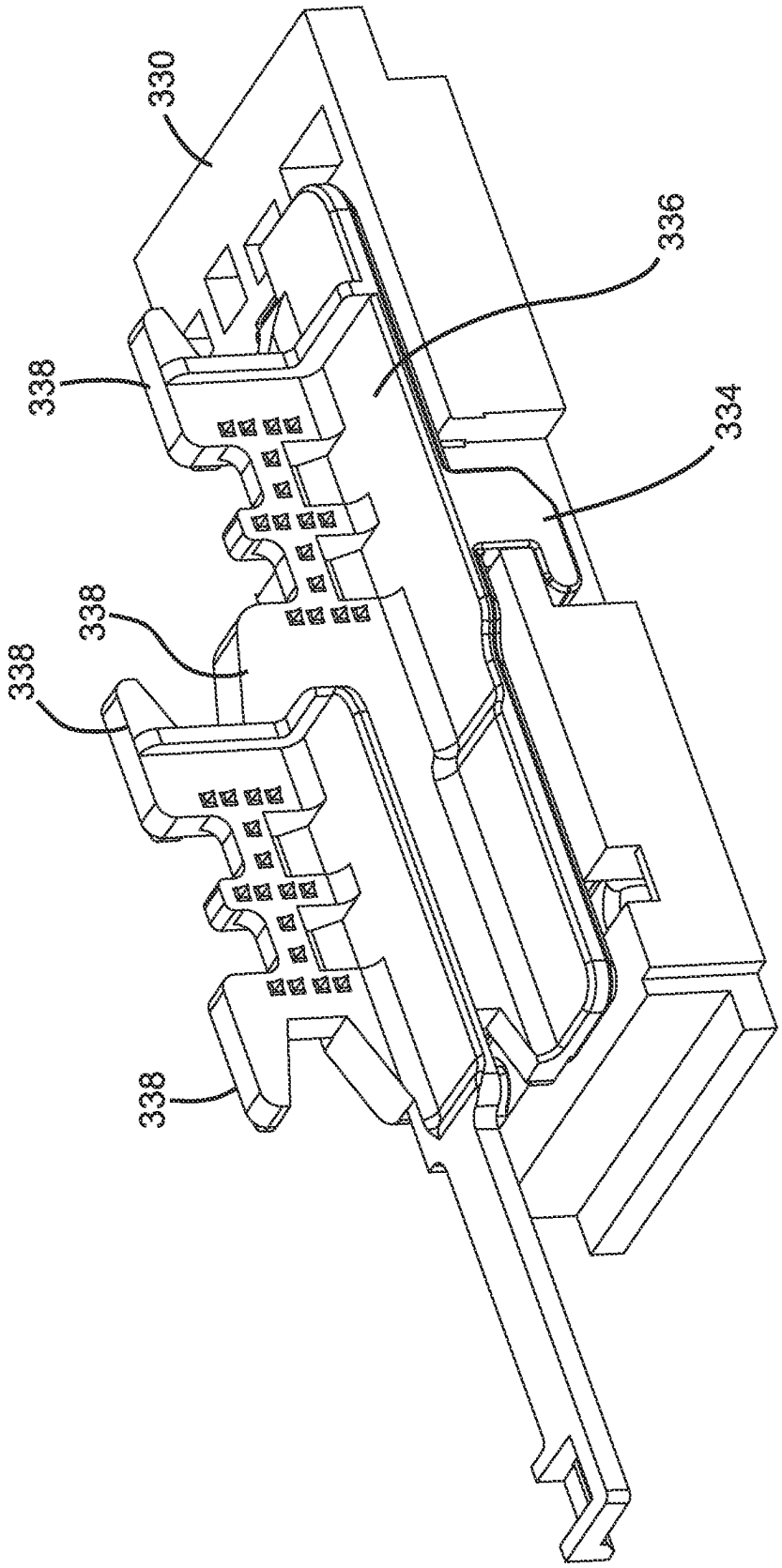

FIG. 22

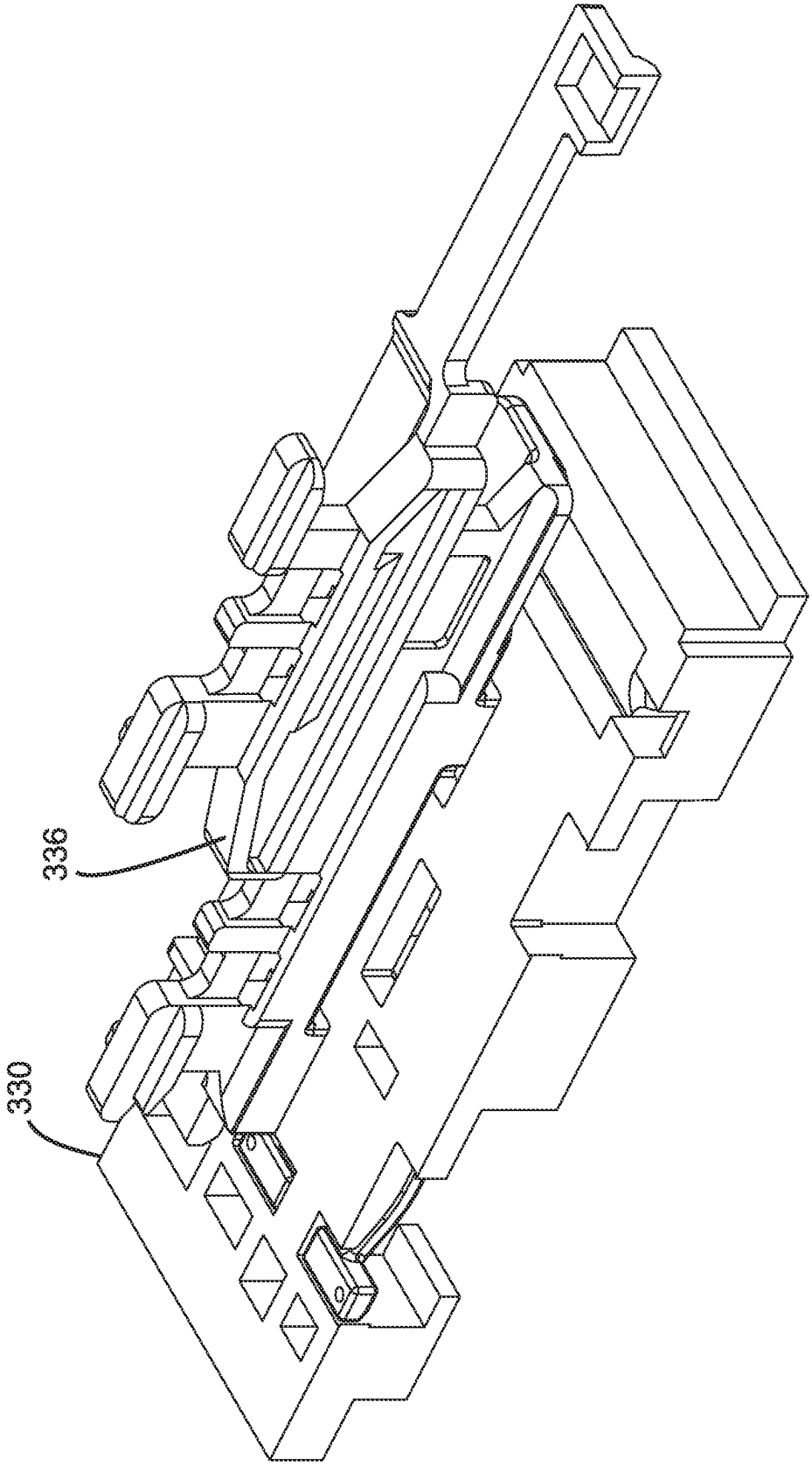

FIG. 23

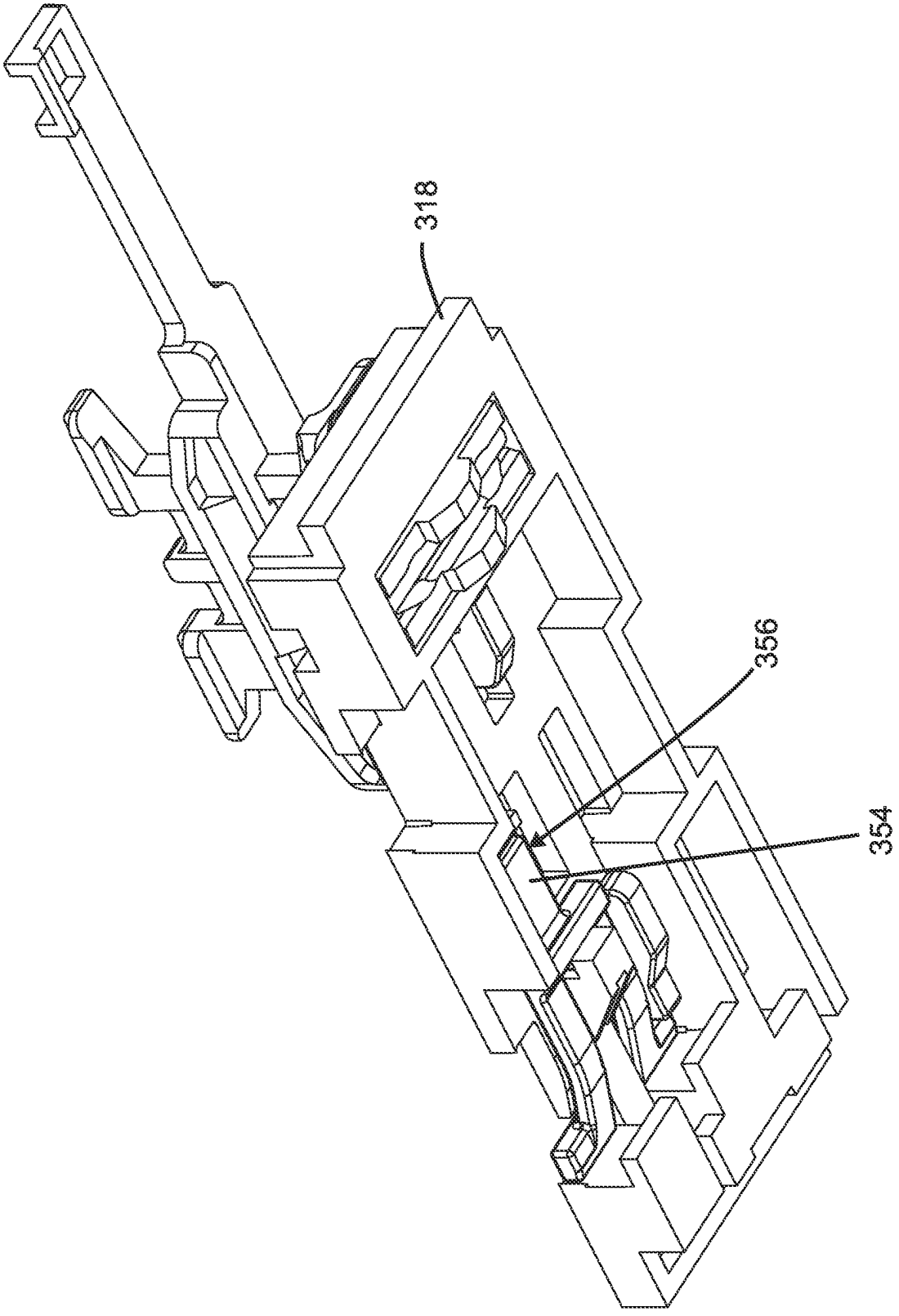

FIG. 24

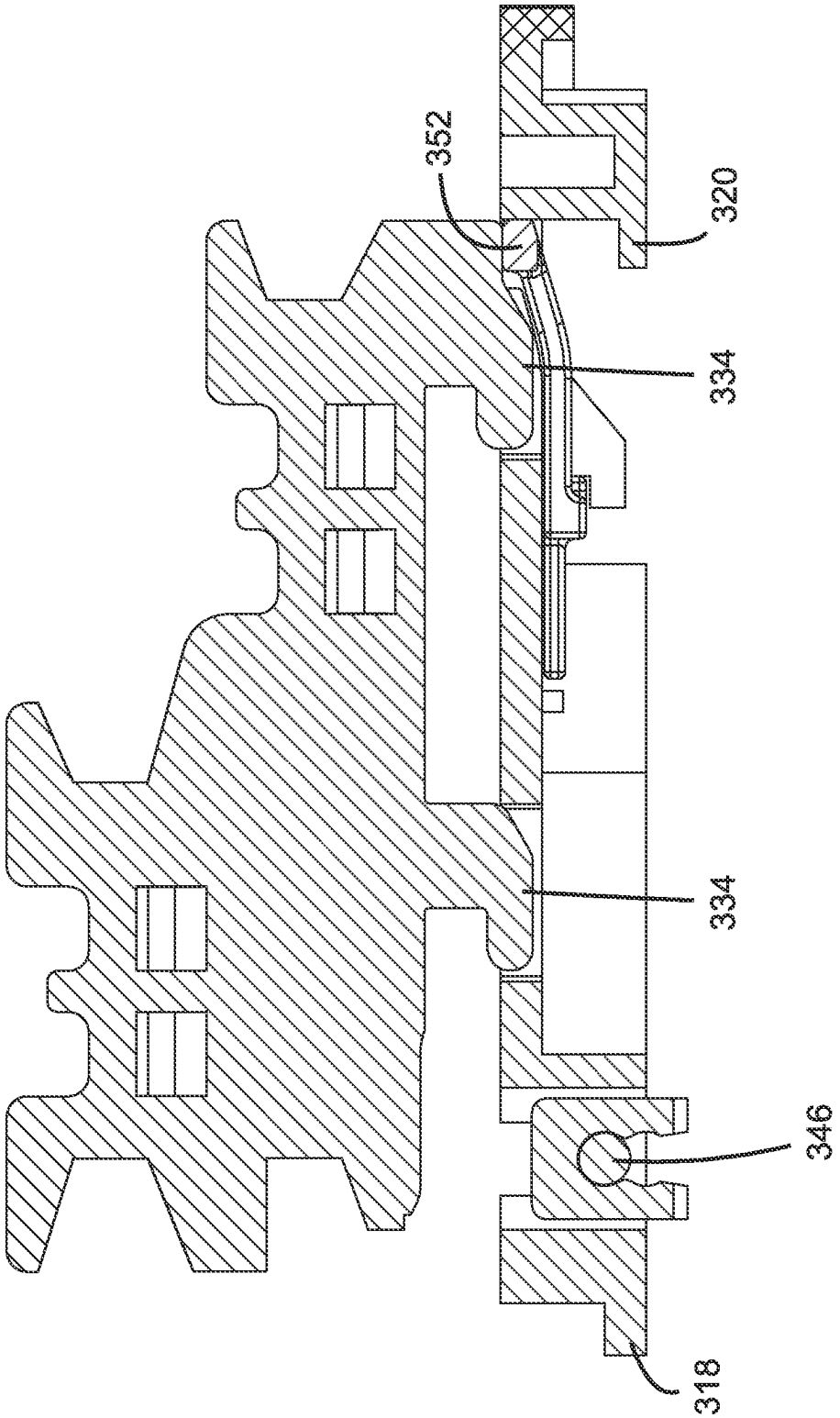

FIG. 25

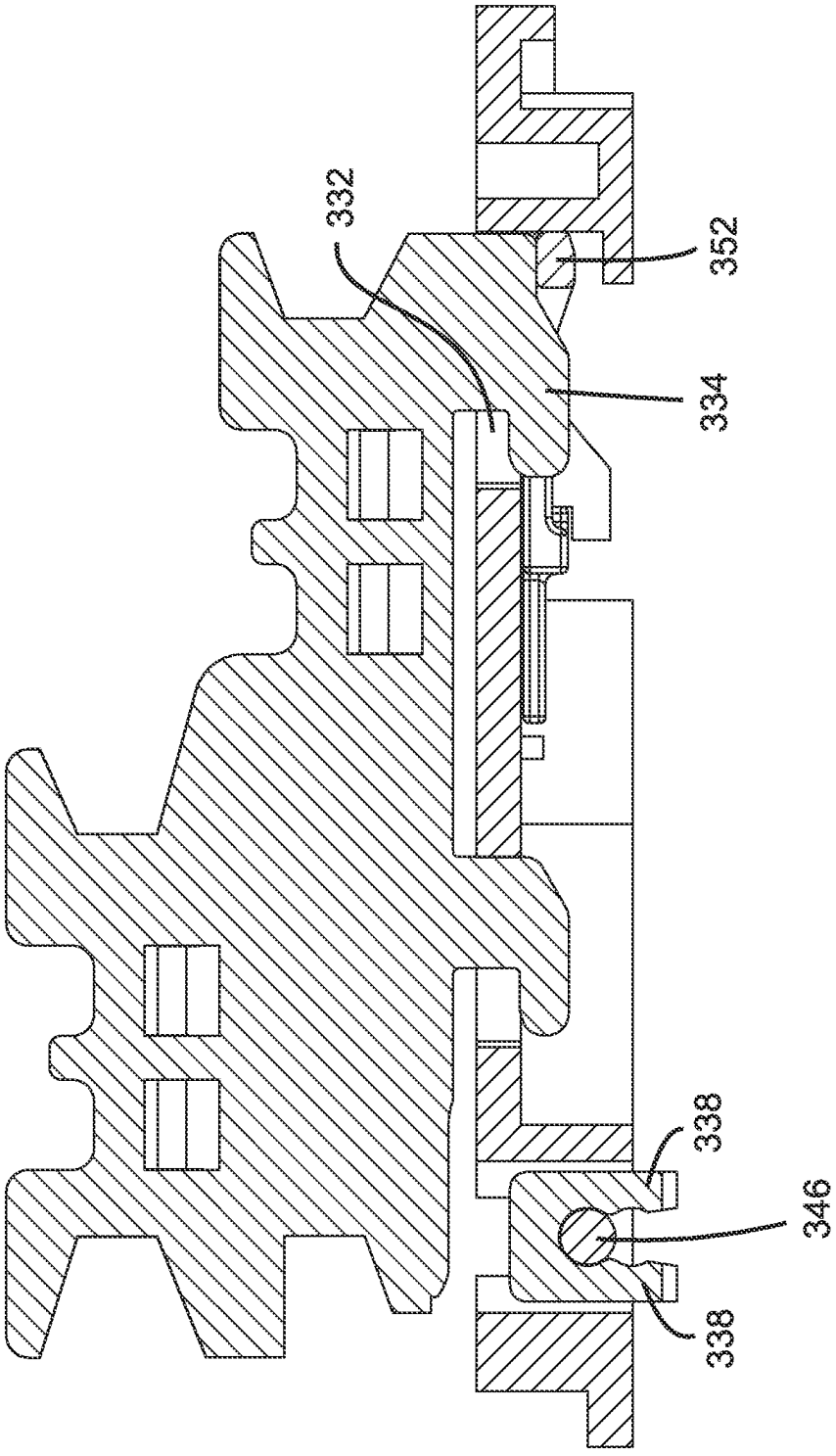

FIG. 26

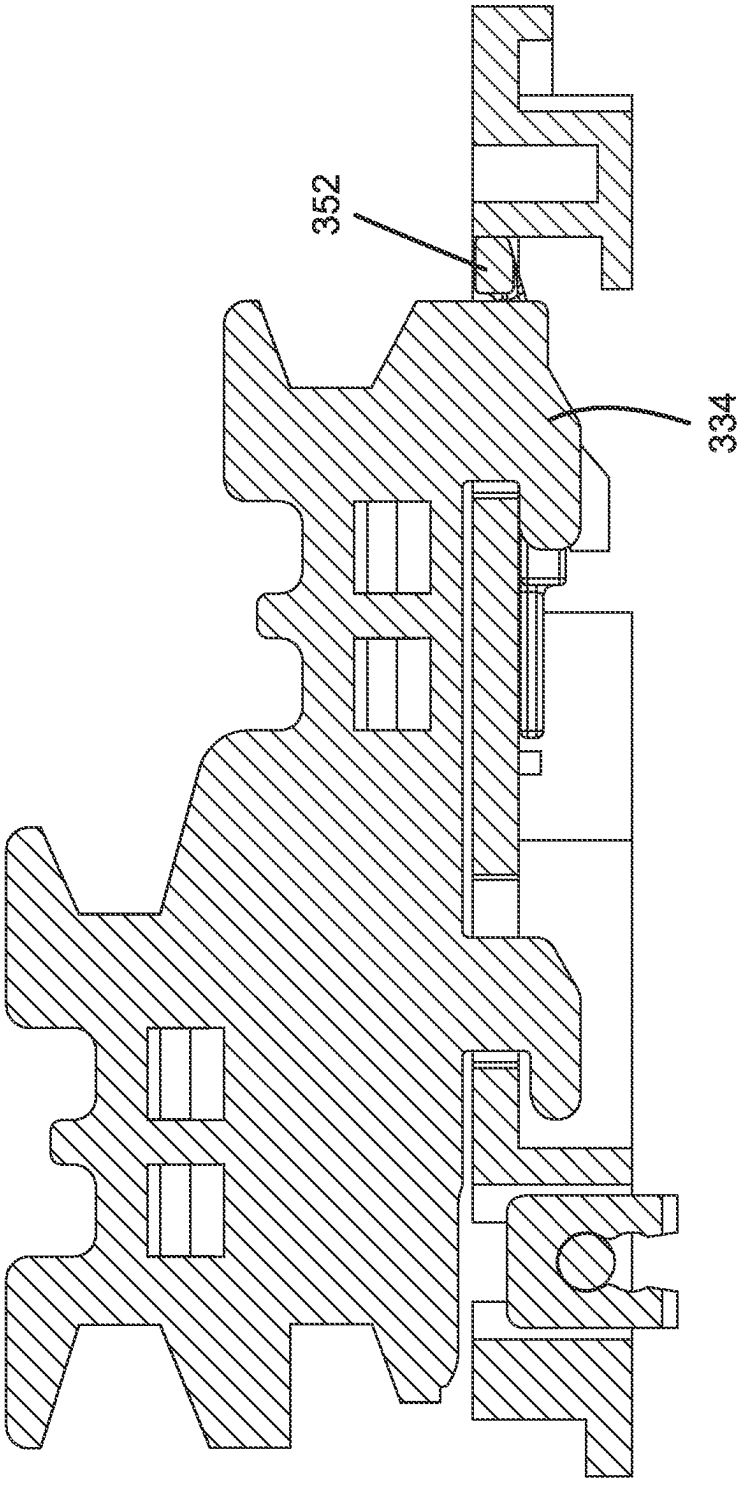

FIG. 27

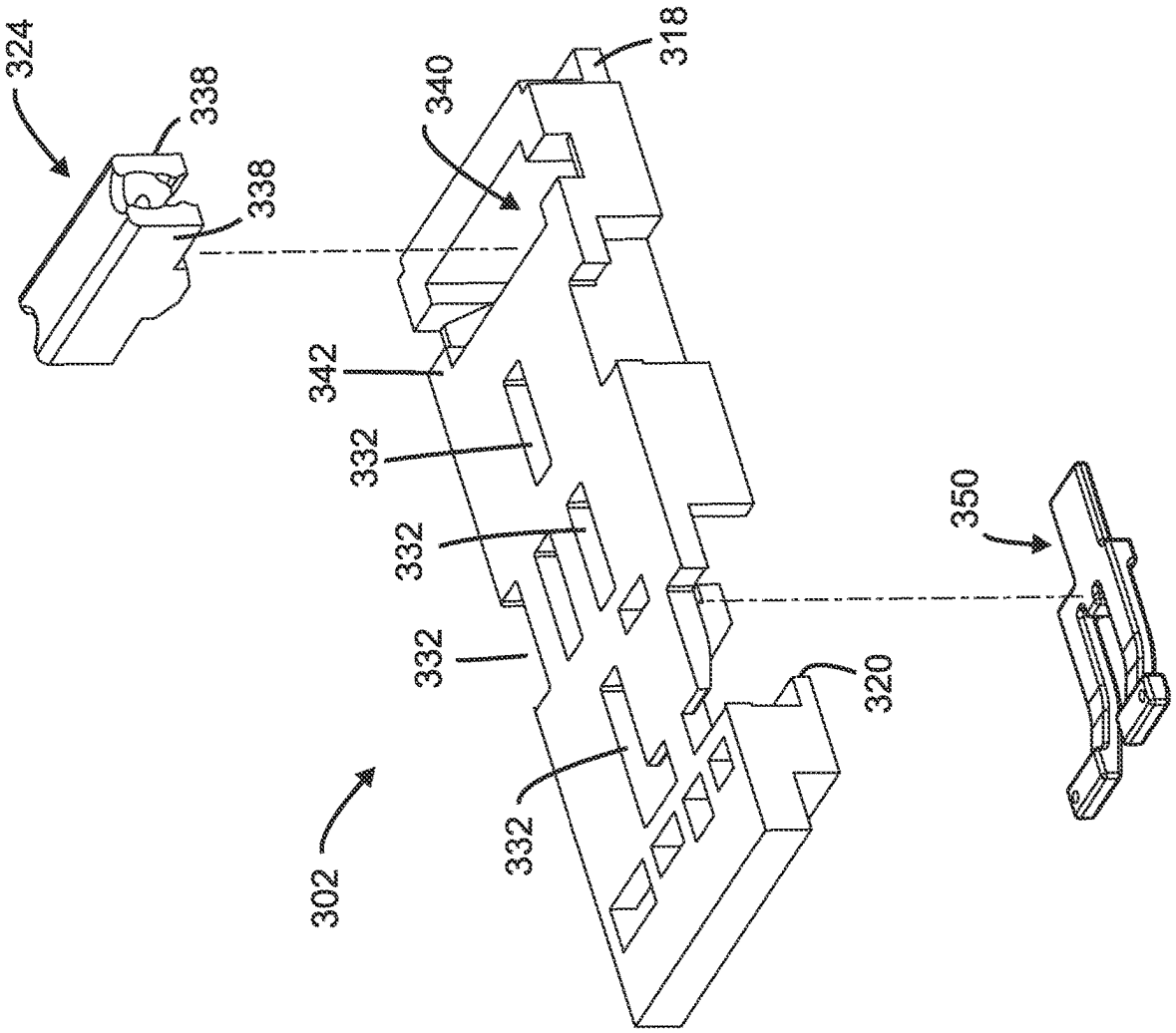

FIG. 28

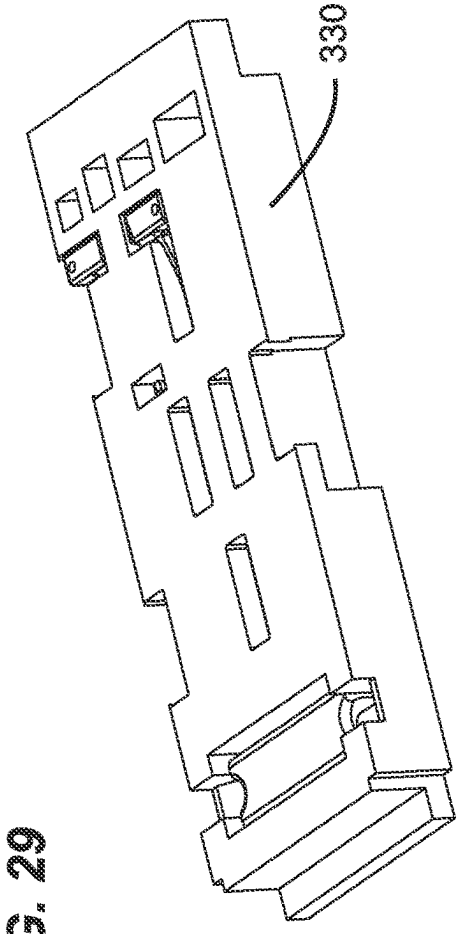

FIG. 29

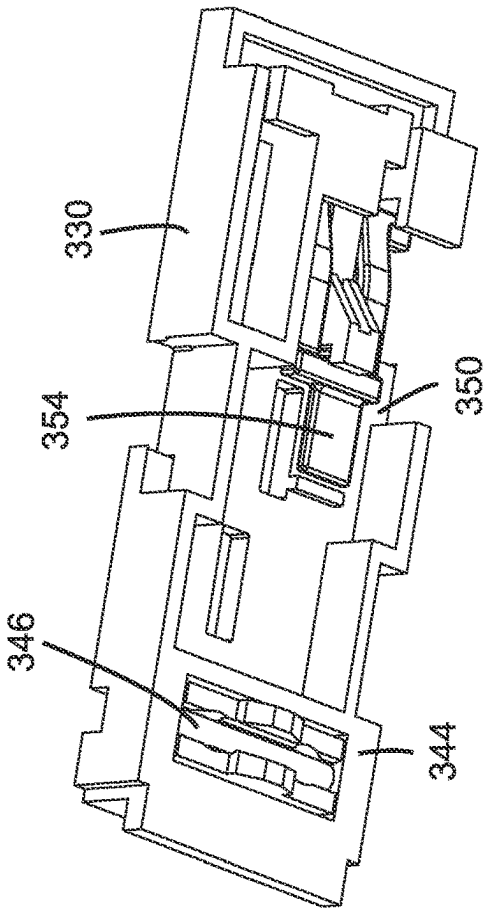

FIG. 30

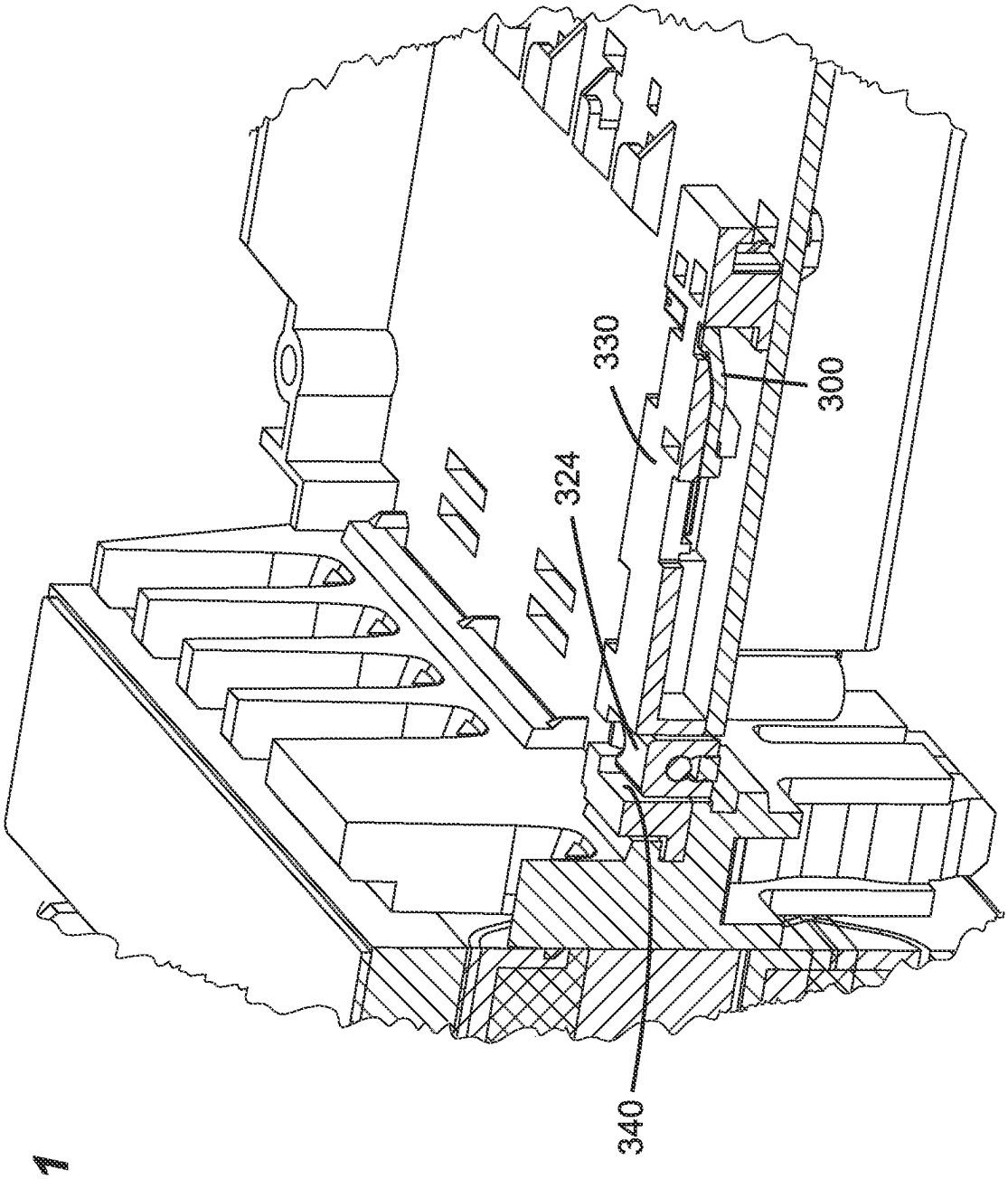

FIG. 31

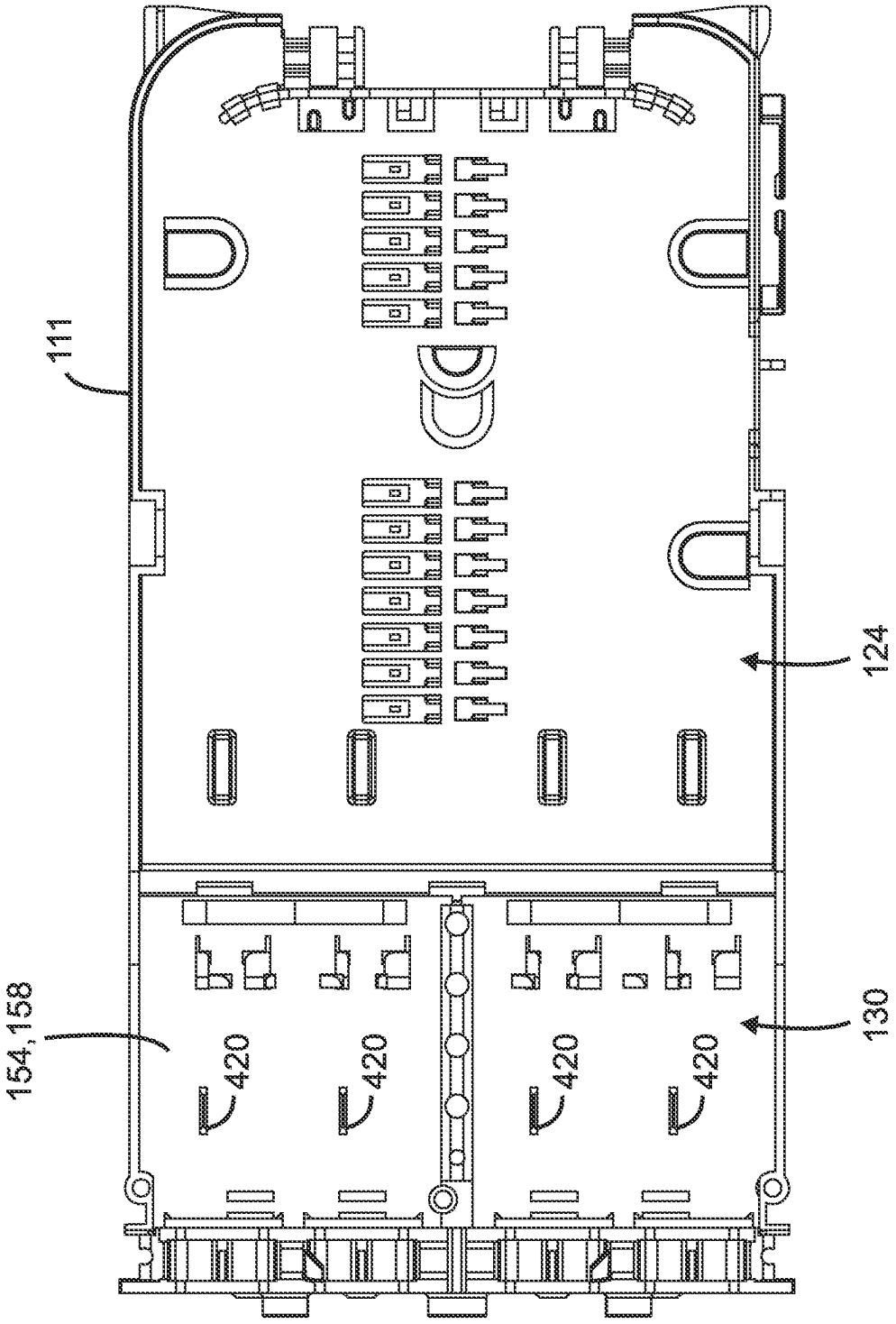

FIG. 32

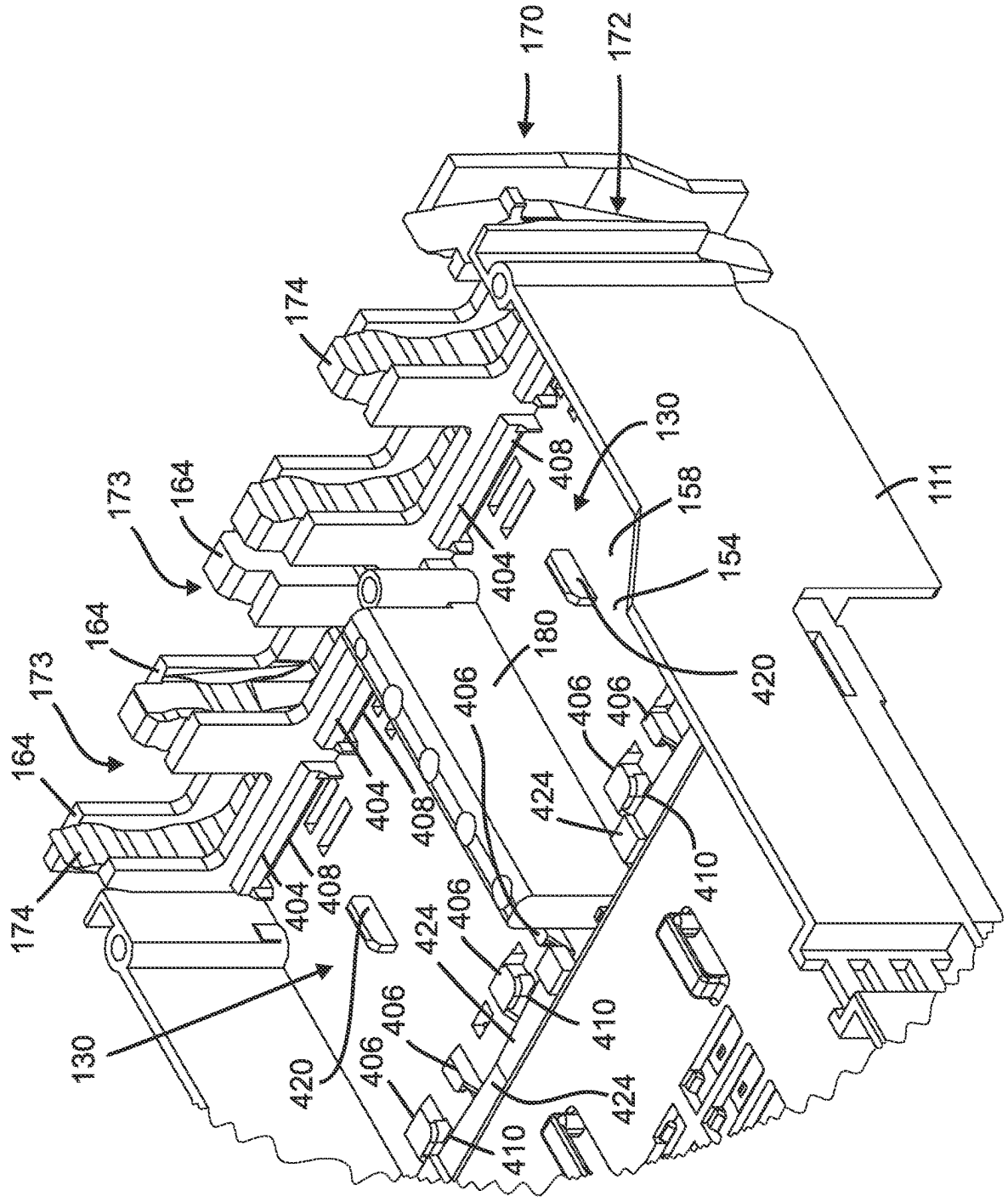

FIG. 33

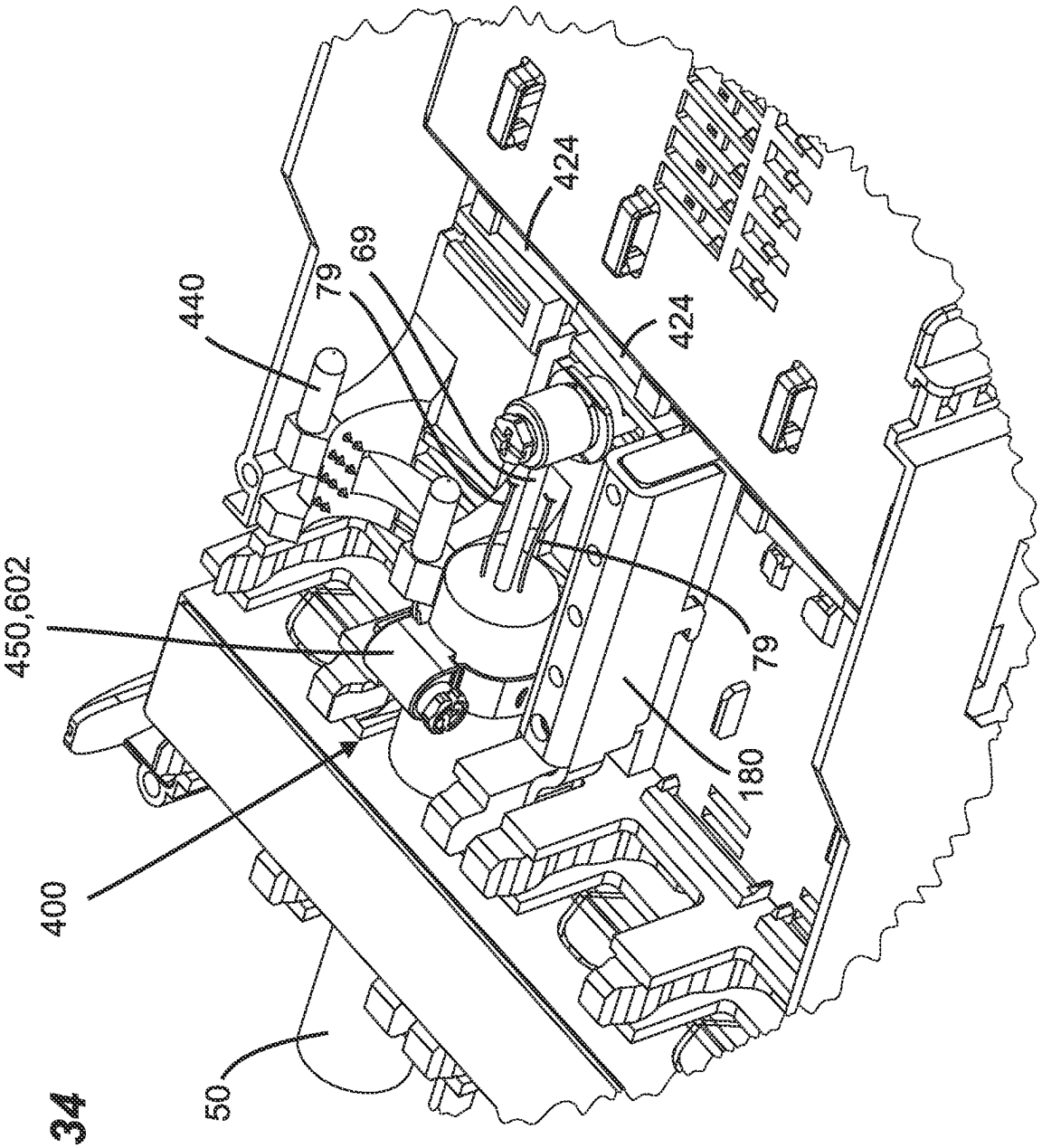

FIG. 34

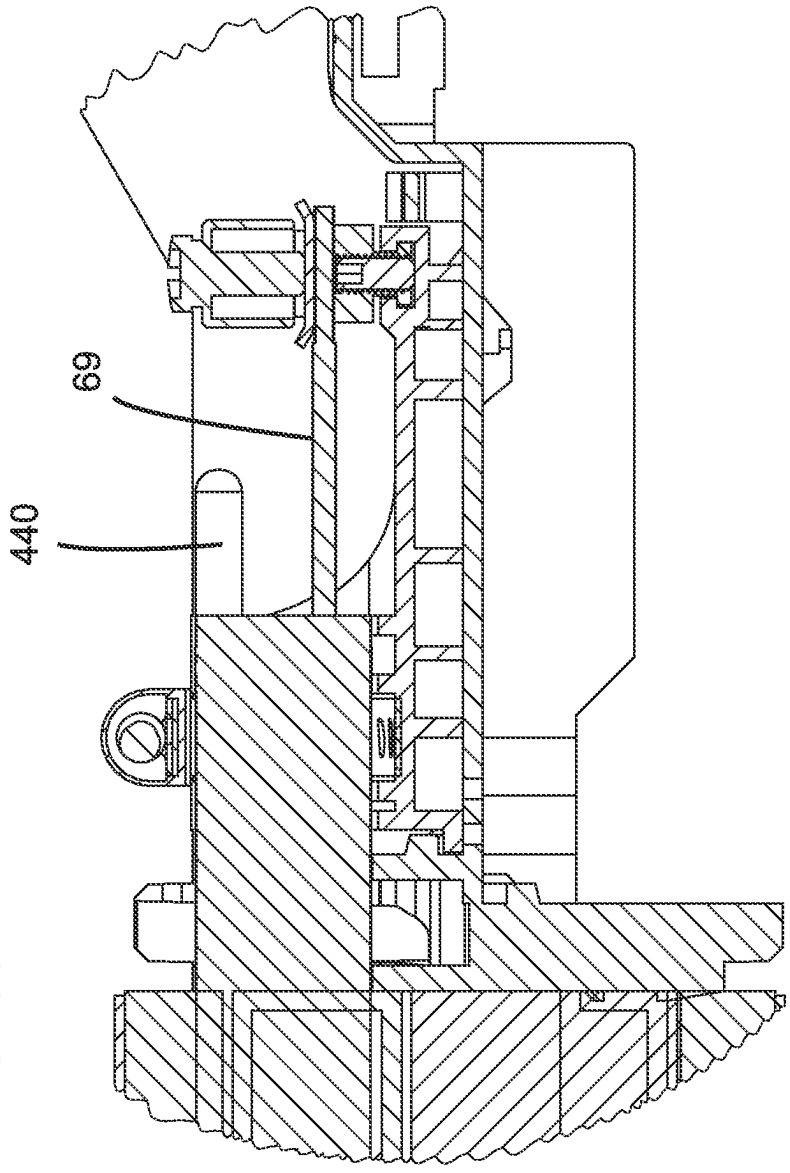

FIG. 35

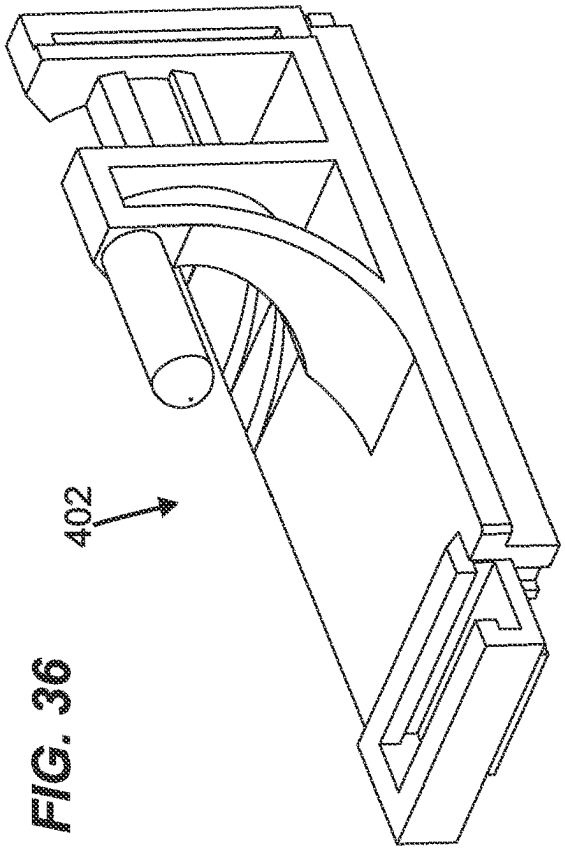

FIG. 36

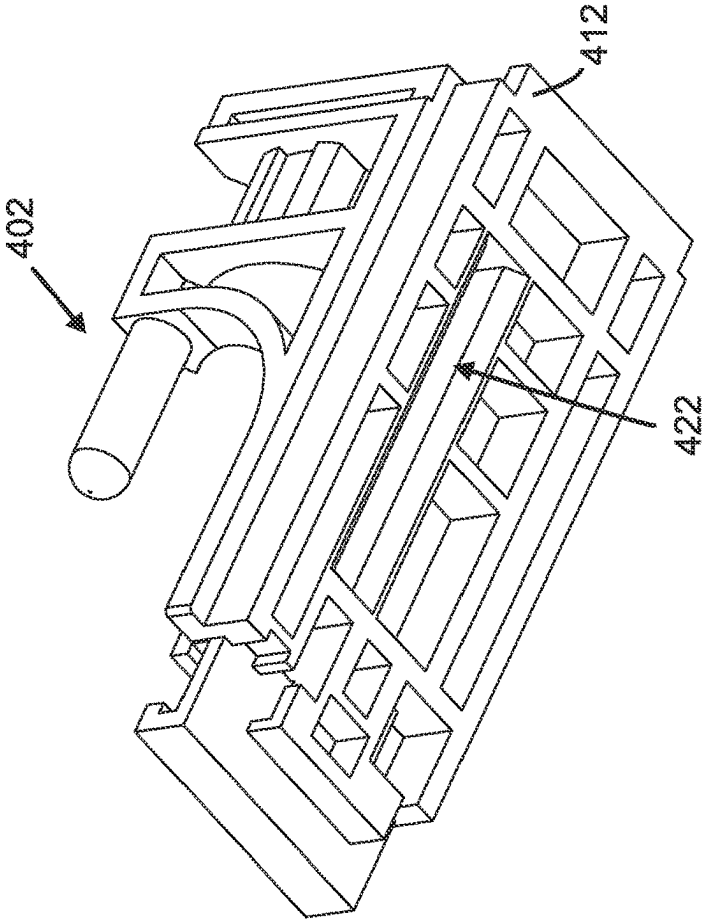

FIG. 37

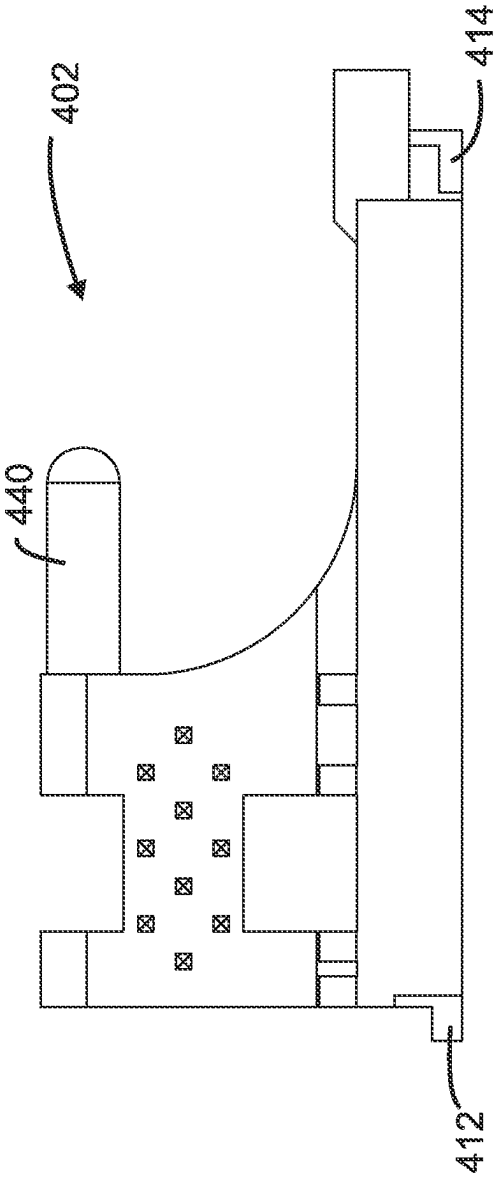

FIG. 38

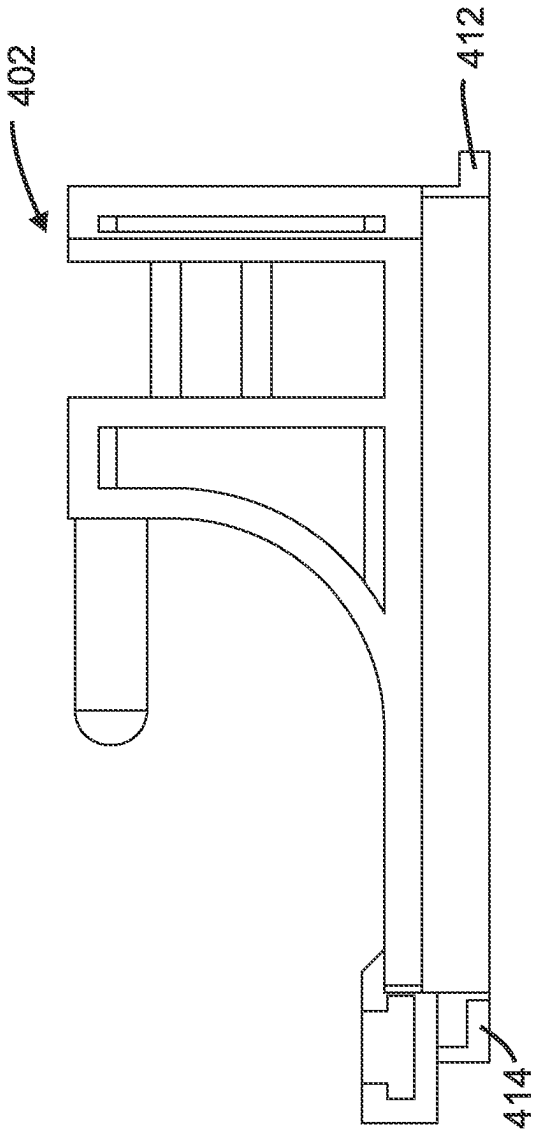

FIG. 39

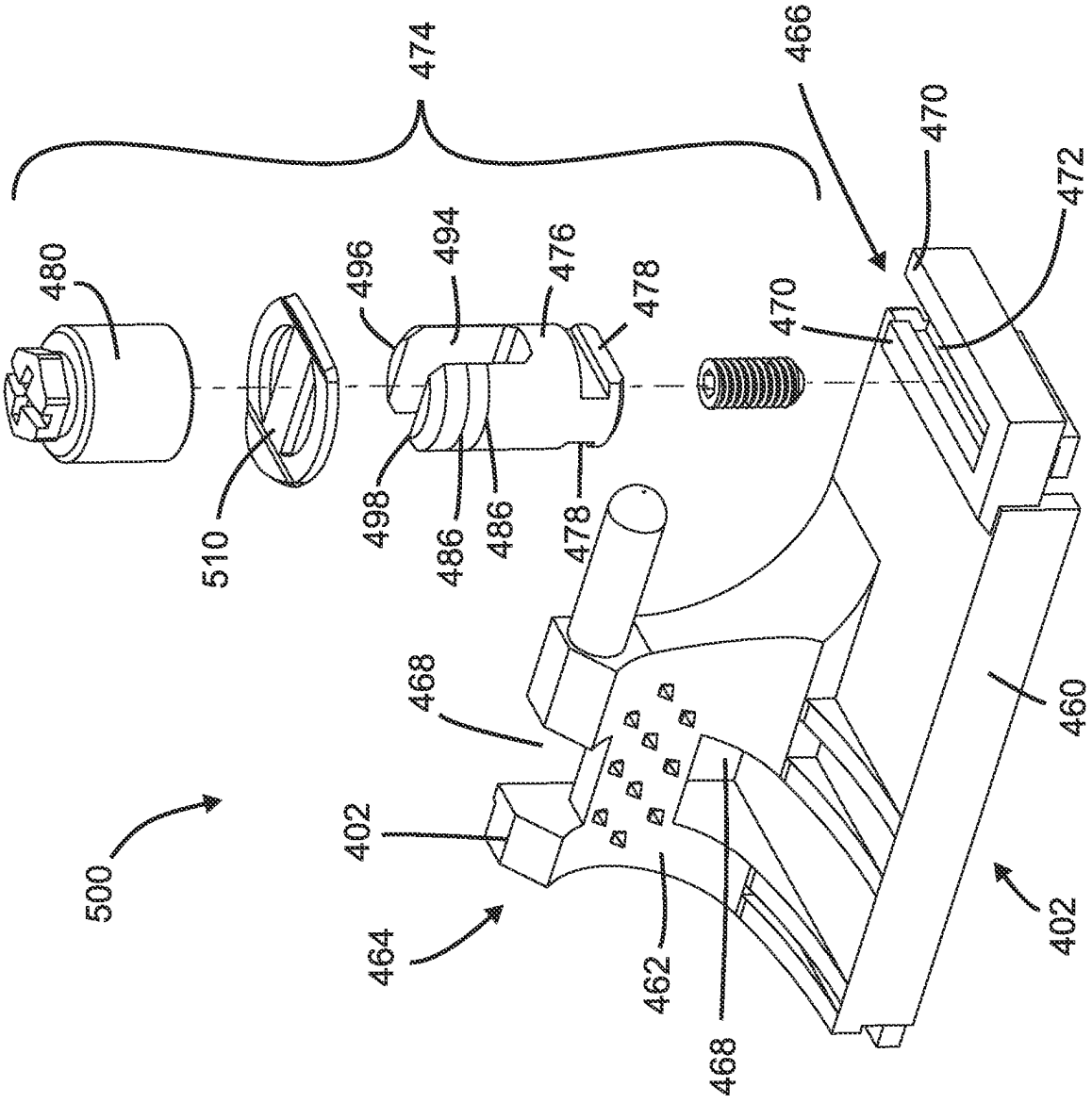
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FIG. 40

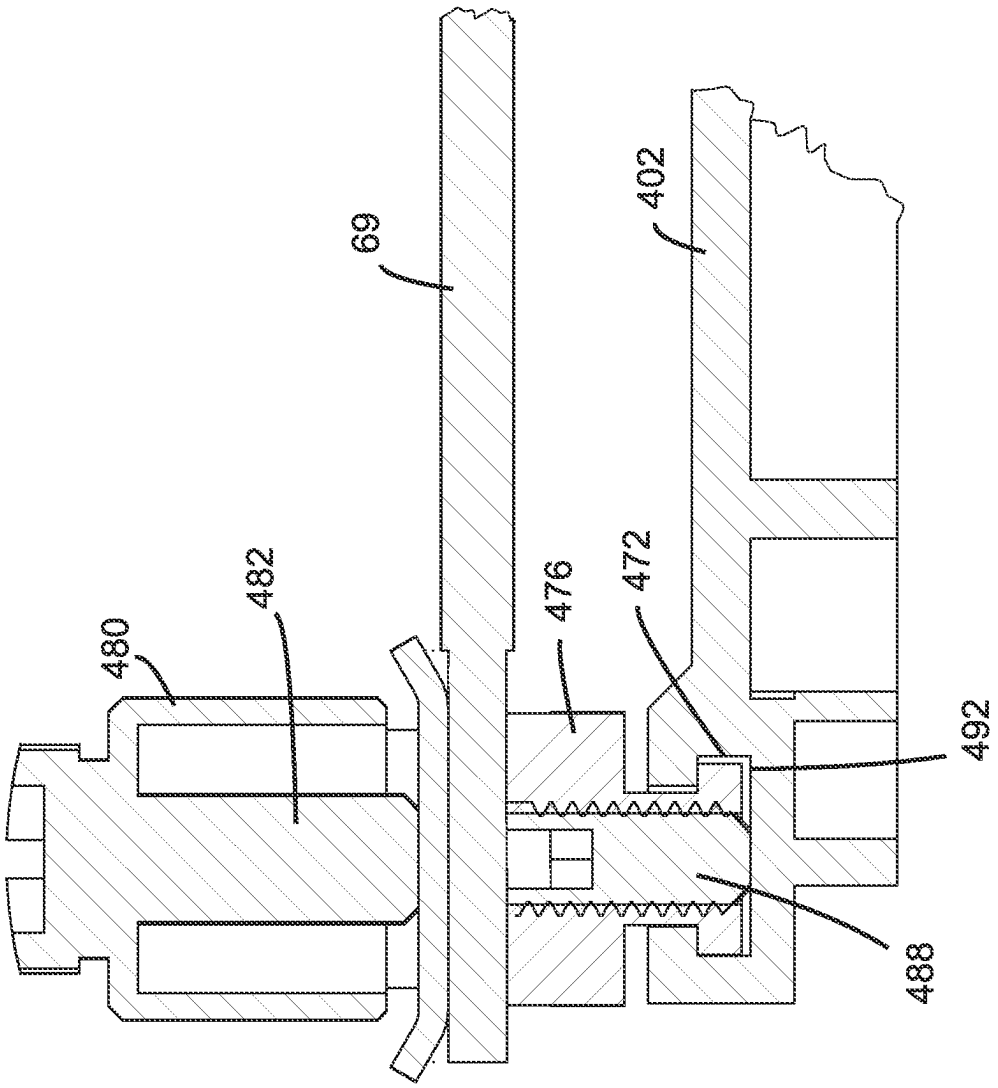


FIG. 41

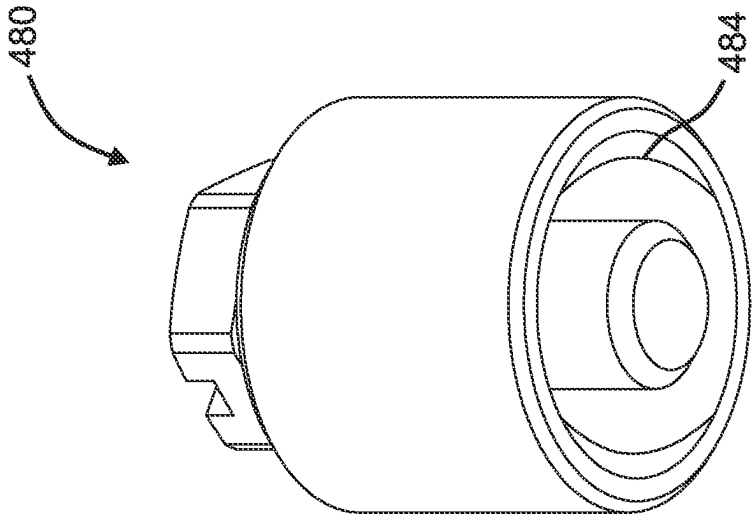


FIG. 43

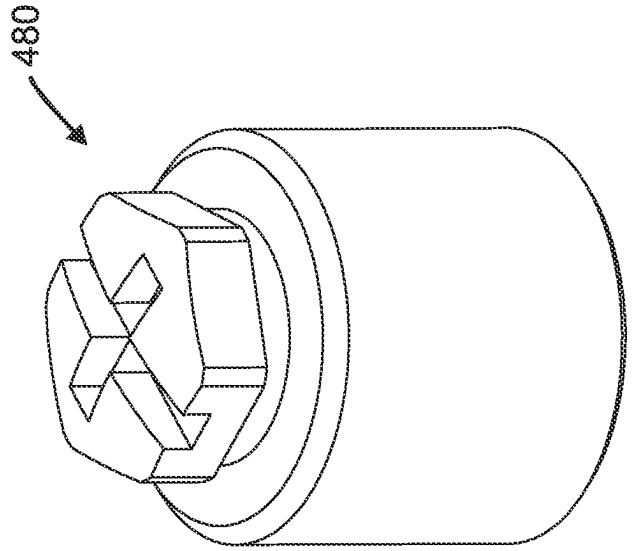


FIG. 42

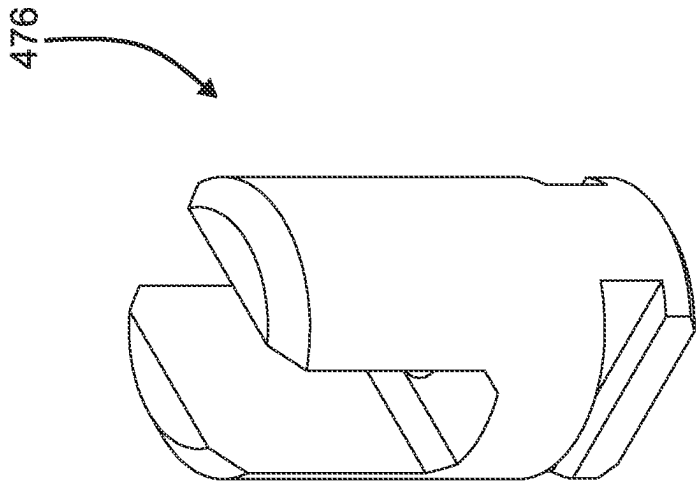


FIG. 45

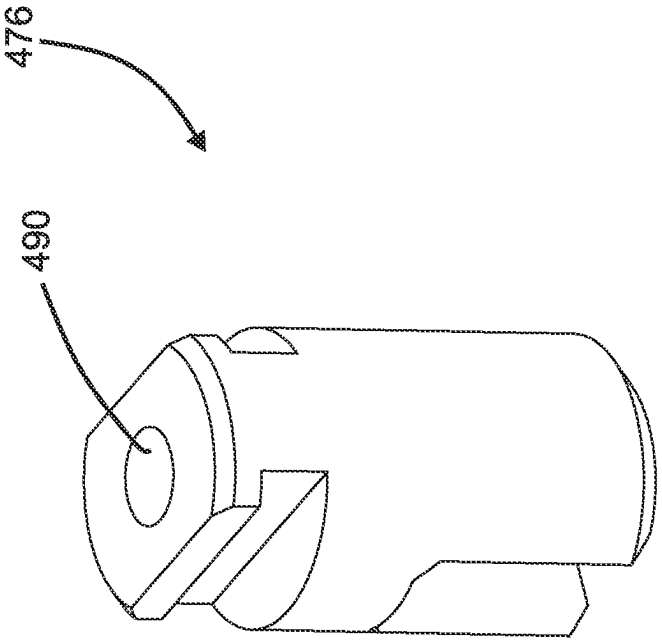


FIG. 44

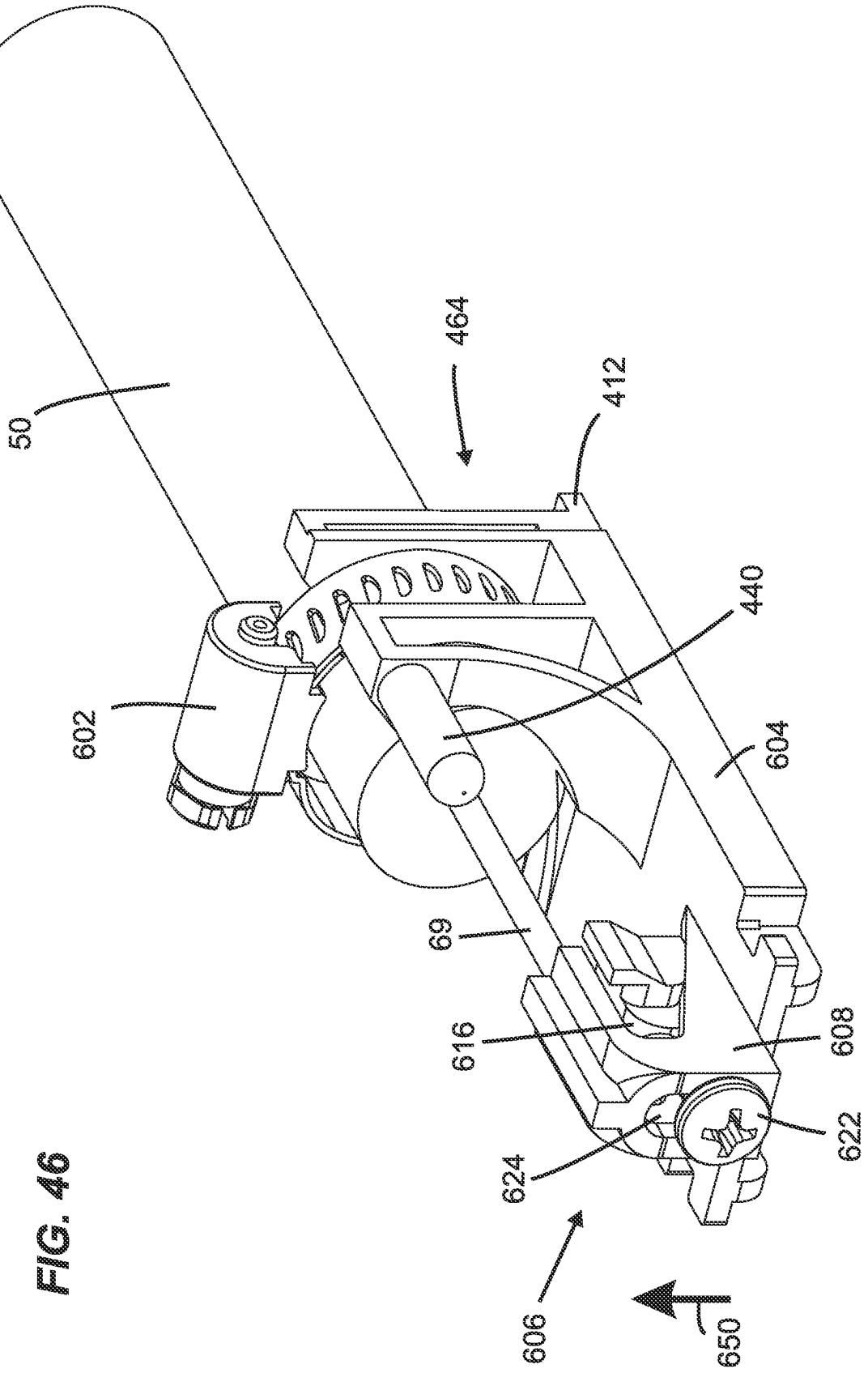
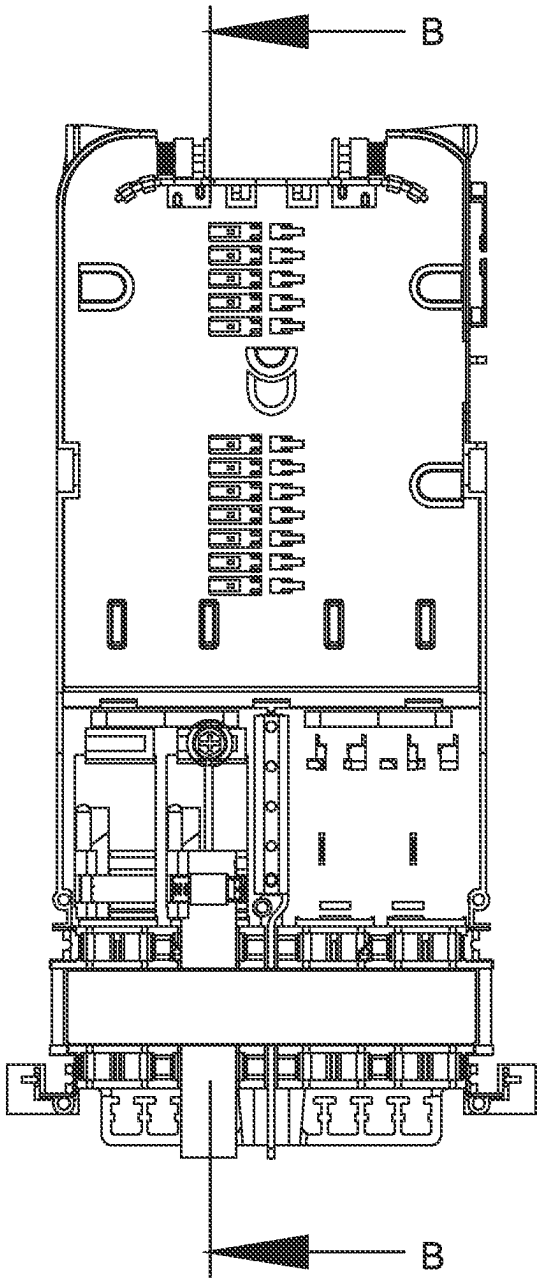


FIG. 46

FIG. 47



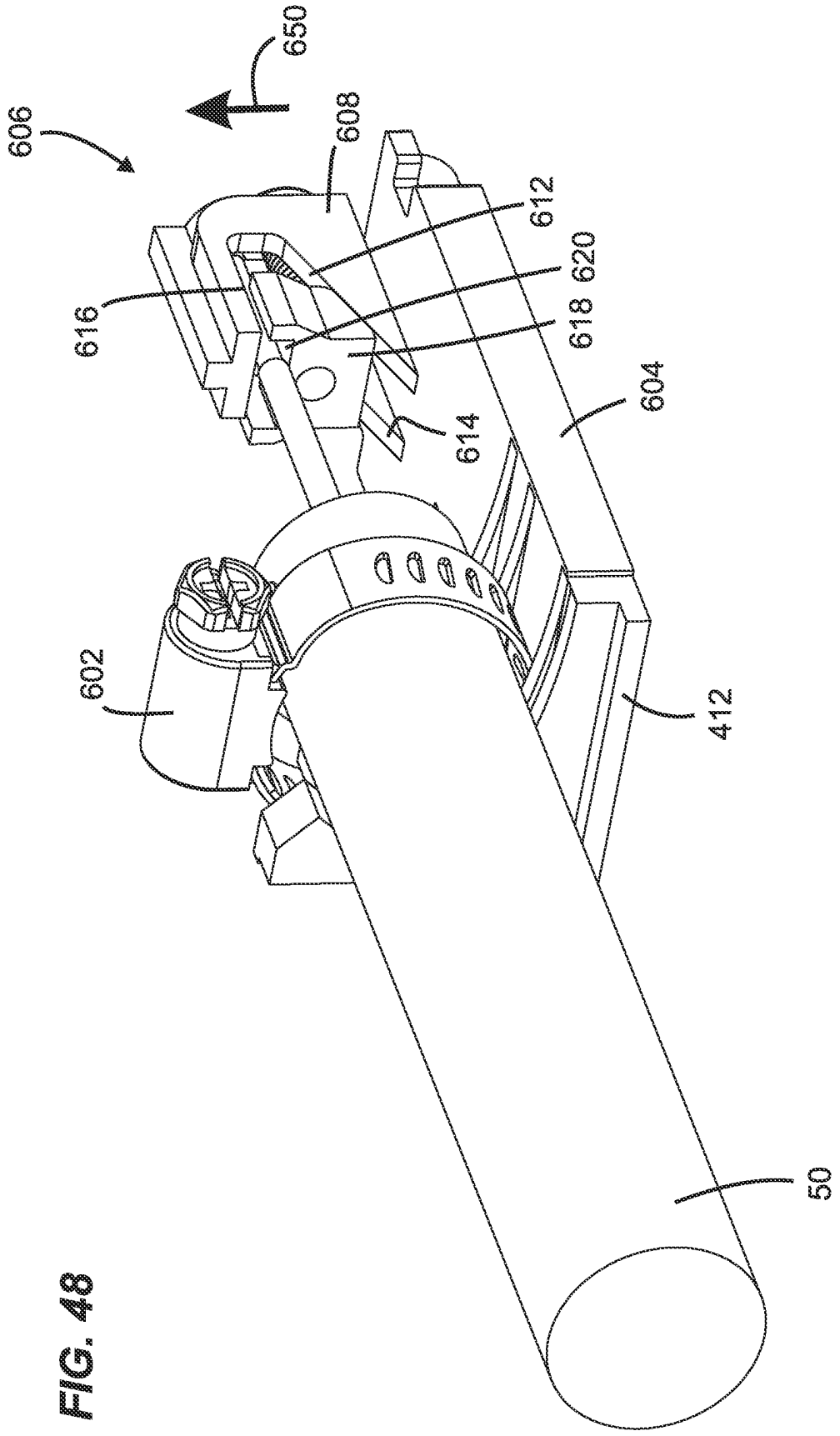


FIG. 48

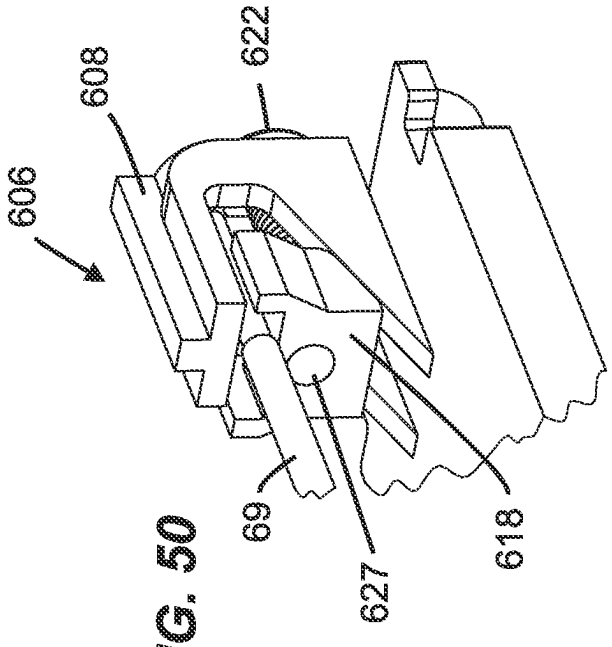


FIG. 50

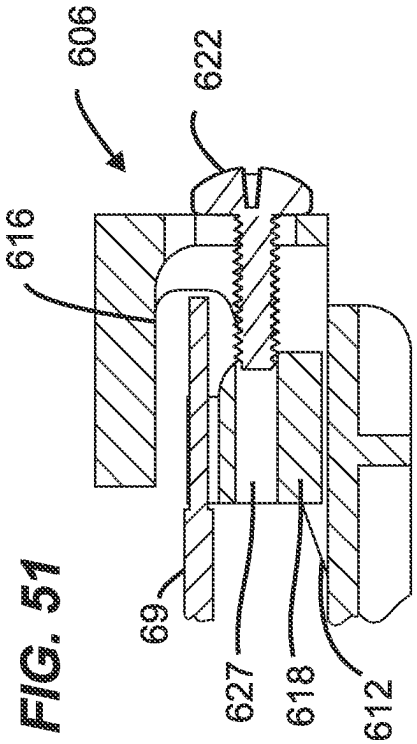


FIG. 51

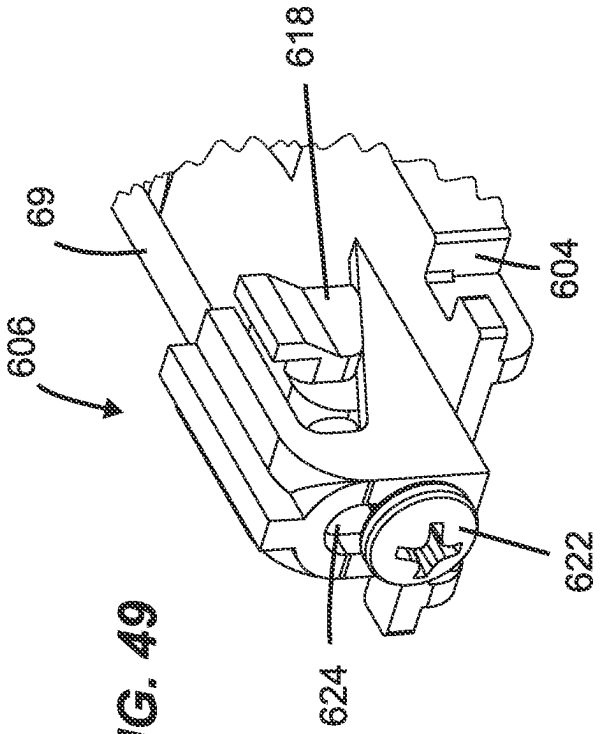


FIG. 49

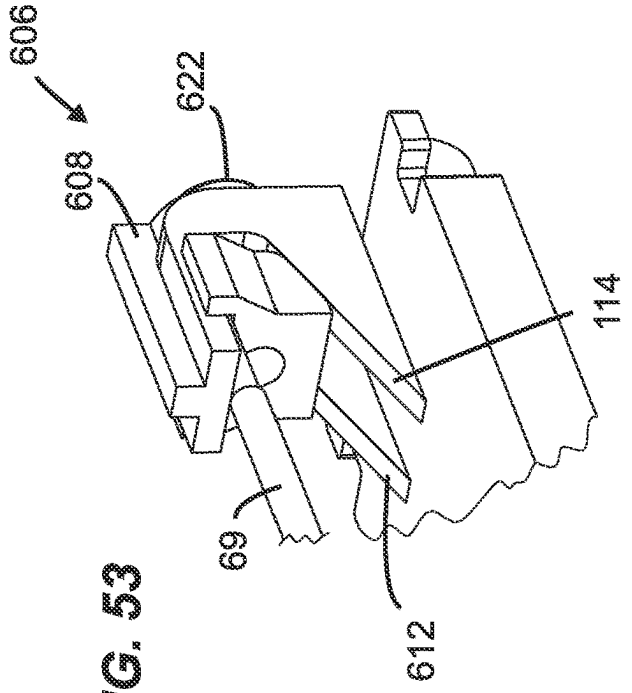


FIG. 53

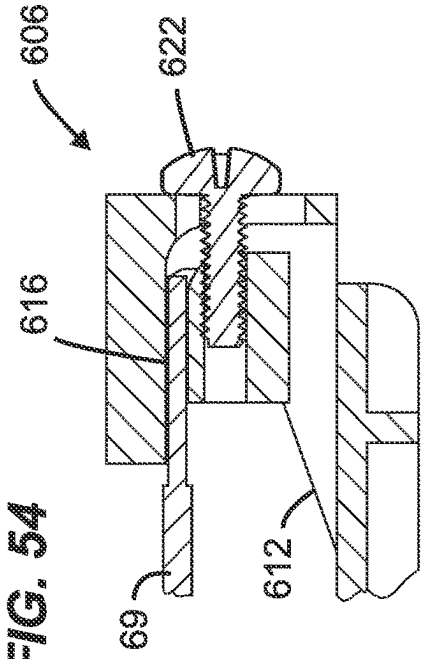


FIG. 54

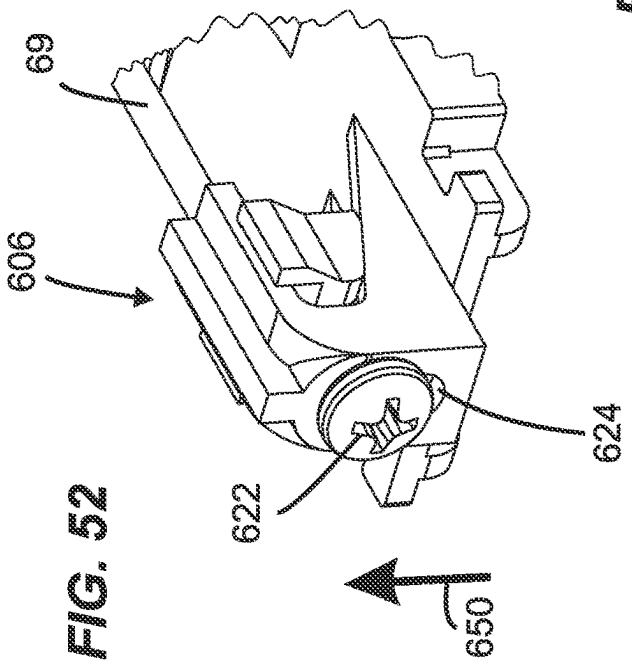


FIG. 52

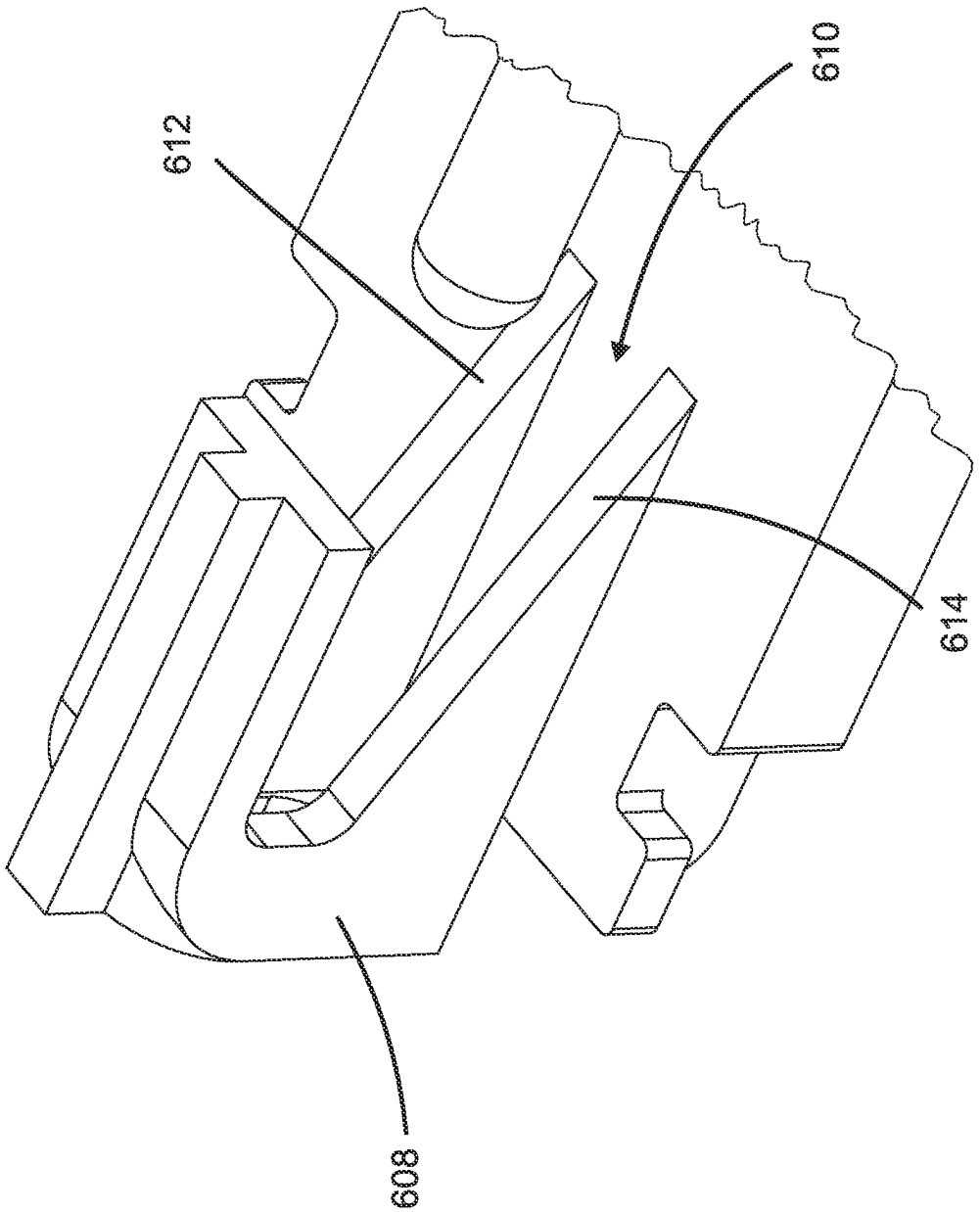


FIG. 55

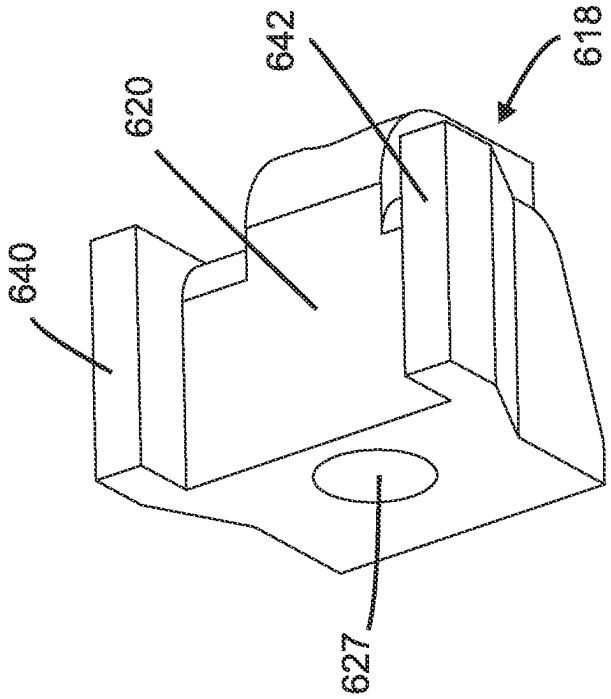


FIG. 57

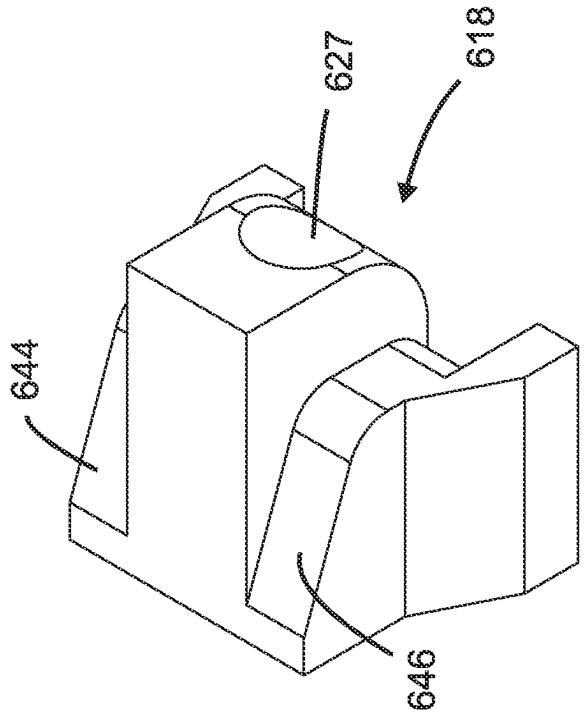


FIG. 56

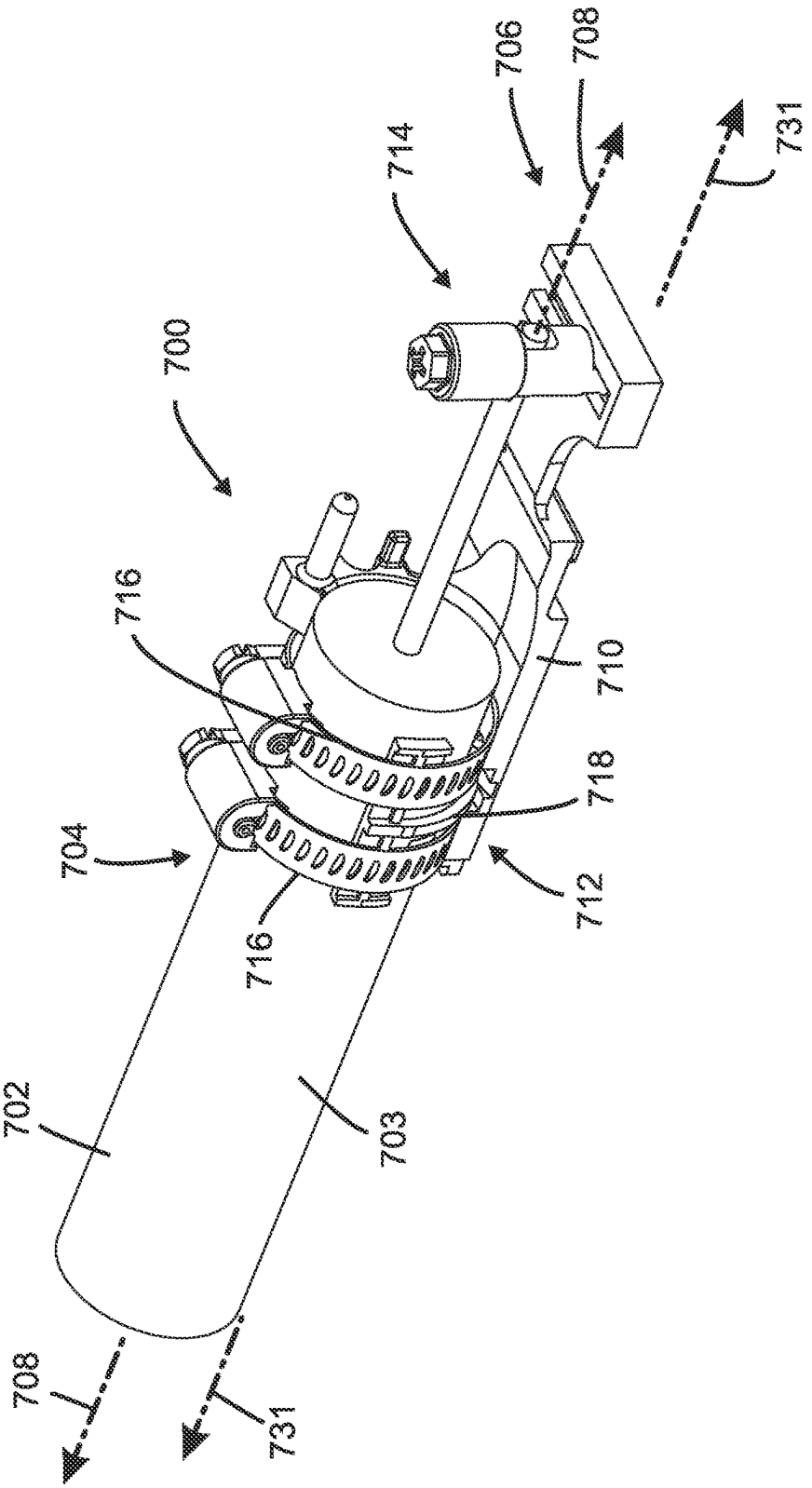


FIG. 58

FIG. 59

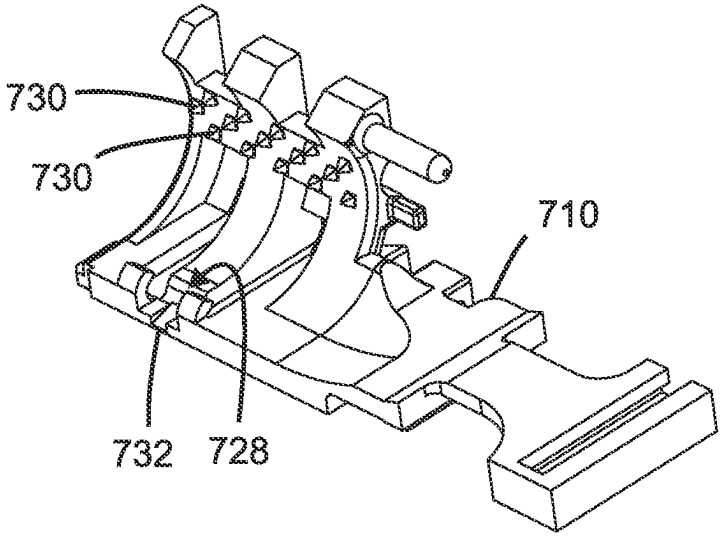


FIG. 60

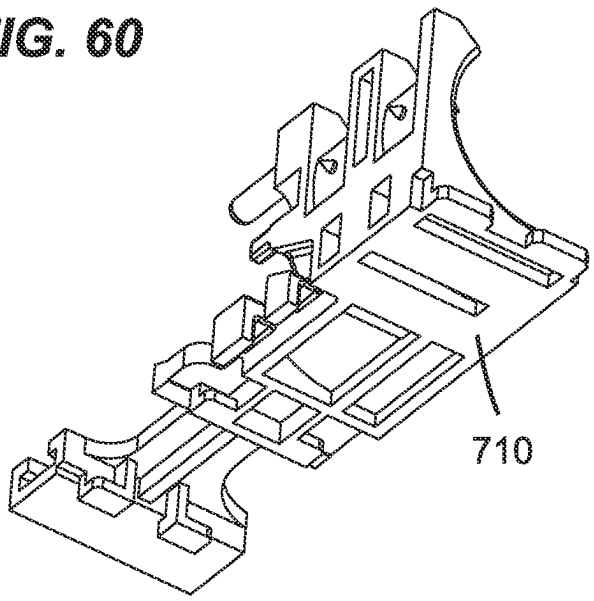


FIG. 61

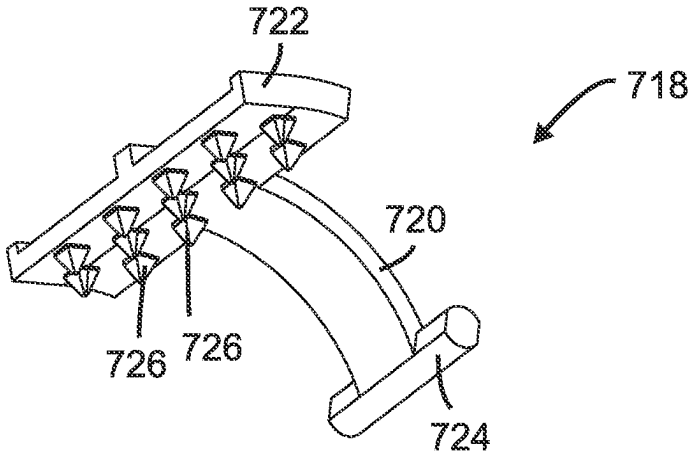
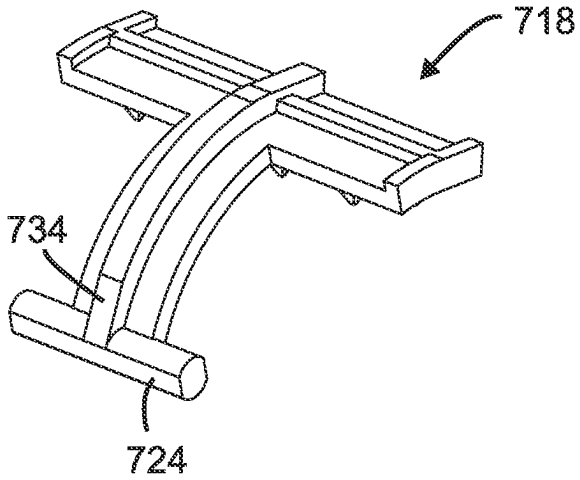


FIG. 62



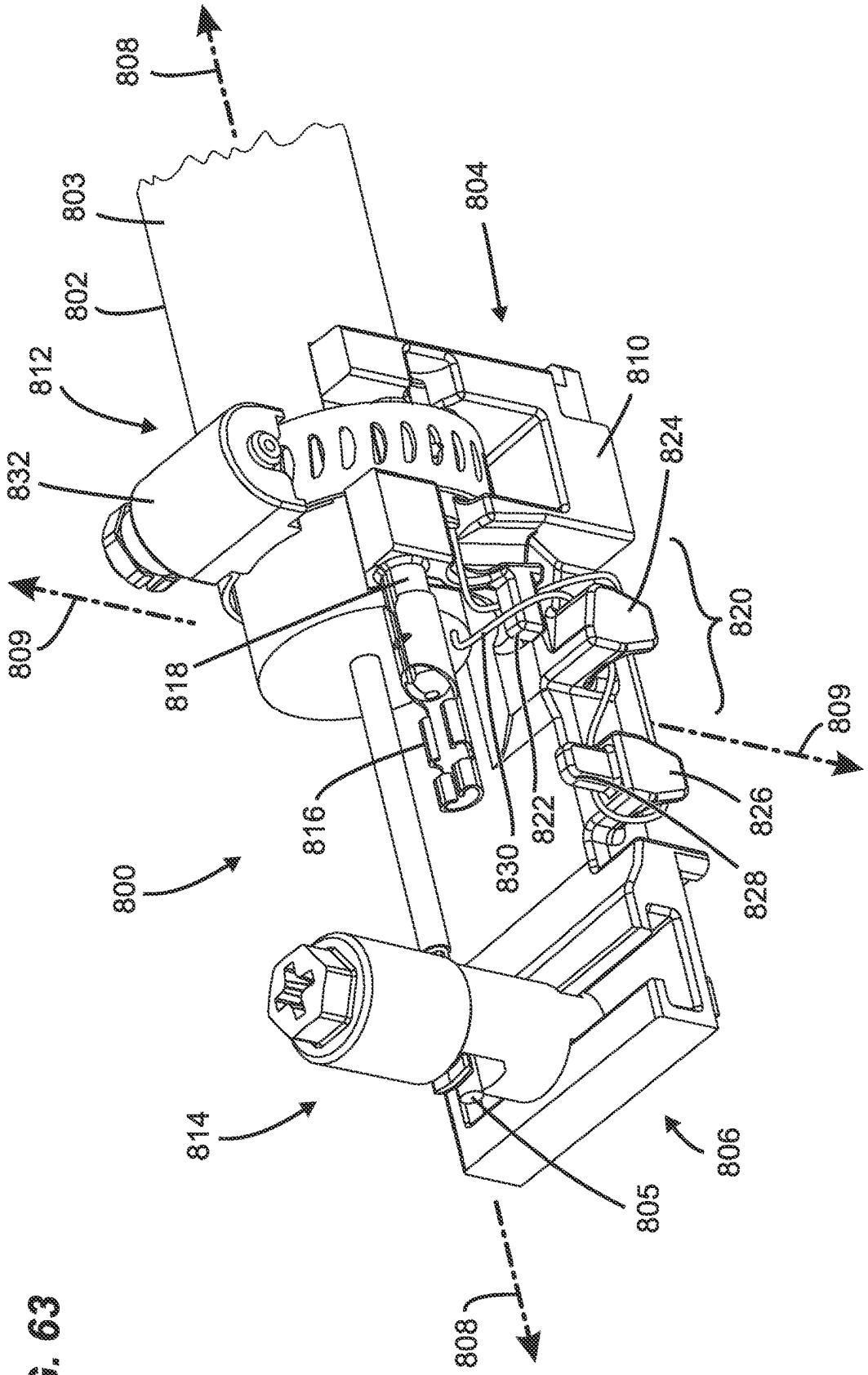

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FIG. 63

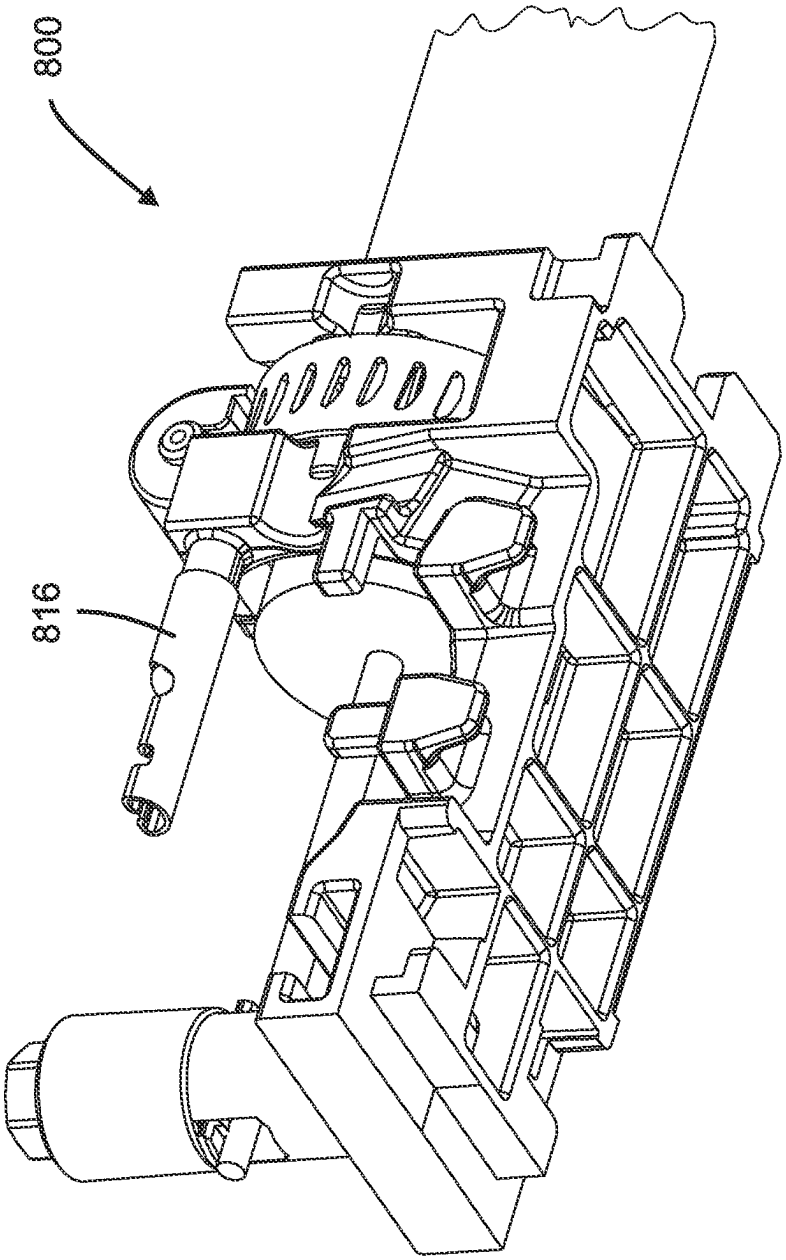

FIG. 64

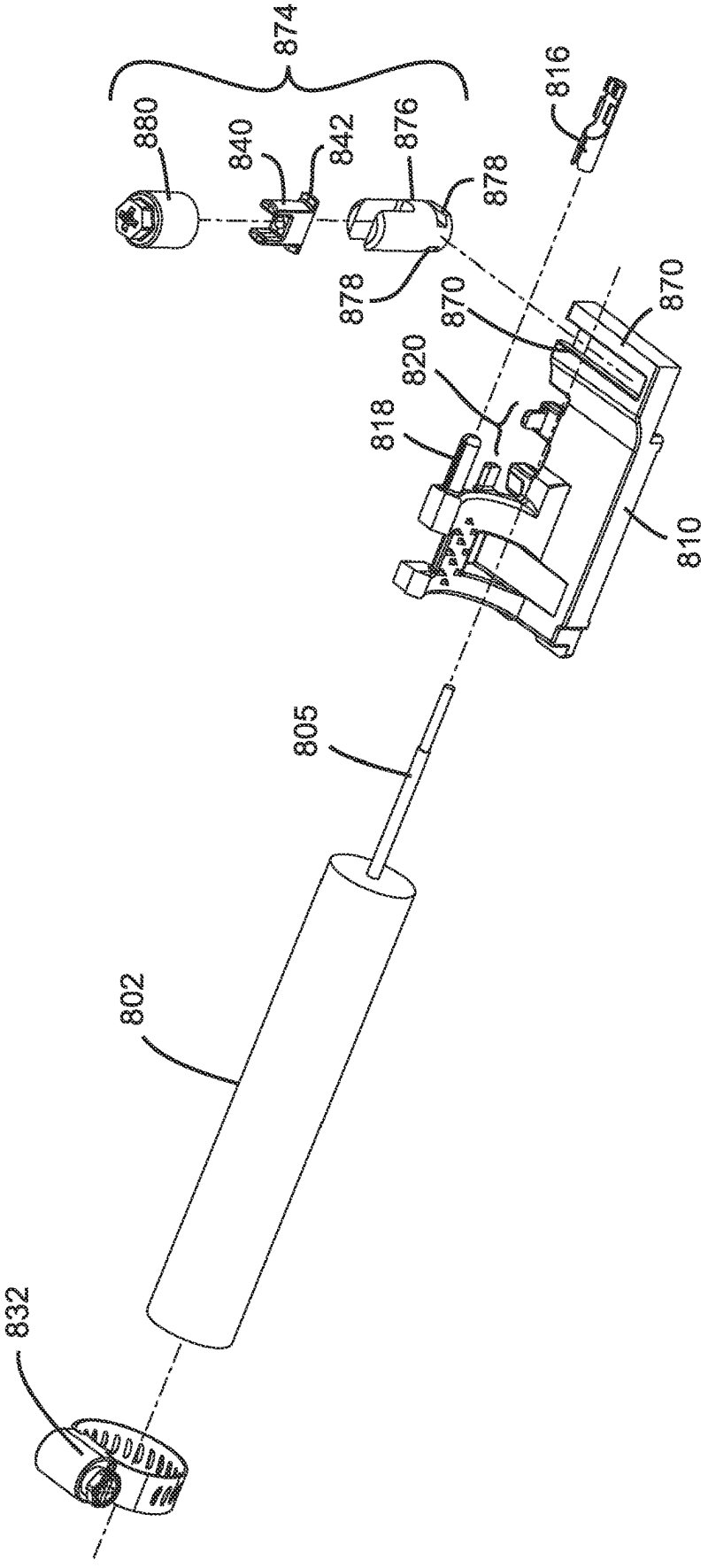

FIG. 65

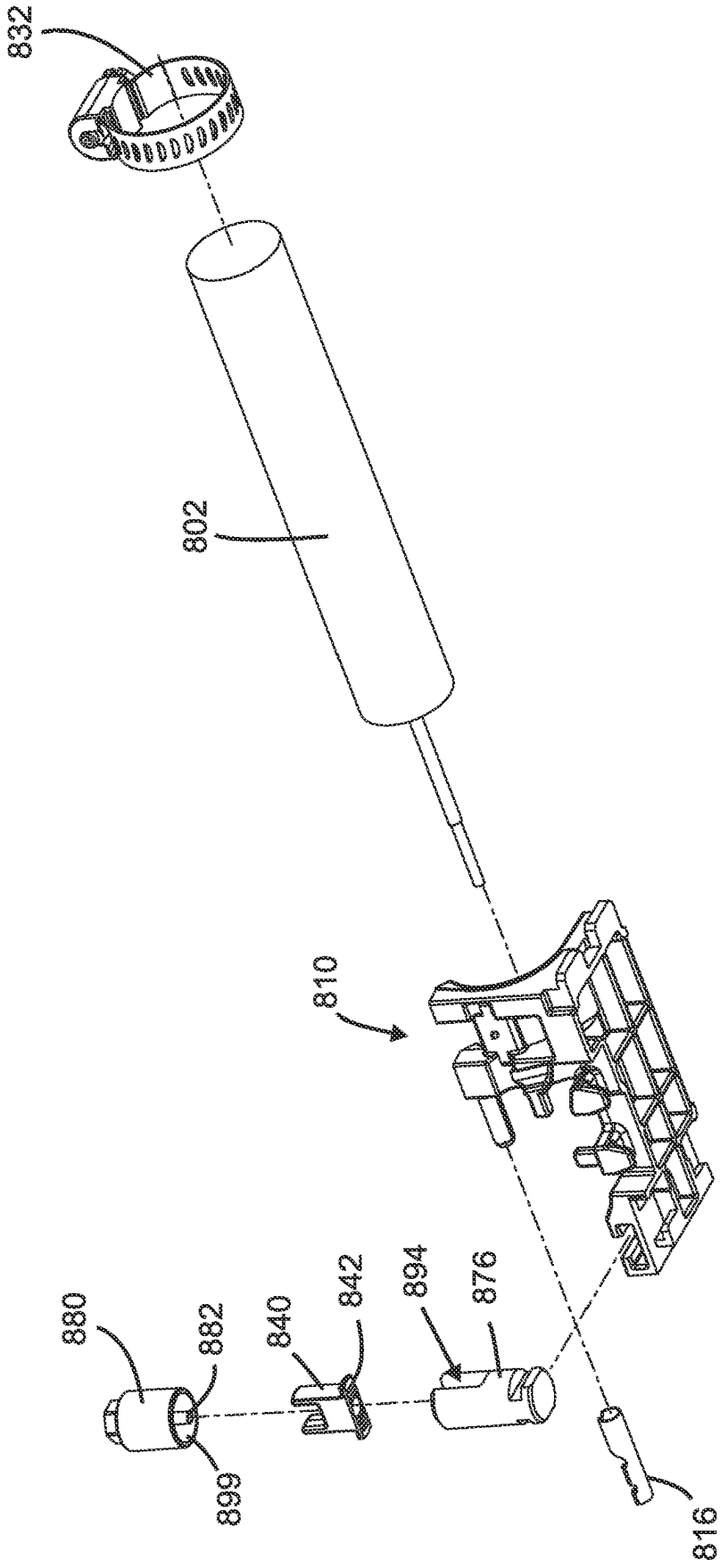

FIG. 66

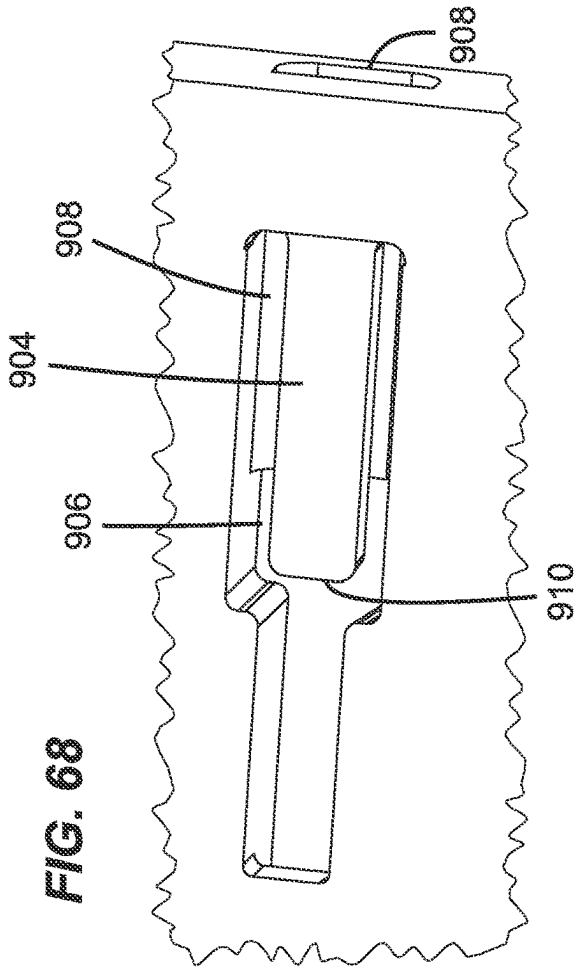

FIG. 68

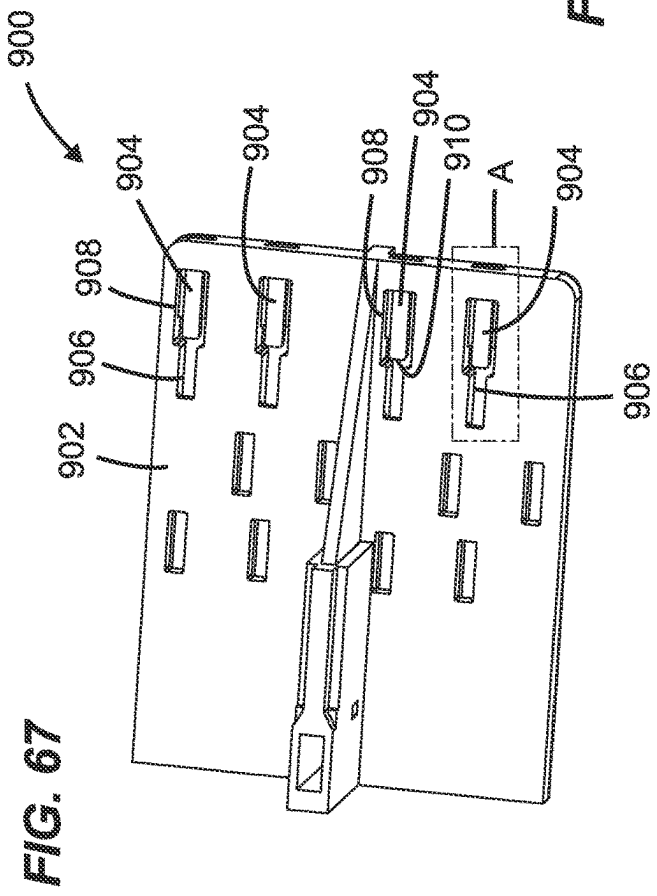

FIG. 67

CABLE FIXATION DEVICES AND ARRANGEMENTS WITH IMPROVED INSTALLATION AND SPACE UTILIZATION AT TELECOMMUNICATIONS ENCLOSURES

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is a continuation of U.S. application Ser. No. 18/531,924, filed Dec. 7, 2023, which is a continuation of U.S. application Ser. No. 17/798,231, filed Aug. 8, 2022, now U.S. Pat. No. 11,867,872, which is a National Stage Application of PCT/US2021/017678, filed on Feb. 11, 2021, which claims the benefit of U.S. Patent Application Ser. No. 62/972,864, filed on Feb. 11, 2020, the disclosures of which are incorporated herein by reference in their entirety. To the extent appropriate, a claim of priority is made to each of the above disclosed applications.

TECHNICAL FIELD

[0002] The present disclosure relates to telecommunications enclosures, and more particularly to devices and arrangements for fixing portions of telecommunications cables to telecommunications enclosures.

BACKGROUND

[0003] Telecommunications systems typically employ a network of telecommunications cables capable of transmitting large volumes of data and voice signals over relatively long distances. Telecommunications cables can include fiber optic cables, electrical cables, or combinations of electrical and fiber optic cables. A typical telecommunications network also includes a plurality of telecommunications enclosures integrated throughout the network of telecommunications cables. The telecommunications enclosures or "closures" are adapted to house and protect telecommunications components such as splices, termination panels, power splitters, wave division multiplexers, fiber management trays, cable organizing and routing components, etc.

[0004] It is often preferred for telecommunications enclosures to be re-enterable. The term "re-enterable" means that the telecommunications enclosures can be reopened to allow access to the telecommunications components housed therein without requiring the removal and destruction of the telecommunications enclosures. For example, certain telecommunications enclosures can include separate access panels that can be opened to access the interiors of the enclosures, and then closed to reseal the enclosures. Other telecommunications enclosures take the form of elongated sleeves formed by wrap around covers or half-shells having longitudinal edges that are joined by clamps or other retainers. Still other telecommunications enclosures include two half-pieces that are joined together through clamps, wedges or other structures.

[0005] In certain applications, the enclosure/housing needs to be water and contaminant (e.g., dust) proof or water-resistant. In particular, water, moisture, cleaning fluids, dust etc., present at the exterior of the housing/enclosure should be prevented by the housing/enclosure from reaching components within the interior of the enclosure/housing. To provide such protection, enclosures can include a seal (e.g., a gel seal) around the perimeter of the enclosure or portions of the perimeter of the enclosure. One or more sealing blocks (e.g., gel blocks) housed in one of the housing pieces can be compressed against corresponding sealing blocks in another housing piece to form a seal therebetween. To accommodate cables or entering the enclosure through ports in the enclosure wall, corresponding sealing blocks positioned at the port locations of the enclosure can include sealing blocks that define cable passages such that the sealing blocks can be compressed around the cable forming a seal.

[0006] Typically, cables entering telecommunications enclosures must be fixed in place inside the enclosure. Within the closure, and depending on the type of cable, protective components of the cable, such as a jacket, a buffer tube, strength members, etc., are stripped, truncated, or removed, allowing the optical fibers held by the cable to be managed within the closure.

SUMMARY

[0007] In general terms, the present disclosure is directed to improvements in the fixation of cables at telecommunications closures.

[0008] Devices and arrangements according to the present disclosure can increase fiber management capabilities at a telecommunications closure having a given external profile.

[0009] Fiber management capabilities can include the number of fibers that can be managed at the telecommunications closure, as well as the types of cables managed at the telecommunications closure.

[0010] A given telecommunications closure is configured to route fibers from one or more provider side telecommunications cables to one or more subscriber side telecommunications cables. The cables enter the closure, typically through sealed ports defined by the closure, and the fibers of those cables are then managed within the interior volume of the closure by a technician. Fiber management can include, for example, fiber storage (typically in loops or portions of loops), splicing, splitting, wave division multiplexing, indexing, and so forth.

[0011] The particular fiber management needs for a given closure can change over time, requiring cables and cable fixation components to be swapped for others.

[0012] A given telecommunications closure can support one or more of: feeder cables, branch cables, connectorized and non-connectorized drop (or distribution) cables, loose fibers, fiber ribbons, etc. Some cables that enter a telecommunications closure include rigid strength rods that must be fixed relative to the closure. Some cables that enter a telecommunications closure include strength yarn, e.g., made from aramid fibers, that must be fixed relative to the closure. Some fibers are spliced to other fibers at splices that are supported within the closure. The optical fibers of connectorized drop cables are terminated at optical fiber connectors. The connectors at some drop cables can be connected to other connectorized fibers at panels (or banks) of adapters mounted within the closure.

[0013] The portions of the cables that enter the closure through the closure ports are typically jacketed with outer protective jackets. Seal blocks positioned at the cable ports seal around the outer jackets of the cables. For feeder and drop cables, the bare fibers are exposed within the closure by stripping the outer jacket, and a remaining end portion of the outer jacket is fixed to cable fixation assemblies within the closure. Exposed aramid yarn and/or rigid strength rods of such cables are also anchored within the closure, often to the same cable fixation assembly as the outer jacket. Fixation of

cables and strength members relative to the closure can help to avoid fiber breakage and disruption of the closure seal due to lateral loads on the cables.

[0014] For connectorized cables (such as cables connectorized with LC-form factor, SC-form factor, MPO-form factor, or other form factor connectors), in some examples the outer jacket will be continuous all the way to the connector such that there is no need to anchor strength yarn with respect to the closure. To minimize the amount of space needed to assemble a panel of connectorized cables within a closure, it can be desirable to minimize the amount of cable slack that is stored within the closure. However, reducing the amount of slack of the drop cables can make it more challenging to fix the outer jackets of the drop cables relative to the closure. Aspects of the present disclosure relate to devices that facilitate fixation of connectorized drop cables after they have been connected to an adapter panel or parking panel supported by a closure. A parking panel is a bank of adapter like structures that receive fiber optic connectors for storage but do not include structures for optically connecting the connectors to other connectors. The parked connectors are stored at the parking panel it they are needed for active signal connections.

[0015] Different regions of a closure volume can be set up for different types of cable fixation and fiber management. For example, a closure can include a main support structure that can support feeder cable fixation on one side of the structure and connectorized and non-connectorized drop cables on the opposite side.

[0016] Aspects of the present disclosure relate to features of a main support structure of a telecommunications closure that can enhance the support structure's versatility in handling different types of cables and cable fixations.

[0017] Aspects of the present disclosure relate to cable fixation assemblies and components with improved features that enhance versatility and help to maximize available space within a telecommunications closure, thereby allowing the overall external profile of a given closure to be reduced in size.

[0018] The contents of International PCT Publication No. WO2020/154418 filed Jan. 22, 2020 and International Publication No. WO2019/160995 filed Feb. 13, 2019 are hereby incorporated by reference in their entireties.

[0019] In accordance with certain specific aspects of the present disclosure, a cable fixation assembly, comprises: a first cable fixation body mountable at a first cable entry opening defined by a main support structure of a telecommunications closure, the first cable fixation body including a first cable support wall and a first mounting member; and a second cable fixation body couplable to the mounting member, the second cable fixation body including a second cable support wall, wherein when the first cable fixation body is coupled to the main support structure and the second cable fixation body is coupled to the first mounting member of the first cable fixation body, the first and second cable support walls are positioned to support a pair of cables passing through the first cable entry opening in a vertically offset arrangement.

[0020] In accordance with further aspects of the present disclosure, cable fixation assembly, comprises: a main support structure configured to be positioned within an interior volume of a telecommunications closure, the main support structure extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, the main support structure including a wall dividing the main support structure into an upper region above an upper horizontal surface of the wall and a lower region below a lower horizontal surface of the wall, the upper horizontal surface facing upward and the lower horizontal surface facing downward, the upper horizontal surface defining a first cable fixation area of the upper region, the lower horizontal surface defining a second cable fixation area of the lower region, wherein the upper horizontal surface is configured to lockingly mount a slotted base plate subassembly, the slotted base plate subassembly configured to lockingly mount one or more first cable fixation bodies; and wherein the lower horizontal surface is configured to lockingly mount one or more second cable fixation bodies configured differently from the first cable fixation bodies.

[0021] In accordance with further aspects of the present disclosure, base plate assembly for mounting one or more cable fixation bodies, the base plate assembly extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, the base plate assembly comprising: a plate member including a plurality of through slots for receiving hooked members of a cable fixation body, the plate member further defining a cavity; a spring element coupled to the plate member that cooperates with one of the through slots to lock the hooked members to the plate member; a proximally positioned foot member and a distally positioned foot member a bar spanning a dimension of the cavity; and a clip having a pair of clip arms, the clip configured to snappingly engage the bar such that at least one of the clip arms extends below the bar and below a bottom surface of the plate member.

[0022] According to further aspects of the present disclosure, a cable fixation body extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, the cable fixation body comprises: a main body defining a cable support surface and including a cable jacket fixation portion and a strength member fixation portion, the cable jacket fixation portion being configured to couple to a cable jacket clamp; a first foot member positioned at a proximal-most end of the main body; and a second foot member positioned distally from the first foot member, wherein the main body defines a fin slot open at the top of the main body and extending downwardly from the top of the main body.

[0023] According to further aspects of the present disclosure, an assembly comprises: a cable fixation body extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, including: a main body defining a cable support surface and including a cable jacket fixation portion and a strength member fixation portion, the cable jacket fixation portion being configured to couple to a cable jacket clamp,

the main body defining a pair of tracks on either side of a recess, the tracks and the recess being elongate parallel to the second axis; and a strength member fixation subassembly including: a first strength member clamp body configured to couple to and slide along the tracks to adjust a position of the strength member fixation subassembly relative to the second axis; a second strength member clamp body including a press pin; and a press plate, the first and second strength member clamp bodies and the press plate configured to cooperate to press a strength member of a fiber optic cable between the first strength member clamp body and the press plate with the press pin pressing the press plate toward the first strength member clamp body.

[0024] According to further aspects of the present disclosure, an assembly comprises: a cable fixation body extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, including: a main body defining a cable support surface and including a cable jacket fixation portion and a strength member fixation portion, the cable jacket fixation portion being configured to couple to a cable jacket clamp; and a strength member fixation subassembly including: a first strength member clamp body including a ramp inclined downward as the ramp extends distally, and a first clamp surface positioned below the ramp; and a second strength member clamp body including a second clamp surface, the second strength member clamp body being configured to couple to and slide distally down the ramp to press a strength member of a fiber optic cable between the first and second clamp surfaces.

[0025] According to further aspects of the present disclosure, an assembly comprises: a cable fixation body extending from a proximal end to a distal end along a first axis, from a first side to a second side along a second axis perpendicular to the first axis, and from a top to a bottom along a vertical axis that is perpendicular to the first and the second axes, the first and second axes defining a horizontal plane, including: a main body defining a cable support surface and including a cable jacket fixation portion and a strength member fixation portion, the cable jacket fixation portion being configured to couple to a cable jacket clamp; and a strength member fixation subassembly including: a strength member clamp body configured to adjustably couple to the main body.

[0026] According to further aspects of the present disclosure, a base plate assembly for mounting one or more cable fixation bodies, comprises: a plate member defining a plurality of through slots configured to receive hooked members of a cable fixation body; a spring element positioned in one of the through slots configured to cooperate with the one of the through slots to lock the hooked members to the plate member; and a stop wall positioned in the one of the through slots to inhibit flexion of the spring element.

[0027] According to further aspects of the present disclosure, a cable fixation assembly, comprises: a cable fixation body, including: a jacket clamp portion; and an arrangement of at least three posts for winding strength yarn of a cable, each of the posts projecting from a fixed end of the post to a free end of the post, the at least three posts projecting to their free ends in mutually different projection directions one from another relative to a reference plane that is parallel to the projection directions.

[0028] According to further aspects of the present disclosure, A cable fixation assembly comprises: a cable fixation body, including a jacket clamp portion; and a jacket clamp support pivotally coupled with a hinge to the cable fixation body at the jacket clamp portion.

[0029] A variety of additional inventive aspects will be set forth in the description that follows. The inventive aspects can relate to individual features and to combinations of features. It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the broad inventive concepts upon which the embodiments disclosed herein are based.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The following drawings are illustrative of particular embodiments of the present disclosure and therefore do not limit the scope of the present disclosure. The drawings are not to scale and are intended for use in conjunction with the explanations in the following detailed description. Embodiments of the present disclosure will hereinafter be described in conjunction with the appended drawings, wherein like numerals denote like elements.

[0031] FIG. **1** is a perspective view of a telecommunications closure in accordance with the present disclosure, the closure being in a closed configuration.

[0032] FIG. **2** is a perspective view of the housing pieces of the closure of FIG. **1**.

[0033] FIG. **3** is a top perspective view of a cable organizer in accordance with the present disclosure, including a first configuration of cables.

[0034] FIG. **4** is a bottom perspective view of the cable organizer and cables of FIG. **3**.

[0035] FIG. **5** is a top, planar, enlarged view of a portion of the cable organizer and cables of FIG. **3**.

[0036] FIG. **6** is a top, planar view of the cable organizer and cables of FIG. **3**.

[0037] FIG. **7** is a top, perspective view of the cable organizer of FIG. **3**, with an example configuration of connectorized drop cables.

[0038] FIG. **8** is an enlarged, perspective view of a portion of the cable organizer and drop cables of FIG. **7**.

[0039] FIG. **9** is an enlarged perspective view of a further portion of the cable organizer and drop cables of FIG. **7**.

[0040] FIG. **10** is a cross-sectional view of a portion of the cable organizer of FIGS. **3** and **7** including a portion of a cable fixation assembly in accordance with the present disclosure.

[0041] FIG. **11** is further cross-sectional view of a portion of the cable organizer of FIGS. **3** and **7** and a portion of a cable fixation assembly of FIG. **10**.

[0042] FIG. **12** is a perspective view of a cable fixation assembly according to the present disclosure.

[0043] FIG. **13** is a perspective view of a further cable fixation assembly according to the present disclosure.

[0044] FIG. **14** is a perspective view of a portion of the cable fixation assemblies of FIGS. **12** and **13**.

[0045] FIG. **15** is a perspective view of a further portion of the cable fixation assemblies of FIGS. **12** and **13**.

[0046] FIG. **16** is a further perspective view of the further portion of FIG. **15**.

[0047] FIG. **17** is a top view of the cable fixation assembly of FIG. **12**.

[0048] FIG. **18** is a cross-sectional view of the cable fixation assembly of FIG. **12** along the line A-A in FIG. **17**.

[0049] FIG. **19** is a top view of the main support structure of the cable organizer of FIG. **3**.

[0050] FIG. **20** is an enlarged view of a portion of the main support structure of FIG. **19**.

[0051] FIG. **21** is an enlarged view of a portion of the cable organizer of FIG. **3**, including a cable fixation assembly and a pair of cables fixed to the cable fixation assembly.

[0052] FIG. **22** is a perspective view of a subassembly of the cable fixation body of the cable fixation assembly of FIG. **21** mounted to an example base plate assembly according to the present disclosure.

[0053] FIG. **23** is a further perspective view of the subassembly of FIG. **22**.

[0054] FIG. **24** is a further perspective of the subassembly of FIG. **22**.

[0055] FIG. **25** is a cross-sectional view of the subassembly of FIG. **22** in a pre-assembled configuration.

[0056] FIG. **26** is a cross-sectional view of the subassembly of FIG. **22** in a partially assembled configuration.

[0057] FIG. **27** is a cross-sectional view of the subassembly of FIG. **22** in an assembled configuration.

[0058] FIG. **28** is an exploded view of the base plate assembly of FIG. **22**.

[0059] FIG. **29** is a perspective view of the base plate assembly of FIG. **22**.

[0060] FIG. **30** is a further perspective view of the base plate assembly of FIG. **22**.

[0061] FIG. **31** is a cross-sectional perspective view of the base plate assembly of FIG. **22** mounted to the cable organizer of FIG. **3**.

[0062] FIG. **32** is a bottom view of the main support structure of the cable organizer of FIG. **3**.

[0063] FIG. **33** is an enlarged perspective view of a portion of the main support structure of the cable organizer of FIG. **3**.

[0064] FIG. **34** is an enlarged perspective view of a portion of the organizer of FIG. **3** including a further cable fixation assembly and a cable.

[0065] FIG. **35** is a cross-sectional perspective view taken along the line B-B in FIG. **47** of a portion of the organizer, the cable fixation assembly and the cable of FIG. **34**.

[0066] FIG. **36** is a perspective view of a cable fixation body of the cable fixation assembly of FIG. **34**.

[0067] FIG. **37** is a further perspective view of the cable fixation body of FIG. **36**.

[0068] FIG. **38** is a side view of the cable fixation body of FIG. **36**.

[0069] FIG. **39** is a further side view of the cable fixation body of FIG. **36**.

[0070] FIG. **40** is an exploded view of the cable fixation assembly of FIG. **34**.

[0071] FIG. **41** is a cross-sectional view of a portion of the cable fixation assembly of FIG. **34**, including a cable strength member.

[0072] FIG. **42** is a perspective view of the upper clamp body of the strength member fixation portion of the cable fixation assembly of FIG. **34**.

[0073] FIG. **43** is a further perspective view of the upper clamp body of FIG. **42**.

[0074] FIG. **44** is a perspective view of the lower clamp body of the strength member fixation portion of the cable fixation assembly of FIG. **34**.

[0075] FIG. **45** is a further perspective view of the lower clamp body of FIG. **44**.

[0076] FIG. **46** is a perspective view of a further cable fixation assembly according to the present disclosure, including a cable.

[0077] FIG. **47** is a bottom planar view of the cable fixation assembly and the cable of FIG. **34**.

[0078] FIG. **48** is a further perspective view of the cable fixation assembly of FIG. **46**.

[0079] FIG. **49** a perspective view of the strength member subassembly portion of the cable fixation assembly of FIG. **46** in a pre-clamped configuration.

[0080] FIG. **50** is a further perspective view of the strength member subassembly portion of FIG. **46** in the pre-clamped configuration of FIG. **49**.

[0081] FIG. **51** is a cross-sectional view of the strength member subassembly portion of FIG. **46** in the pre-clamped configuration of FIG. **49**.

[0082] FIG. **52** is a perspective view of the strength member subassembly portion of the cable fixation assembly of FIG. **46** in a clamped configuration.

[0083] FIG. **53** is a further perspective view of the strength member subassembly portion of FIG. **46** in the clamped configuration of FIG. **52**.

[0084] FIG. **54** is a cross-sectional view of the strength member subassembly portion of FIG. **46** in the clamped configuration of FIG. **52**.

[0085] FIG. **55** is an enlarged view of a portion of the strength member clamp subassembly portion of the cable fixation assembly of FIG. **46**.

[0086] FIG. **56** is a perspective view of a clamp body of the strength member clamp subassembly of the cable fixation assembly of FIG. **46**.

[0087] FIG. **57** is a further perspective view of the clamp body of FIG. **56**.

[0088] FIG. **58** is a perspective view of a further example cable fixation assembly according to the present disclosure, including a cable.

[0089] FIG. **59** is a perspective view of the cable fixation body of the assembly of FIG. **58**.

[0090] FIG. **60** is a further perspective view of the cable fixation body of FIG. **59**.

[0091] FIG. **61** is a perspective view of the jacket clamp support of the assembly of FIG. **58**.

[0092] FIG. **62** is a further perspective view of the jacket clamp support of FIG. **61**.

[0093] FIG. **63** is a perspective view of a further example cable fixation assembly according to the present disclosure, including a cable.

[0094] FIG. **64** is a further perspective view of the cable fixation assembly of FIG. **62**.

[0095] FIG. **65** is a partially exploded view of the cable fixation assembly of FIG. **63**.

[0096] FIG. **66** is a further partially exploded view of the cable fixation assembly of FIG. **63**.

[0097] FIG. **67** is a perspective view of a further example base plate for mounting cable fixation bodies according to the present disclosure.

[0098] FIG. **68** is an enlarged view of the called-out region in FIG. **67**.

DETAILED DESCRIPTION

[0099] Various embodiments of the present invention will be described in detail with reference to the drawings, wherein like reference numerals represent like parts and assemblies throughout the several views. Reference to various embodiments does not limit the scope of the invention, which is limited only by the scope of the claims attached hereto. Additionally, any examples set forth in this specification are not intended to be limiting and merely set forth some of the many possible embodiments for the claimed invention.

[0100] Referring to FIGS. **1-2** a telecommunications closure **10** extends along a longitudinal axis **12** between a proximal end **14** and a distal end **16**. The closure **10** extends along a transverse axis **18** between a first side **20** and a second side **22**. The closure **10** extends along a vertical axis **24** between a top **26** and a bottom **28**. The axes **12**, **18** and **24** are mutually perpendicular, with the axes **12** and **18** defining a horizontal plane.

[0101] As used herein, terms such as proximal, distal, top, bottom, upper, lower, vertical, horizontal and so forth will be used with reference to the axes **12**, **18**, and **24** of FIG. **1** and in relating the positions of one component to another with respect to the full closure assembly of FIG. **1**. These relative terms are for ease of description only, and do not limit how the closure **10** or any individual component or combination of components, may be oriented in practice.

[0102] The closure **10** includes a first upper housing piece **30** and a second lower housing piece **32** that cooperate (e.g., with hinges, clamps, etc.) to form a sealable and re-enterable closure volume **40**. A perimeter seal element **31** forms a seal about three sides of the closure volume **40** when the closure **10** is in a sealed and closed configuration.

[0103] The closure volume **40** is configured to house a cable organizer **34**. An internal portion (not shown in FIGS. **1-2**) of the cable organizer **34** is positioned within the closure volume **40**. An external portion **35** of the cable organizer **34** is positioned exterior to the closure volume **40**, with the cable organizer **34** extending through a proximally positioned opening **36** defined between the proximal ends of the first and second housing pieces **30** and **32**. Cables enter the closure volume **40** via the opening **36** and sealed cable ports defined by the internal portion of the cable organizer **34**.

[0104] The cable organizer **34** is configured to accommodate relatively thick cables (such as feeder cables) entering the closure **10** via a lower portion **38** of the cable organizer **34**, and relatively thin cables (such as drop cables) entering the closure via an upper portion **42** of the cable organizer **34**.

[0105] Referring now to FIGS. **3-6**, a cable organizer (or organizer) **100** in accordance with the present disclosure will be described. The cable organizer **100** can cooperate with housing pieces of a closure such as described above. For example, the cable organizer **100** can cooperate with the housing pieces **30**, **32** as described above with respect to FIGS. **1** and **2**, an internal portion of the organizer being positioned in the closure volume **40**. Other than at the proximal side, the housing pieces **30-32** do not form another opening to the outside of the closure.

[0106] The organizer **100** extends along a longitudinal axis **102** from a proximal end **103** to a distal end **104**, along a transverse axis **106** from a first side **108** to a second side **110**, and along a vertical axis **112** from a top **114** to a bottom **116**. The axes **102**, **106** and **112** are mutually perpendicular, with the axes **102** and **106** defining a horizontal plane. The organizer includes an external portion **118** configured to be positioned outside of a closure volume and an internal portion **120** positioned distally from the external portion **118** and configured to be positioned within a closure volume. In some examples the external portion **118** and the internal portion **120** of the organizer are of unitary construction. Alternatively, the external portion is constructed separately and attached to the internal portion.

[0107] The organizer **100** is generally divided by one or more panels, walls, or other structures between an upper portion **122** and a lower portion **124**. Some of these panels, walls and other structures form an integrated unit that serves as a main support structure **111** of the organizer **100**. In some examples, the internal portion **120** of the organizer **100** corresponds to the main support structure **111**, and the external portion **118** is coupled to the main support structure **111**. The organizer **100** defines one or more channels and other guiding structures for guiding optical fibers between the upper and lower portions, such that an optical fiber from a cable (e.g., a feeder cable) fixed in the lower portion can be optically coupled to an optical fiber of a cable (e.g., a drop cable) fixed in the upper portion.

[0108] The internal portion **120** includes in the upper portion **122** a cable fixation region **126** and a fiber management region **128** positioned distally from the cable fixation region **126**. The internal portion **120** also includes in the lower portion **124** a cable fixation region **130** and a fiber management region **132** positioned distally from the cable fixation region **130**. The cable fixation regions **126** and **130** are generally vertically aligned. The fiber management regions **128** and **132** are generally vertically aligned.

[0109] The lower fiber management region **132** is partially defined by a side wall **134** and a horizontal downward facing surface **136** of a panel **138**, together forming a basket. The basket of the lower fiber management region **132** can serve as a storage area for looped fiber from the feeder cables **50**. The looped fiber can be in the form of loose fibers, loose fibers protected in groups by a common sheath, fiber ribbons, etc. Fibers can be guided from the lower fiber management region **132** to the upper fiber management region where they can be further managed, e.g., with splices, connectors and adapters, splitters, wave division multiplexors, etc.

[0110] The upper fiber management region **128** includes an upward facing horizontal surface **140** of the panel **138**. The surface **140** defines mounting structures **142** for mounting optical fiber management components, such as splitter holders and/or splice holders. Fiber guides **144** and retainers **146** are also provided in the upper fiber management region **128** and retain fibers **64** within the upper fiber management region **128** while enabling compliance with bend radius limitations of the optical fibers **64**.

[0111] The upper fiber management region **128** can also include one or more banks **150** of fiber optic adapters **152**. The adapters **152** can be used to optically connect connectorized drop cables **60** having connectors **62** with connectorized fibers **64** having connectors **66** terminating the fibers **64**. In this example, one bank **150** of adapters **152** is provided. In other examples, zero or two banks of adapters can be provided aligned with one another parallel to the transverse axis **106**. Where adapters are not longitudinally aligned with entering cables, non-connectorized drop cables **61** can be fixed in the upper cable fixation region **126** and

their fibers **57** managed in the upper fiber management region **128**. Thus, the upper region of the organizer **100** can accommodate connectorized drop cables, non-connectorized drop cables, or a combination of connectorized and non-connectorized drop cables. Other cable types and configurations can also be accommodated and managed at the cable fixation region **126**. In alternative examples, the adapters, or non-functional receptacles that behave like one-sided adapters, can serve as parking or storage for the connectors **62** or the connectors **66** until an active fiber optic connection is needed.

[0112] The upper cable fixation region **126** and the lower cable fixation region **130** are separated by a wall **154**. The wall includes an upward facing horizontal surface **156** and a downward facing horizontal surface **158** (FIG. **32**). The surfaces **156** and **158** can support cable fixation assemblies as will be described in greater detail below.

[0113] Positioned proximally of the cable fixation regions **126** and **130** is a seal region **160** of the organizer **100**. The seal region **160** includes a plurality of dividers **162** and **164** in the upper portion **122** and the lower portion **124**, respectively, of the organizer **100**. The dividers **162** define openings **166** (FIG. **7**) through which connectorized drop cables **60** and non-connectorized drop cables **61** enter the closure. The dividers **164** define openings **173** (FIG. **33**) through which feeder cables **50** or the like enter the closure. The dividers **162** and **164** are provided in two rows **167** and **168** in the upper portion **122** spaced apart longitudinally from each other and two rows **170** and **172** in the lower portion **124** spaced apart longitudinally from each other. In the space between rows of dividers there are placed seal blocks **174**. The seal blocks **174** form seals around the cables **50**, **60**, and **61** entering the closure. The seal blocks **174** also serve to seal off the proximal opening of the closure defined between the housing pieces of the closure.

[0114] Referring to FIGS. **7-9**, the cable fixation region **126** fixes cables entering the closure through four cable ports defined by the seal blocks **174**. The fixed cables shown include a total of six connectorized drop cables **60**. The connectors **62** of two of the cables are not shown to aid illustration. Two of the cable ports receive just one connectorized drop cable **60***a*, **60***b*. Each of the other two ports receives a pair of vertically offset drop cables **60***c* and **60***d*. The outer jackets of the cables **60** extend longitudinally to the connectors **62**. An upper set (not shown) of adapters **152** can be provided above the bank **150** to receive connectors of the upper connectorized drop cables **60***d*.

[0115] The number of drop cables extending through the four ports can depend on the particular fiber management needs of the closure. For example, each port can accommodate a single drop cable or two drop cables. In addition, one or more of the ports can be plugged and not receive any drop cable. Whatever the configuration of drop cables entering the four ports at the cable fixation region **126**, those cables must be affixed, and are preferably affixed near the seal blocks to minimize compromising of the seal due to lateral load on the cables. In addition, due to the lack of cable slack between the adapters **152** and the seal blocks **174**, the cables are appropriately affixed only after their connectors are installed on the adapters which have been pre-mounted to the main support structure. In addition, it is desirable that the cable fixation components be readily modified or adjusted to accommodate modifications to the types and number of cables. Thus, for example, it is desirable that the cable fixation components be readily configured to accommodate a single cable or an arrangement of two vertically offset cables, or to be uninstalled to enable fixation of a different type of cable, such as a non-connectorized drop cable.

[0116] Referring to FIGS. **7-18**, the cable fixation assembly **200** can provide one or more of these desirable features. The cable fixation assembly **200** includes a first cable fixation body **202** that is configured to span two adjacent cable ports and to support a cable extending through each of the adjacent ports. In some examples, the cable fixation body **202** is made from pressed metal. In some examples, the cable fixation body **202** is made from a polymeric material. The first cable fixation body **202** includes a pair of mounting tabs **204** that are downwardly insertable into mounting slots **206** located between the dividers **162** of the main support structure **111**. To provide stability, tabs **204** are longitudinally offset such that one of the tabs **204** can be inserted in a slot **206**, and the other **240** abuts a distally facing surface **163** of a divider **162** or a wall that forms a divider **162** (FIG. **20**), such that the two tabs **204** essentially straddle a longitudinal wall thickness **165** adjacent a divider **162** (FIG. **20**). The sizing and materials of the mounting tabs **204** and the slots **206** can be selected to provide for a frictional fit therebetween. The cable fixation body **202** also includes a U-shaped retaining bracket **209** configured to engage a divider **162** and prevent distal movement of an installed cable fixation body **202**. With the tabs **204** installed about the wall thickness **165** and the retaining bracket **209** engaging a divider **162**, the cable fixation body **202** is mounted to the main support structure **111**.

[0117] Prior to mounting the cable fixation body **202** to the main support structure **111**, one or two of the connectorized drop cables **60**, which have already been connected to adapters, are clamped to the cable fixation body **202**. Optionally, and depending on the diameter of the cable **60**, the portion of the outer jacket of the cable **60** that is to be clamped to the main cable fixation body **202** is first wrapped in a substrate, such as a foam or tape to increase the diameter at the clamping location and thereby facilitate clamping. The cable **60** is placed on the first cable support wall **208** of the cable fixation body **202**. The body **202** also includes a second cable support wall **212** transversely offset from the cable support wall **208**, the support walls **208** and **212** being connected by base portion **214** from which also extend the mounting tabs **204**, **206**. When installed, the base portion **214** straddles one of the dividers **162**. The cable **60** is then clamped to the cable support wall **208** with one or more clamps, such as zip ties **80**. The zip tie or zip ties **80** are looped around the cable **60** and around the corresponding T-shaped tab **210** that is an integral part of the cable fixation body **202** and extends distally from the base **214**. Optionally, a second drop cable **60** that passes through an adjacent port of the closure can be clamped in a similar fashion to the second cable support wall **212**. Alternatively the lower level drop cable or drop cables can instead, or in addition, be clamped to the external portion **118** that is attached to the main structural support **111** and, particularly, to T-shaped tabs **234** of an external frame **232** of the external portion **118** that is configured to be positioned proximally from the seal blocks **174** and external to the closure volume.

[0118] If either or both of the closure ports served by the cable fixation body **202** is/are to receive a second cable vertically offset above the first cable, one or two upper cable fixation bodies **216** are clipped onto the first cable fixation

body **202**. In FIG. **12**, two upper cable fixation bodies **216** are clipped onto support arms **218**, **220** of the cable fixation body **202**. In FIG. **13**, just one upper cable fixation body **216** has been clipped onto the cable fixation body **202** at the support arm **220**.

[0119] In some examples, the cable fixation body **216** is a plastic part that clips to the cable fixation body **202**, which is a metal part.

[0120] The cable fixation body **216** includes a coupling portion **222**, a cable support wall **224** and a seal anchor **226**. The coupling portion **222** includes resilient clip arms **228** with latches **229** that lockingly clip to the corresponding support arm **218**, **220** of the cable fixation body **202**. By flexing the clip arms **228** outward, the cable fixation body **216** can be easily detached from the cable fixation body **202** to convert to a single cable fixation arrangement. The cable support wall **224** supports a cable vertically offset above a cable supported by the corresponding cable support wall **208**, **212** below. The seal anchor **226** includes a frame **233** defining an opening **235** to which can be anchored a sealing component such as a gel piece or a gel pad **229** (schematically represented in FIG. **12**). The seal anchor **226** projects proximally from the support wall **224** and is configured to be positioned within the seal blocks of the organizer to enhance the seal between the two vertically offset cables e.g., by filling a gap between the two vertically offset cables.

[0121] To clamp a cable to the cable fixation body **216**, in some examples one or more clamps (e.g., zip ties **80**) are tightened around the upper cable and the cable fixation body **216** with the strap portion of the zip tie being guided through the guide notches **230** defined by the cable fixation body **216** and the recesses **231**. Slits **239** are provided in the cable support wall **224**. The slits **239** are vertically aligned with the recesses **231** and the guide notches **230**. Zip ties can be inserted through the slits **239**, and through the recesses **231** and guide notches **230** to clamp a cable to the cable support wall **224**. The slits **239** are transversely offset from each other, which can promote different zip tie insertion directions for the two ties that enter the slits, which can provide for a tighter clamping force on the upper cable. Such a clamping arrangement is housed within the closure volume together with the clamping arrangement of the lower cables. Alternatively (or in addition), the upper cables can be clamped outside the closure volume to the external portion **118** of the main structural support **111** and, particularly, to T-shaped tabs **234** of an external frame **232** of the external portion **118** that is configured to be positioned proximally from the seal blocks **174** and external to the closure volume. By positioning the clamping arrangement of the lower cables inside the closure volume and the clamping arrangement of the upper cables outside the closure volume, space inside the closure volume can be more effectively allocated.

[0122] In some examples, to affix a pair of connectorized cables in a vertically offset arrangement through a single port of the closure, the connectors are installed in adapters **152**, following which one of the cables is clamped to the cable fixation body **202** or to the cable support structure external to the closure volume, following which the cable fixation body **216** is coupled to the cable fixation body **202**, following which the cable fixation body **202** is mounted to the main support structure **111**, following which the second cable is clamped to the cable fixation body **216** or to the cable support structure external to the closure volume. In alternative examples, both cables can be clamped before the cable fixation body **202** is mounted to the main support structure **111**. In alternative examples, the second connector is installed in the corresponding adapter after the first cable is clamped to the cable fixation body **202**.

[0123] Referring now to FIGS. **19-31**, a further cable fixation assembly **300** that can be mounted at the cable fixation region **126** of the upper portion **122** of the main support structure **111** of the organizer **100** will be described. The cable fixation assembly **300** is configured to clamp (e.g., with zip ties **80**) non-connectorized drop cables **61** whose outer jackets have had their distal portions stripped, exposing the optical fiber(s) **57** and strength yarn **67**. It should be appreciated that a portion of the cable fixation region **126** can support connectorized cable fixation while another portion of the cable fixation region **126** supports non-connectorized cable fixation, and the cable fixation assemblies employed can be adjusted over time as dictated by fiber routing needs. That is, the main support structure **111** is configured to support multiple different configurations of cables and cable fixation assemblies.

[0124] The upper horizontal surface (or top horizontal surface) **156** is configured to lockingly mount a slotted base plate subassembly **302**. The slotted base plate subassembly **302** is configured to lockingly mount one or more cable fixation bodies **304**, as well as other cable fixation bodies with similar mounting portions that can engage the slots of the base plate subassembly as described below. The lower horizontal surface **158** is configured to lockingly mount one or more cable fixation bodies with mounting portion configurations that are different from those of the first cable fixation bodies, as will described in greater detail below. A base plate subassembly is not required for the cable fixation body fixation to the lower surface **158**. The cables fixed at the lower surface **158** are generally of relatively large diameter, such as feeder cables. At the upper surface **156**, the cables to be fixed are generally of relatively small diameter, such as drop cables, and the base plate subassembly **302** serves as a vertical spacer to vertically align the corresponding fixed cables with the appropriate cable port.

[0125] At or defined by the upper surface **156** are interfacing structures. The interfacing structures are configured to lockingly mount the base plate subassemblies **302**. The interfacing structures include proximal and distal first mechanical stops **310** and **312** that define transversely elongate slots **314** and **316** above the upper surface **156**. The proximal and distal mechanical stops **310** and **312** are aligned parallel to the longitudinal axis **12**. The slots **314** and **316** are adapted to horizontally receive proximally sliding foot members **318** and **320** of the base plate subassembly **302**. Additional slots **322** are defined by the wall **154** and extend downward from the upper horizontal surface **156**. The slots **322** are configured to vertically receive downwardly inserting arm portions of a clip **324** of the base plate subassembly **302**.

[0126] The base plate subassembly **302** includes a plate member (or plate) **330** including a plurality of vertically extending through slots **332**. The through slots **332** are sized and positioned on the plate **330** to receive hooked members **334** of the cable fixation body **336**. The cable fixation body **336** is configured to affix a pair of jacketed portions of non-connectorized drop cables **61**. The cable fixation body **336** further includes strength member anchors **338** about

which strength yarn **67** from the drop cables **61** can be looped and tied off for enhanced overall fixation of the cables.

[0127] The plate member **330** defines a cavity **340** the extends through an entire vertical thickness of the plate member **330** and is open at the top surface **342** and the bottom surface **344** of the plate member **330**. Within the vertical thickness of the plate member **330**, a bar **346** spans a transverse dimension of the cavity **340**.

[0128] The subassembly **302** includes the clip **324**. The clip **324** is configured to snappingly engage the bar **346** such that the flexibly resilient clip arms **348** grasp the bar **346** and lower portions of the clip arms **348** extend below the bar and below the bottom surface **344** of the plate member and into the slot **322**, thereby restricting horizontal movement of the plate member **330** relative to the upper surface **156**, while engagement of the foot members **318** and **320** with the slots **314** and **316** restricts upward movement of the plate member **330** relative to the upper surface **156**, such that the plate member **330** is locked to the main support structure **111**.

[0129] The subassembly also includes a spring element **350** coupled to the plate member **330**. As shown in the installation progression of the cable fixation body **336** to the plate member **330** in FIGS. **25**, **26** and **27**, the spring element **350** cooperates with one of the through slots **332** to lock the hooked members **334** of the cable fixation body **336** to the plate member **330**. As shown in FIGS. **25** and **26**, one of the hooked member **334** presses down the free end **352** of the spring element **350** until the hooked member **334** vertically clears the vertical thickness of the plate member **330**, at which point the cable fixation body **336** is slid proximally, causing the free end **352** of the spring element **350** to be released and return to its relaxed positioned within the through slot in which it restricts distal movement of the hook member **334**, thereby locking the cable fixation body **336** to the plate member **330**. To remove the cable fixation body **336** from the plate member **330**, the spring element **350** can be flexed downward allowing the hooked member **334** to slide distally and be lifted out of the through slot. A fixed end **354** of the spring element **350** is captured by a pocket **356** defined by the plate member **330** at the bottom of the plate member **330**.

[0130] The foot member **318** (and, optionally also the foot member **320**) spans an entire transverse width of the plate member **330**, thereby providing enhanced coupling of the plate member **330** to the main support structure **111**. In addition, the foot member **318** is the proximal-most end of the plate member **330**.

[0131] It can be appreciated that the foregoing features of the subassembly **302** and main support structure **111** allow for an easily installable and de-installable plate assembly with respect to the main support structure **111**, as well as a secure coupling of the subassembly **302** to the main support structure **111**.

[0132] Referring now to FIGS. **32-39**, a further cable fixation assembly **400** that can be mounted at the cable fixation region **130** of the lower portion **124** of the main support structure **111** of the organizer **100** will be described. The cable fixation assembly **400** is configured to clamp a single non-connectorized drop cable **50** (e.g., a feeder cable) whose outer jacket has had its distal portion stripped, exposing the optical fiber(s) **79** and a rigid strength rod **69**.

[0133] At or defined by the lower (or bottom) surface **158** of the wall **154** are interfacing structures for lockingly mounting one or more cable fixation bodies **402**. The interfacing structures include proximal and distal mechanical stops **404** and **406** positioned below the lower horizontal surface **158**. The stops **404** and **406** define slots **408** and **410** vertically positioned between the stops **404**, **406** and the lower horizontal surface **158**. The stops **404** and **406** area aligned parallel to the longitudinal axis **12**. The slots **408** and **410** are configured to horizontally (in a proximal sliding direction) receive foot members **412** and **414** of the cable fixation body **402** to restrict downward vertical separation of the cable fixation body **402** from the lower surface **158**.

[0134] Fins **420** project downwardly from the lower surface **158** and are elongate parallel to the longitudinal axis **12**. A fin **420** is configured to engage a chamfered and longitudinally elongate fin slot **422** of the cable fixation body **402** to resist transverse movement of the cable fixation body **402** relative to the lower surface **158**. Flexible members **424** positioned distally of the distal mechanical stops **406** are positioned and configured to resist distal movement of the cable fixation body **402** relative to the lower surface **158**. The flexibly resilient member **424** can be resiliently flexed downward or upward to install the cable fixation body **402** on the main support structure **111**, and then released to its relaxed position shown in which it blocks distal movement of the cable fixation body **402**.

[0135] The foot member **412** is positioned at a proximal-most end of the main body.

[0136] The lower surface **158** includes a set of the interfacing structures per cable port or corresponding opening between dividers **164**, such that plurality of the cable fixation bodies **402** (in this example, four such cable fixation bodies **402**) and cables **50** can be affixed at the lower surface **158**.

[0137] It can be appreciated that the foregoing features of the subassembly **400** allow for an easily installable and de-installable cable fixation body directly to the main support structure **111**, as well as a secure coupling of the cable fixation body **402** to the main support structure **111**.

[0138] The main support structure **111** also includes a block **180** projecting downward from the lower surface **158** of the wall **154**. The block **180** can be an integrally formed (e.g., in a mold) component of the main support structure **111**. The block **180** is configured to support and engage a body **430** of an electrical grounding assembly **432** (FIG. **4**). The body **430** of the electrical grounding assembly **432** can be fastened to the block **180**. The electrical grounding assembly **432** can include a grounding rod **434** (FIG. **4**) extending proximally from the body **430** to an exterior of the closure. The cable fixation bodies **402** can be made from an electrically conductive material and conductively linked via a grounding conductor secured to the grounding post **440** (e.g., by crimp sleeve) at one end of the cable fixation body **402**, and at the grounding body **430** (e.g., with a threaded fastener) at the end other end of the grounding conductor, in order to electrically ground the cable clamped to the cable fixation body **402**. To this end, a conductive path can be established from one or more conductive components of the cable **50** to the grounding post **440**. Such conductive cable components can include, e.g., the strength rod **69**, which can metallic, or a cylindrical conductive shield that is positioned within the cable's outer jacket and around the fibers **79**. The conductive path from the conductive shield can include a metallic cable clamp **450** that contacts the conductive shield.

The conductive path from the strength rod can include a strength rod fixation assembly that is fastened to the cable fixation body **402**.

[0139] Referring now to FIGS. **32-45**, a cable fixation assembly **500** that includes the cable fixation body **402** will be described.

[0140] The cable fixation body **402** includes a main body **460** defining a cable support surface **462**. The cable fixation body **402** includes a cable jacket fixation portion **464** and a strength member fixation portion **466**. The cable jacket fixation portion **464** is configured to couple to a cable jacket clamp (e.g., a hose clamp having a strap portion that passes through slots **468**) that is clamping a cable to the cable support surface **460**.

[0141] The strength member fixation portion **466** includes a pair of tracks **470** on either side of a recess **472**. The tracks **470** and the recess **472** are elongate parallel to the transverse axis.

[0142] The assembly **500** includes a strength member fixation subassembly **474** for anchoring a rigid strength rod, strength yarn (e.g., aramid yarn), or both a rod and yarn. The subassembly **474** includes an upper strength member clamp body **476** defining opposing shoulders **478** configured to couple to and slide along the tracks **470** to adjust a transverse position of the strength member fixation subassembly **474**. The subassembly **474** also includes a lower strength member clamp body **480** that includes a press pin **482**. Interior threads **484** of the lower strength member clamp body **480** cooperate with exterior threads **486** of the upper strength member clamp body **476** to allow rotational advancement of the lower clamp body towards the upper clamp body.

[0143] A set screw **488** is threadably received in a hole **490** of the upper clamp body **476**. The set screw **488** is used to set the transverse position of the upper clamp body **476** relative to the tracks **470**. That is, the set screw **488** can be rotated to dig into the upward facing surface **492** of the recess **472** at the desired transverse position.

[0144] The upper clamp body **476** includes a channel **494** defined by two walls **496**, **498**. The strength rod **69** of the cable **50** is received in the channel **494** above the set screw **488** and the corresponding hole **490**.

[0145] The subassembly **474** also includes a press plate **510** positioned directly above the strength rod and configured to complement the cross-sectional horizontal shape of the upper clamp body **476**.

[0146] The lower strength member clamp body **480** is threadably screwed onto the upper clamp body **476**, causing the press pin **482** to press on the underside of the press plate **510** and thereby anchor the strength rod **69** within the channel **494**.

[0147] The transverse slidable cooperation between the upper clamp body **476** and the tracks **470** can advantageously allow for improved longitudinal alignment of the strength member fixation subassembly **474** for strength rods of different sized cables.

[0148] Referring now to FIGS. **46** and **48-57**, a further example cable fixation assembly **600** is shown. The assembly **600** includes a hose clamp **602** that is clamping an outer jacket of a cable **50** to a main cable fixation body **604**. The cable **50** includes a strength rod **69**.

[0149] The assembly **600** includes a strength member subassembly **606** that can advantageously provide a strong fixation of the rod **69** with an easily adjustable magnitude of clamping or fixation force on the rod **69**.

[0150] The following description will presume on orientation of the assembly **600** based on its mounting to the lower surface **158** of the wall **154** of the main support structure **111** in the same manner as the mounting of the cable fixation body **402** thereto as described above.

[0151] The subassembly **606** includes a first clamp body **608**, which can be unitarily constructed with the cable fixation body **604**, or alternatively fastened thereto. The clamp body **608** includes a pair of transversely spaced guide ramps **612**, **614** inclined downward as the guide ramps **612**, **614** extend distally. The ramps **612**, **614** define a substantially triangular shaped cavity **610** positioned therebetween that can receive a portion of the second clamp body **618**, providing additional mechanical engagement between the clamp bodies **608** and **618**.

[0152] The clamp body **608** includes a first clamp surface **616** positioned below the ramps **612**, **614**.

[0153] The second clamp body defines a second clamp surface **620** flanked by transversely spaced apart vertical walls **640**, **642**. The second clamp body **618** is configured to couple to and slide distally down the ramps **612**, **614** to press and clamp the strength rod **69** between the clamp surfaces **616** and **620**. The clamp body **618** includes transversely spaced part angled shoulders **644**, **646** that engage the ramps **612**, **614** for sliding the clamp body **608** up and down the ramps.

[0154] The subassembly **606** includes a screw **622** that longitudinally extends through a vertically elongated slot **624** that permits a limited vertical range of motion for the screw **622** within the elongated slot **624**. The second clamp body **618** is configured to advance down the ramps **612**, **614** by rotating action of the screw **622** as the screw **622** threadably engages a hole **627** in the second clamp body. As the second clamp body **618** advances down the ramps distally upon rotating action of the screw **622**, the screw **622** moves downward (in the direction **650**) in the slot **624** (from the configuration illustrated in FIGS. **49-51** to the configuration illustrated in FIGS. **52-54**), vertically holding the second body **618** as it moves toward the first clamp surface **616** to clamp the strength rod **69** with the desired force. To release the strength rod, the screw **622** can be rotated in the opposite direction to push the clamp body **618** up the ramps, causing the clamp surfaces **616**, **620** to release the strength rod **69**.

[0155] Referring now to FIGS. **58-62**, a further example cable fixation assembly **700** is shown. In FIG. **58**, the assembly **700** is fixing a cable **702**. The assembly extends from a proximal end **704** to a distal end **706** along an axis **708**. The cable fixation assembly **700** includes features similar to one or more other cable fixation assemblies described herein, and the following discussion will be limited primarily to features of the assembly **700** that do not overlap with one or more other cable fixation assemblies described herein.

[0156] The cable fixation assembly **700** includes a cable fixation body **710**, a cable fixation portion **712**, and a strength member fixation portion **714**.

[0157] The cable fixation portion **712** includes a portion of the body **710**, two cable jacket clamps **716** (e.g., hose clamps), and a jacket clamp support **718**.

[0158] The body **710** is configured to mount to one or more of the plates or plate members described herein.

[0159] The cable fixation portion **712** is configured to secure a relatively thick (in dimension transverse to the axis

708) cable, such as the cable **702**. Due to the heft of such thick cables, multiple hose clamps **716** are used to clamp the cable jacket **703** to the body **710**. In addition, for further robustness of the clamping of the jacket **703**, the jacket clamp support **718** is provided.

[0160] The jacket clamp support **718** includes a curved arm **720**, a clamp portion **722**, and a hinge pin **724**. The clamp portion **722** includes teeth **726** configured to dig into the cable jacket **703**. The teeth **726** can substantially oppose the teeth **730** of the body **710**, which perform the same function as the teeth **726** on the other side of the cable **702**. The body includes a socket **728** configured to pivotally receive the hinge pin **724** such that the support **718** can pivot about a pivot axis **731** that is parallel to the axis **708**. A notch **732** receives a rib **734** of the curved arm **720** and acts a pivot stop for the support **718**.

[0161] Pivoting about axis **731** by the support **718** allows the support **718** to be adjusted to different cable thicknesses. The configuration of the support **718** distributes the clamping force of the cable clamps **716** to more securely clamp the cable **702**. In some examples, the support **718** is constructed of electrically conductive material (e.g., metal).

[0162] Referring to FIGS. **63-66**, a further example cable fixation assembly **800** is shown. In FIG. **63**, the assembly **800** is fixing a cable **802**. The assembly extends from a proximal end **804** to a distal end **806** along an axis **808**. The assembly **800** extends vertically along an axis **809** that is perpendicular to the axis **808**. The cable fixation assembly **800** includes features similar to one or more other cable fixation assemblies described herein, and the following discussion will be limited primarily to features of the assembly **800** that do not overlap with one or more other cable fixation assemblies described herein.

[0163] The cable fixation assembly **800** includes a cable fixation body **810**, a cable fixation portion **812**, and a strength member fixation portion **814**.

[0164] An electrically conductive connector **816** is frictionally fit or crimped to the grounding post **818**. A grounding conductor can be secured to the connector **816**.

[0165] The body **810** includes a yarn post arrangement **820** that includes a plurality of posts. The arrangement **820** includes posts **822**, **824**, **826**, and **828**. Each post projects from a fixed end of the post to a free end of the post. The configuration of the arrangement **820** can support a plurality of different winding configurations for strength yarn **830** of the cable **802**. Winding the strength yarn around the posts of the arrangement **820** can, advantageously, secure the yarn without pulling on it tightly. That is, due to the winding configuration, the yarn is fixed without having to pull it detrimentally tightly.

[0166] An example winding configuration of the yarn **830** using the arrangement **820** is shown in FIG. **63**. The yarn **830** extends from the jacketed portion of the cable **802**, and is then routed over the post **822**, then under the post **824**, then behind the post **828** while above the post **826**, then behind the post **826**, then behind the post **824**, then behind the post **822** and then to the cable clamp **832**, which can secure a free end portion of the yarn **830** to the body **810** and/or the cable jacket **803**. Alternative routing configurations for the yarn **830** are possible using the arrangement **820**.

[0167] The posts of the arrangement **820** project to their respective free ends in three different directions relative to a plane defined by the axes **808** and **809**. The post **828** projects upward and parallel to the axis **809**. The posts **826** and **824** project downward and parallel to the axis **809**. The post **822** projects parallel to the axis **808**. Having the posts project in different directions can accommodate yarn routing configurations having the benefits described above.

[0168] In some examples, all of the posts project to their free ends in a single plane, e.g., a plane parallel to a plane defined by the axes **808** and **809**.

[0169] The assembly **800** includes a strength member fixation subassembly **874** for anchoring a rigid strength rod, strength yarn (e.g., aramid yarn), or both a rod and yarn. As with the subassembly **474** described above, the subassembly **874** can be selectively included in the overall assembly. Depending on the cable and strength member characteristics, the subassembly **874** may not be needed or appropriate and can be advantageously dispensed with entirely in some use applications, due to the manner in which it mounts to the body **810**.

[0170] The subassembly **874** includes a lower strength member clamp body **876** defining opposing shoulders **878** configured to couple to and slide along the tracks **870** to adjust a transverse position of the strength member fixation subassembly **874**. The subassembly **874** also includes an upper strength member clamp body **880** that includes a press pin **882**. Interior threads of the upper strength member clamp body **880** cooperate with exterior threads of the lower strength member clamp body **876** to allow rotational advancement of the upper clamp body towards the lower clamp body.

[0171] The transverse position (perpendicular of the lower clamp body **876**) can be set relative to the tracks **870** by clamping of a cable strength rod **805** in the subassembly **874**.

[0172] The lower clamp body **876** includes a channel **894**. The strength rod **805** of the cable **802** is received in the channel **894**.

[0173] The subassembly **874** also includes a press block **840** having a unitarily integrated press plate **842**. The press block **840** is positioned in the channel **894** such that the press plate **842** is positioned directly above the strength rod **805**.

[0174] The upper strength member clamp body **880** is threadably screwed onto the lower clamp body **876**, causing the press pin **882** and other portions of the upper clamp body **880** to press on the upper side of the press plate **842** and thereby anchor the strength rod **805** within the channel **894**. The block **840** is a robust part that can resist deformation by the clamping action of the clamping bodies above and below it. The block **840** is shaped and configured to be positioned within a cavity **899** defined by the upper strength member clamp body **880**.

[0175] The transverse slidable cooperation between the lower clamp body **876** and the tracks **870** can advantageously allow for improved longitudinal alignment of the strength member fixation subassembly **874** for strength rods of different cables.

[0176] Referring to FIGS. **67** and **68**, a further example base plate **900** for mounting cable fixation bodies is shown. FIG. **68** is an enlarged view of the called out portion A of FIG. **67**.

[0177] The base plate **900** includes features similar to one or more other base plate assemblies and members described herein, and the following discussion will be limited primarily to features of the base plate **900** that do not overlap with one or more base plate assemblies.

[0178] Spring elements **904** can be unitarily integrated with the plate member **902**. The spring elements **904** cooperate with the corresponding through slots **906** to lock hooked members of cable fixation bodies to the plate member **902**, as described herein. To install and remove a cable fixation body, one or more of its hooked members must clear the free end **910** of the corresponding spring element(s) **904**. To do this, the free ends **910** of the corresponding spring element(s) **904** are flexed downward toward a wall **908** that is positioned within the corresponding through slot **906**. The wall(s) **908** can be unitarily integrated with the plate member **902**. The wall(s) **908** can advantageously serve as a flexion stop that can minimize (e.g., inhibit) over flexing of the flex spring elements **904** when installing and removing cable fixation bodies to or from the plate member **902**, thereby minimizing unwanted breakage or loss of resiliency over time of the spring elements **904**.

[0179] From the foregoing detailed description, it will be evident that modifications and variations can be made in the devices of the disclosure without departing from the spirit or scope of the invention.

What is claimed is:

1. A cable fixation assembly, comprising:

a first cable fixation body including a first cable support wall and a first mounting portion; and

a second cable fixation body couplable to the first mounting portion, the second cable fixation body including a second cable support wall,

wherein when the second cable fixation body is mounted to the first cable fixation body, the first cable support wall and the second cable support wall are positioned to support a pair of cables.

2. The cable fixation assembly of claim **1**, wherein the second cable fixation body includes a projection extending from the second cable support wall, the projection being configured to support a sealing component.

3. The cable fixation assembly of claim **2**, wherein the projection defines an opening for anchoring a sealing component to the projection.

4. The cable fixation assembly of claim **3**, further comprising the sealing component.

5. The cable fixation assembly of claim **4**, wherein the sealing component is anchored to the projection.

6. The cable fixation assembly of claim **4**, wherein the sealing component includes a piece of gel.

7. The cable fixation assembly of claim **1**, wherein the second cable fixation body is configured to clip onto the mounting portion of the first cable fixation body.

8. The cable fixation assembly of claim **7**, wherein the second cable fixation assembly includes a resilient clip arm having a latch configured to lockingly clip to the mounting portion of the first cable fixation body.

9. The cable fixation assembly of claim **8**, wherein the resilient clip arm and the second cable support wall are of unitary construction.

10. The cable fixation assembly of claim **1**, wherein the first cable fixation body includes a base portion and mounting tabs extending downward from the base portion for affixing the first cable fixation body to a main support structure of a telecommunications closure.

11. The cable fixation assembly of claim **10**, wherein the mounting tabs are configured to be inserted in corresponding slots to affix the first cable fixation body to the main support structure.

12. The cable fixation assembly of claim **11**, further comprising the main support structure.

13. The cable fixation assembly of claim **1**, wherein the second cable fixation body includes slits for receiving zip ties to secure a cable to the second cable support wall.

14. The cable fixation assembly of claim **13**, wherein the slits are offset from each to promote different zip tie insertion directions.

15. The cable fixation assembly of claim **13**, wherein the slits are positioned in the second cable support wall.

16. The cable fixation assembly of claim **1**, where the first cable support wall and the second cable support wall are parallel to each other when the second cable fixation body is mounted to the first cable fixation body.

17. A telecommunications closure, comprising:

first and second housing pieces configured to cooperate to define a sealable and re-enterable interior closure volume; and

the cable fixation assembly of claim **12**, the main support structure being at least partially positioned within the interior closure volume.

18. The telecommunications closure of claim **17**, further comprising two cables secured to the first cable fixation body and the second cable fixation body and a sealing component positioned between the two cables and mounted to the second cable fixation body.

19. A method for affixing a first cable and a second cable to a cable fixation assembly, comprising:

(a) affixing the first cable to a first cable support wall of a first cable fixation body;

(b) subsequent to (a) and while the first cable is a fixed to the first cable fixation body, mounting a second cable fixation body to the first cable fixation body; and

(c) while the second cable fixation body is mounted to the first cable fixation body, affixing the second cable to a second cable support wall of the second cable fixation body.

20. The method of claim **19**, further comprising:

(d) mounting the first cable fixation body to a main support structure of a telecommunications closure.

21. The method of claim **19**, further comprising:

(d) anchoring a sealing component to the second cable fixation body such that the sealing component is positioned between the first cable fixation body and the second cable fixation body.

22. The method of claim **19**, wherein the step (c) is performed after the step (b).

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