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(54) **FITTING DEVICE FOR JOINING PIPES AND RODS**

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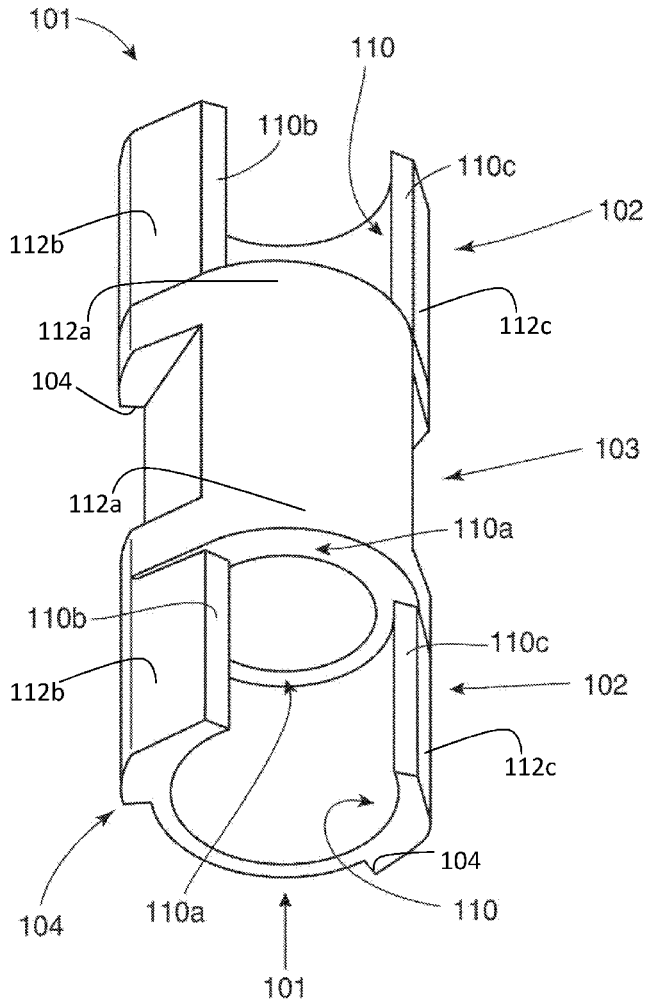
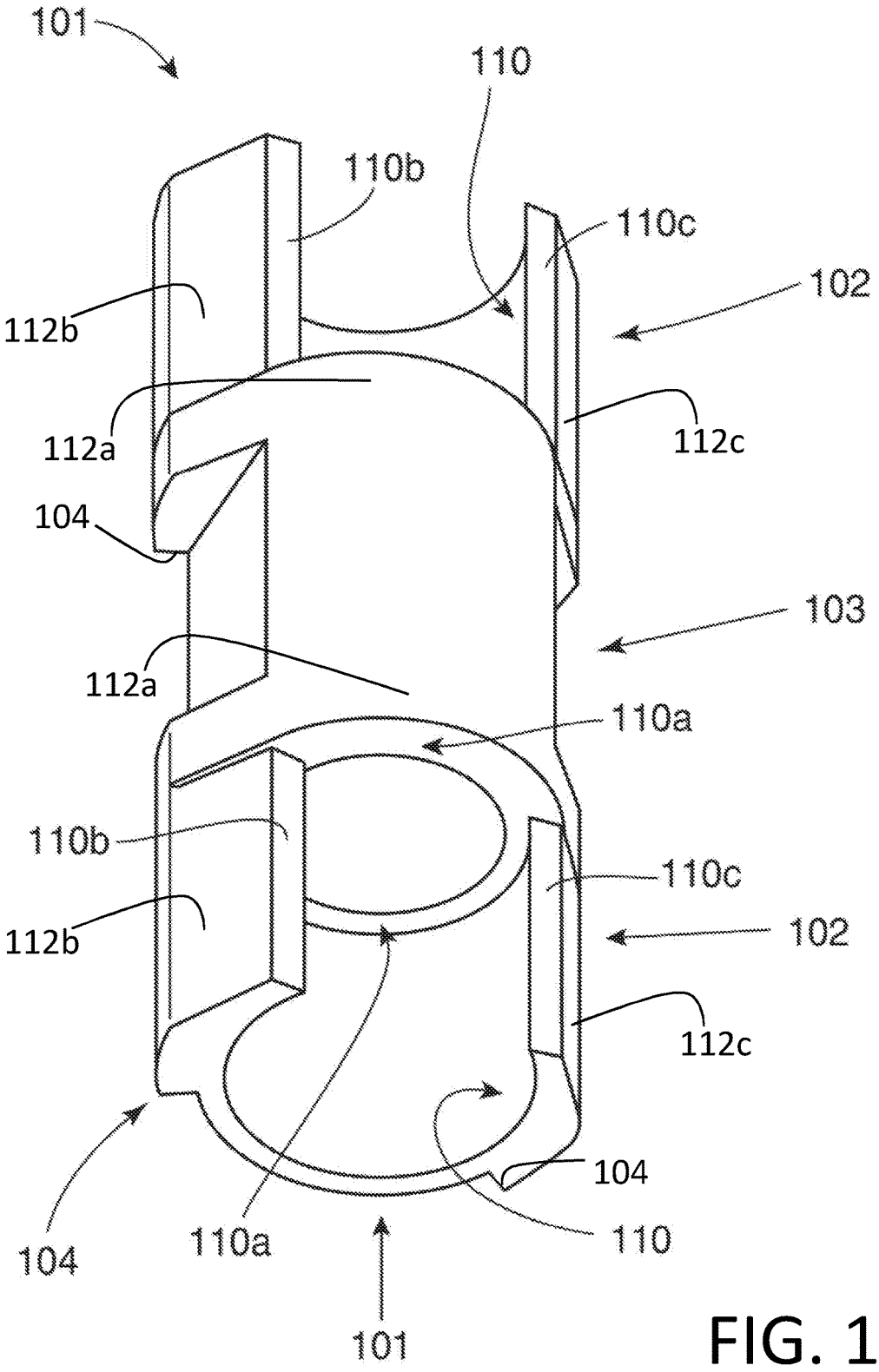
(57) **ABSTRACT**

A fitting device having one or more snap collars; and one or more lock collars, the lock collar having a sealing protrusion to seal the connection of the snap collar and lock collar on the pipe; the one or more snap collars being configured to be snapped in place over a pipe or pipes, and the lock collars being configured to be snapped in place over the pipe and the snap fittings, the sealing protrusion engaging the pipe to seal the connection of the snap collar and lock collar on the pipe so that a sealed joint will be formed.




101
110
110b
110c
102
112b
112a
112c
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103
112a
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110b
110c
112b
102
112c
104
110a
110
101

FIG. 1

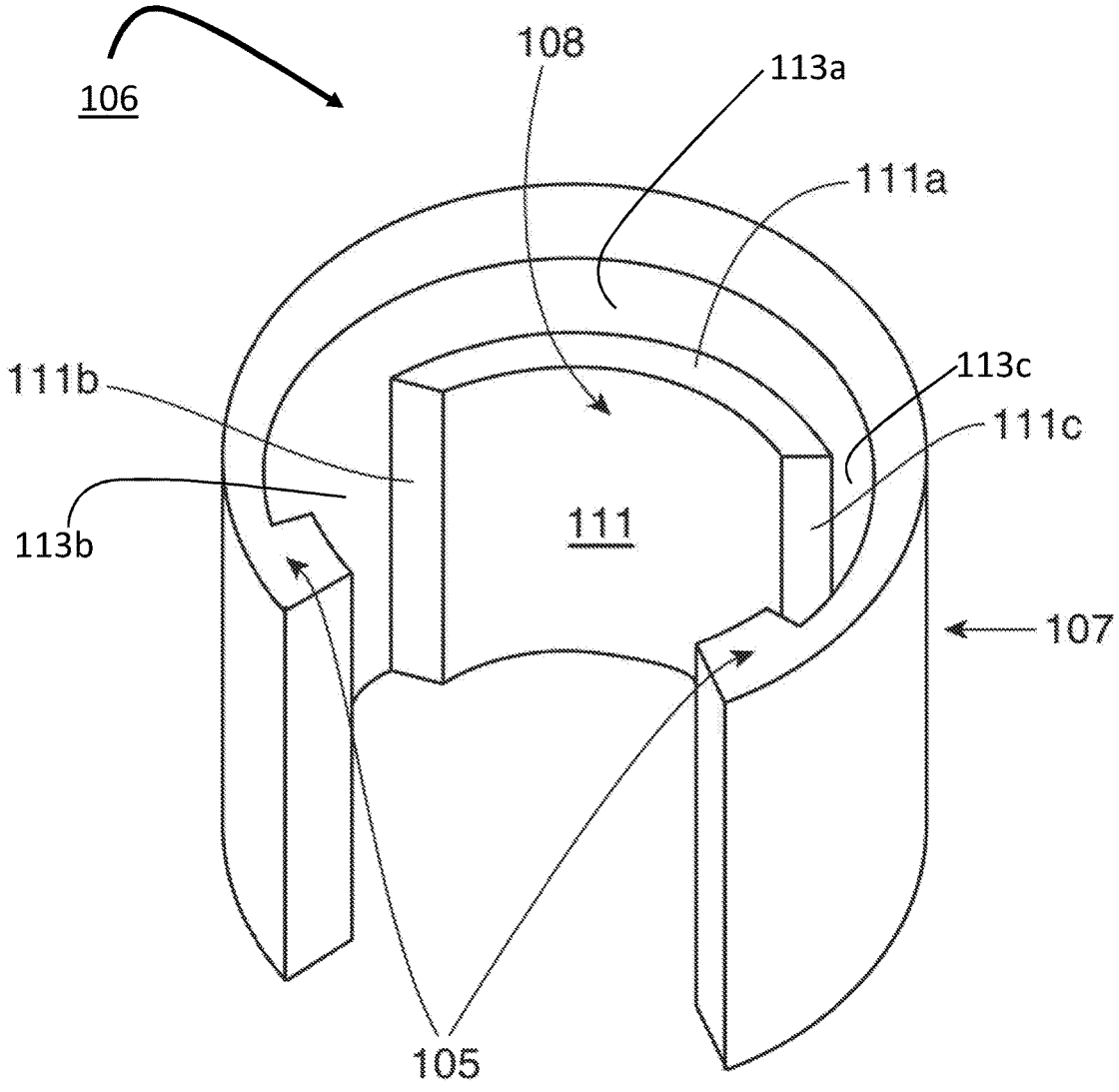


FIG. 2

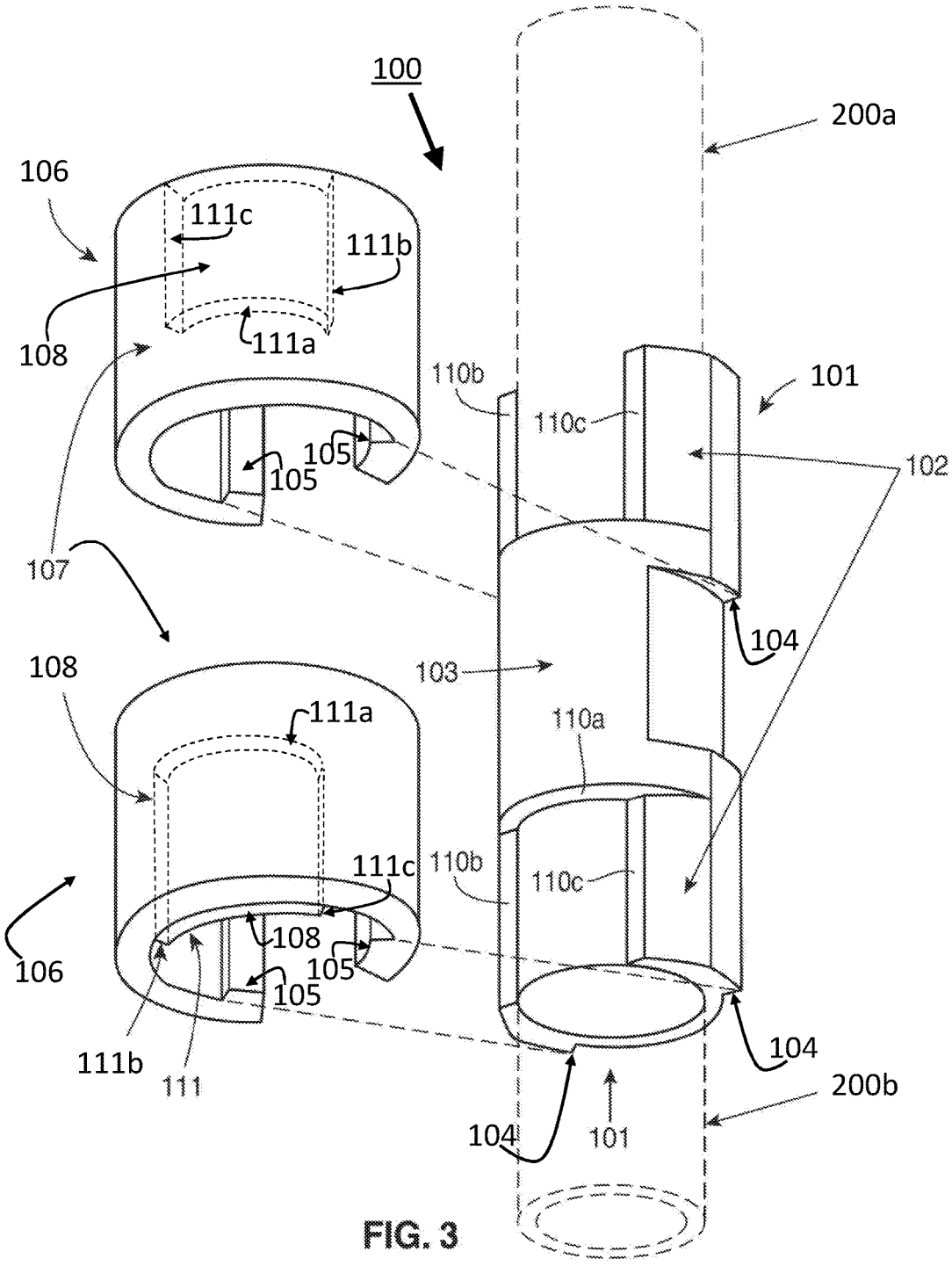

100
200a
106
111c
111b
108
111a
110b
101
110c
105
105
102
107
104
108
103
111a
110a
111c
110b
110c
108
105
105
106
104
111b
111
200b
104
101

FIG. 3

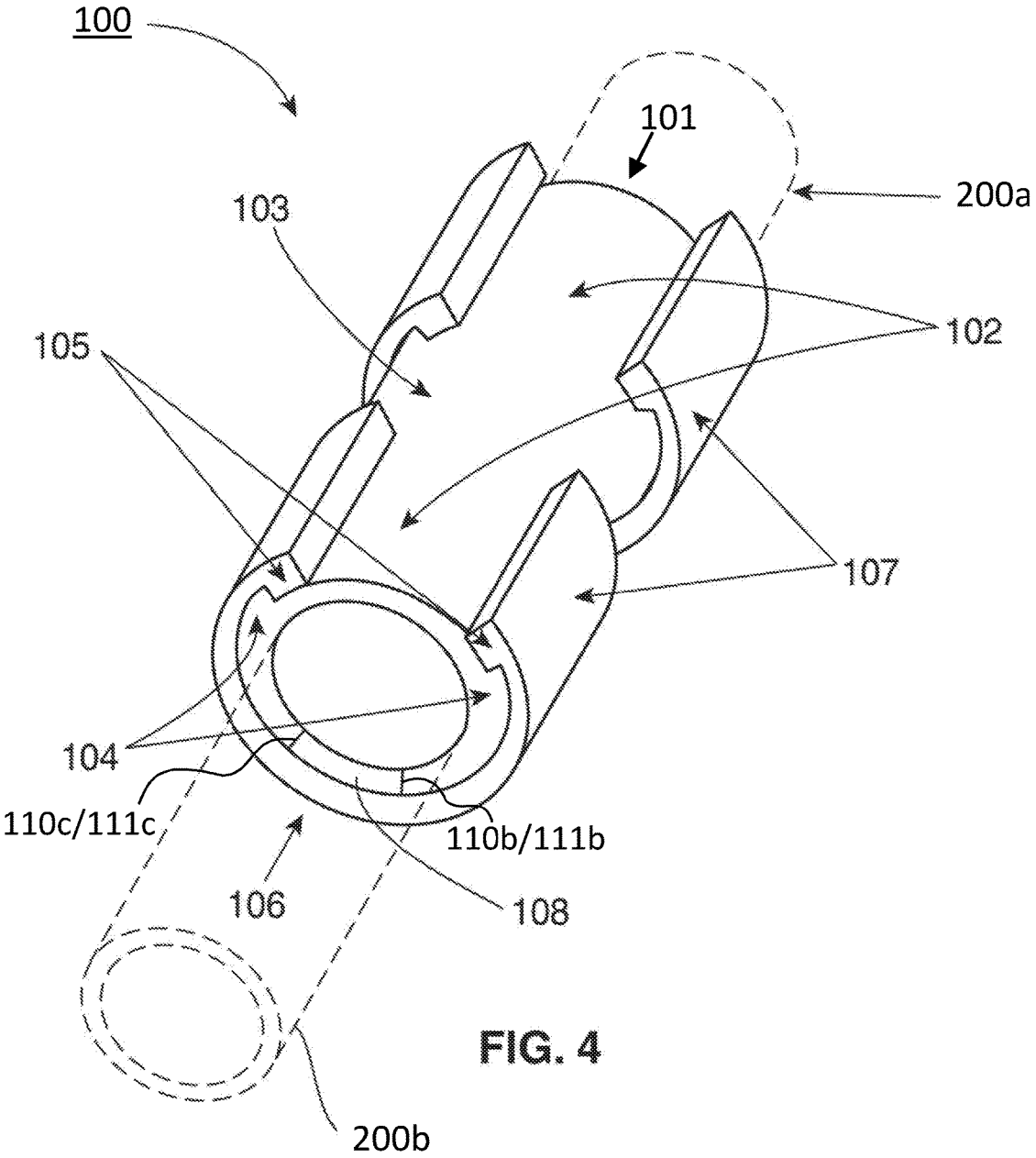

100
101
200a
103
102
105
107
104
110c/111c
110b/111b
106
108
200b

FIG. 4

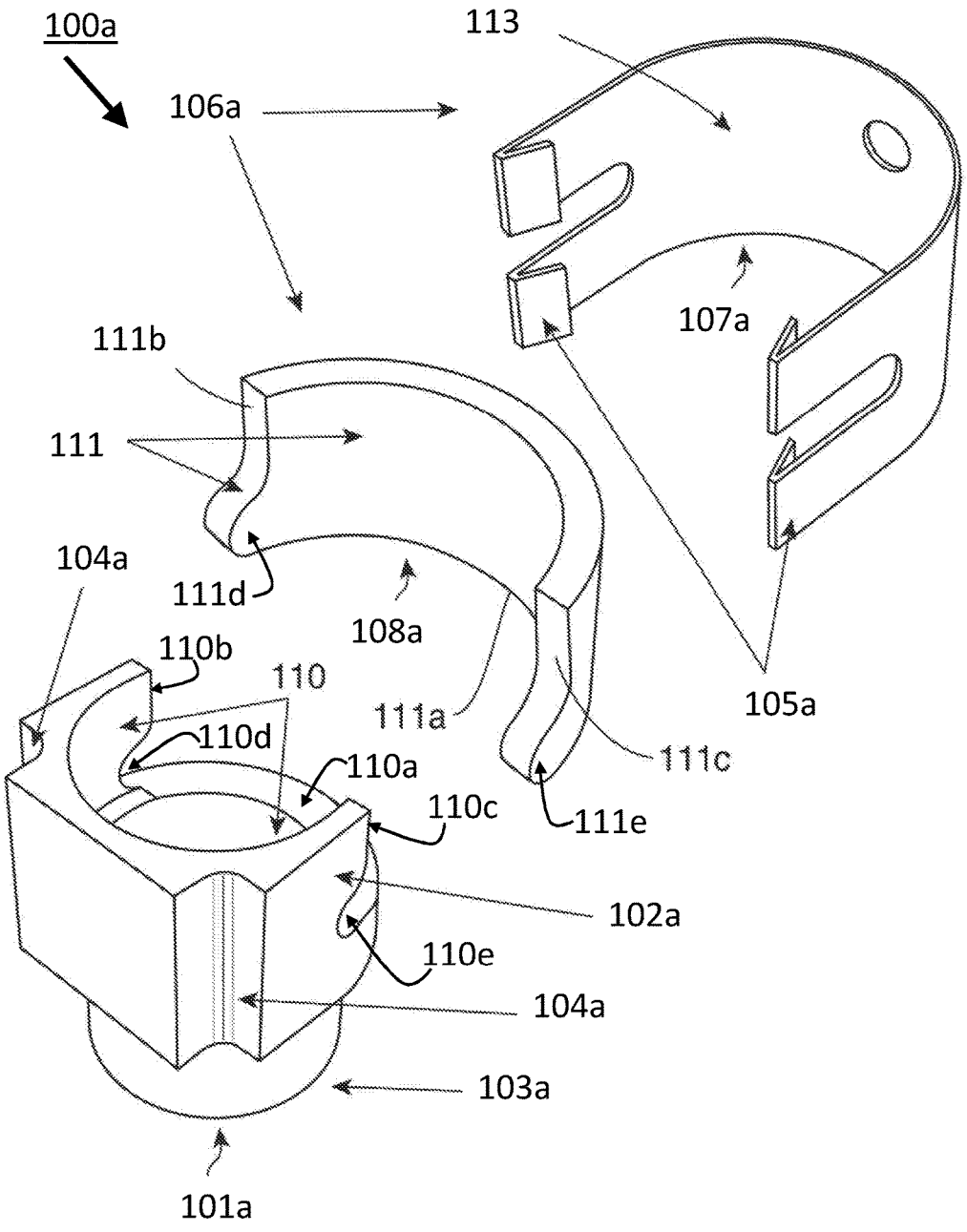
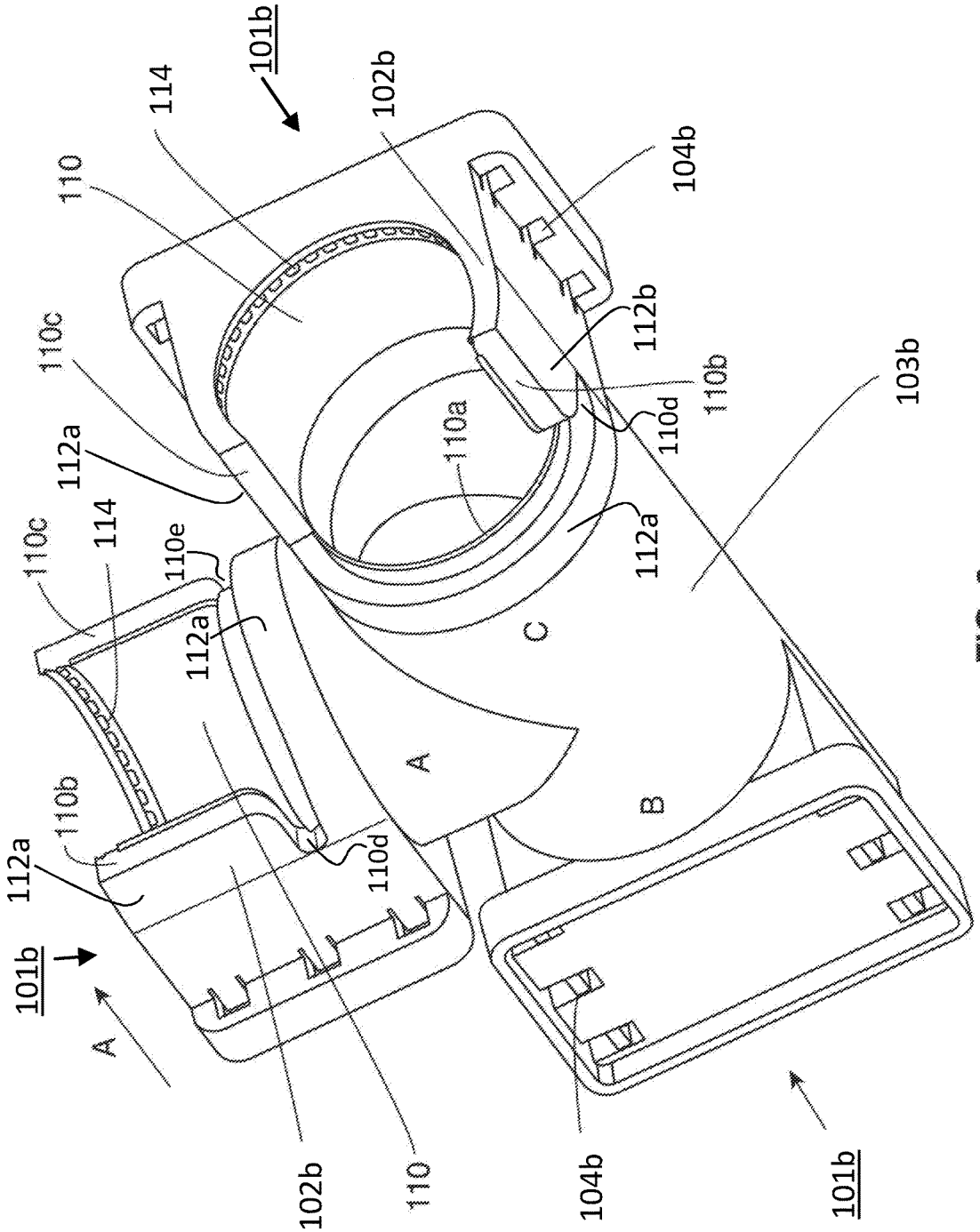

100a
113
106a
107a
111b
111
104a
111d
108a
110b
110
105a
111a
110d
111c
110a
110c
111e
102a
110e
104a
103a
101a

FIG. 5


101b
114
102b
110
104b
110c
112b
110b
110d
103b
112a
110a
114
110e
110c
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C
A
B
110b
112a
110d
101b
A
102b
110
104b
101b

FIG. 6

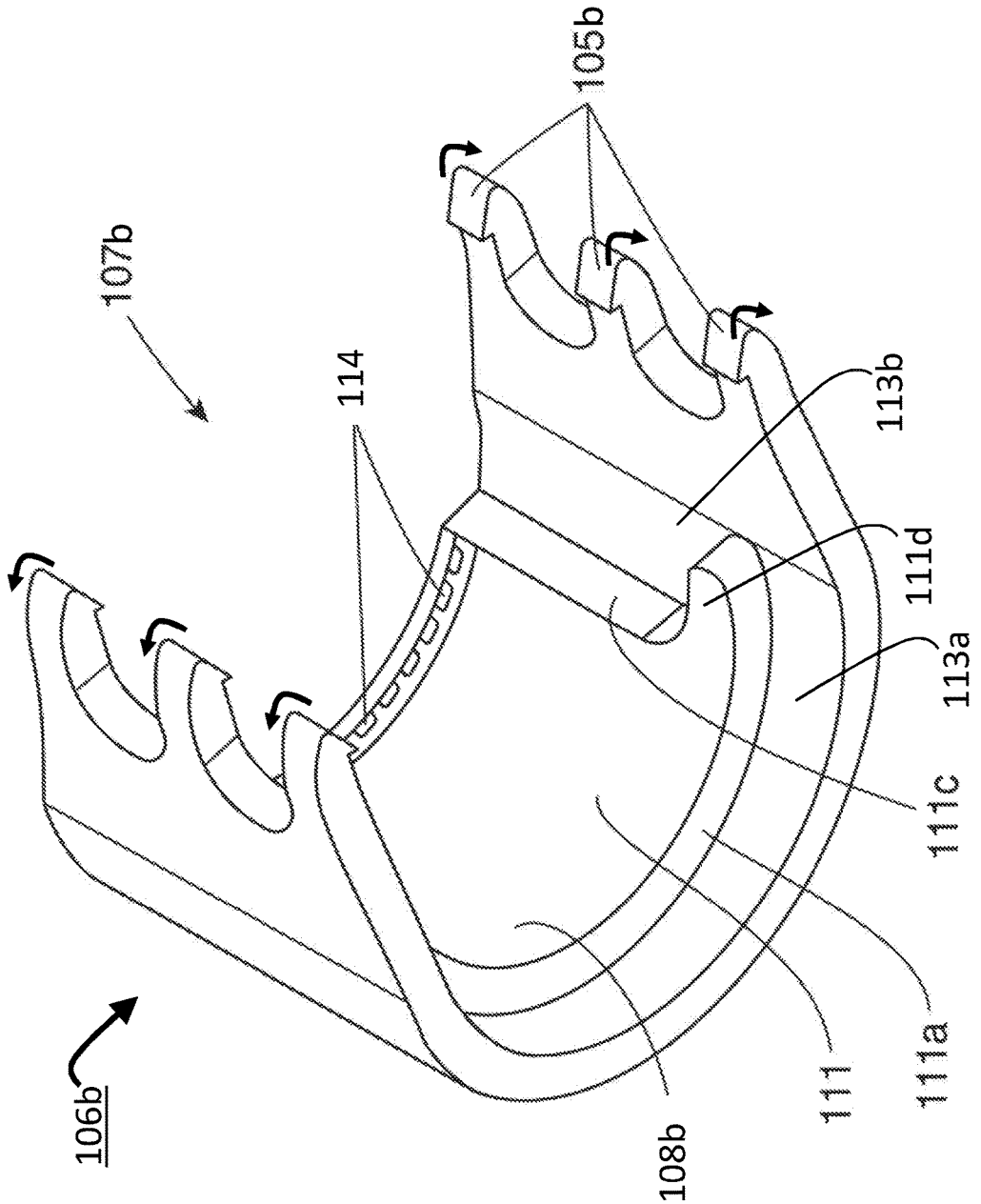

FIG. 7

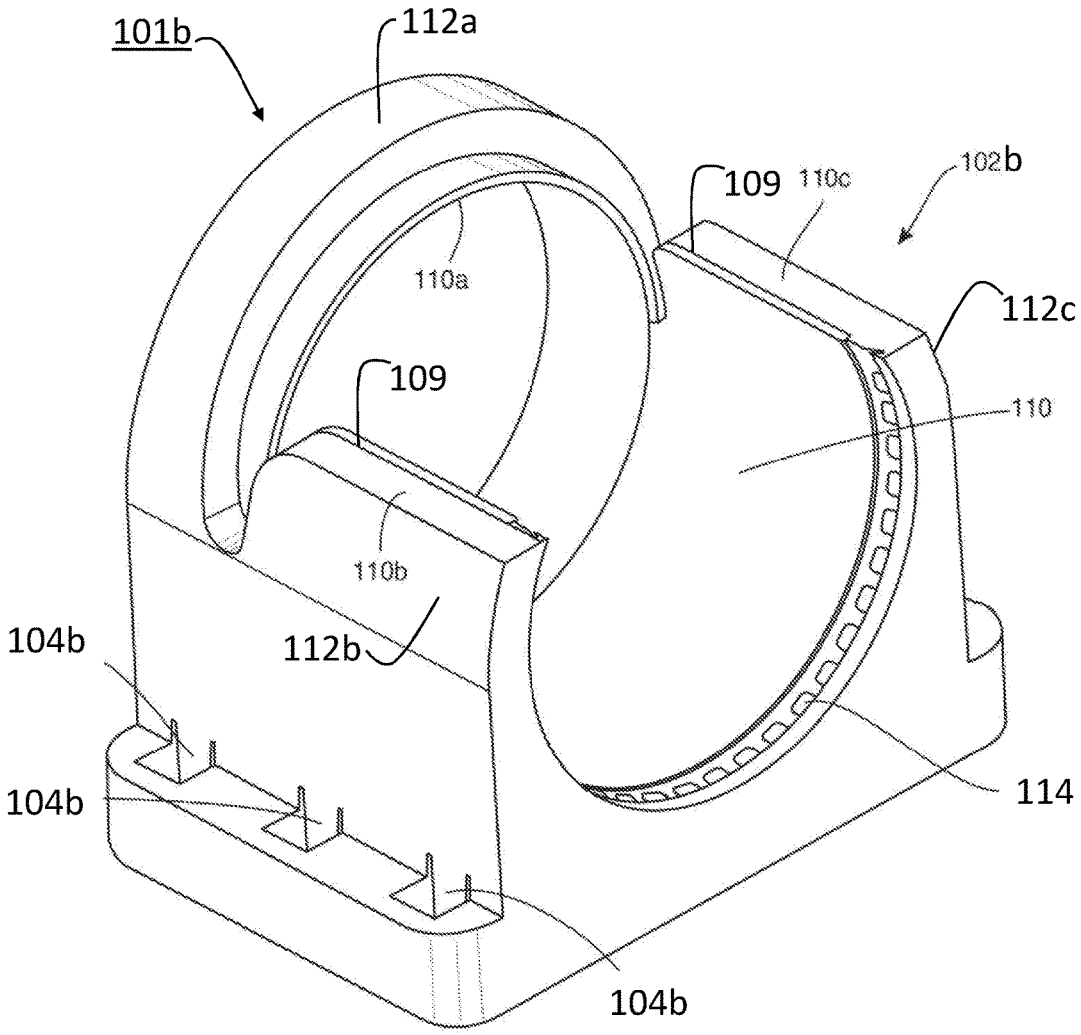
101b
112a
109
110c
102b
110a
112c
109
110
110b
104b
112b
104b
114
104b

FIG. 8

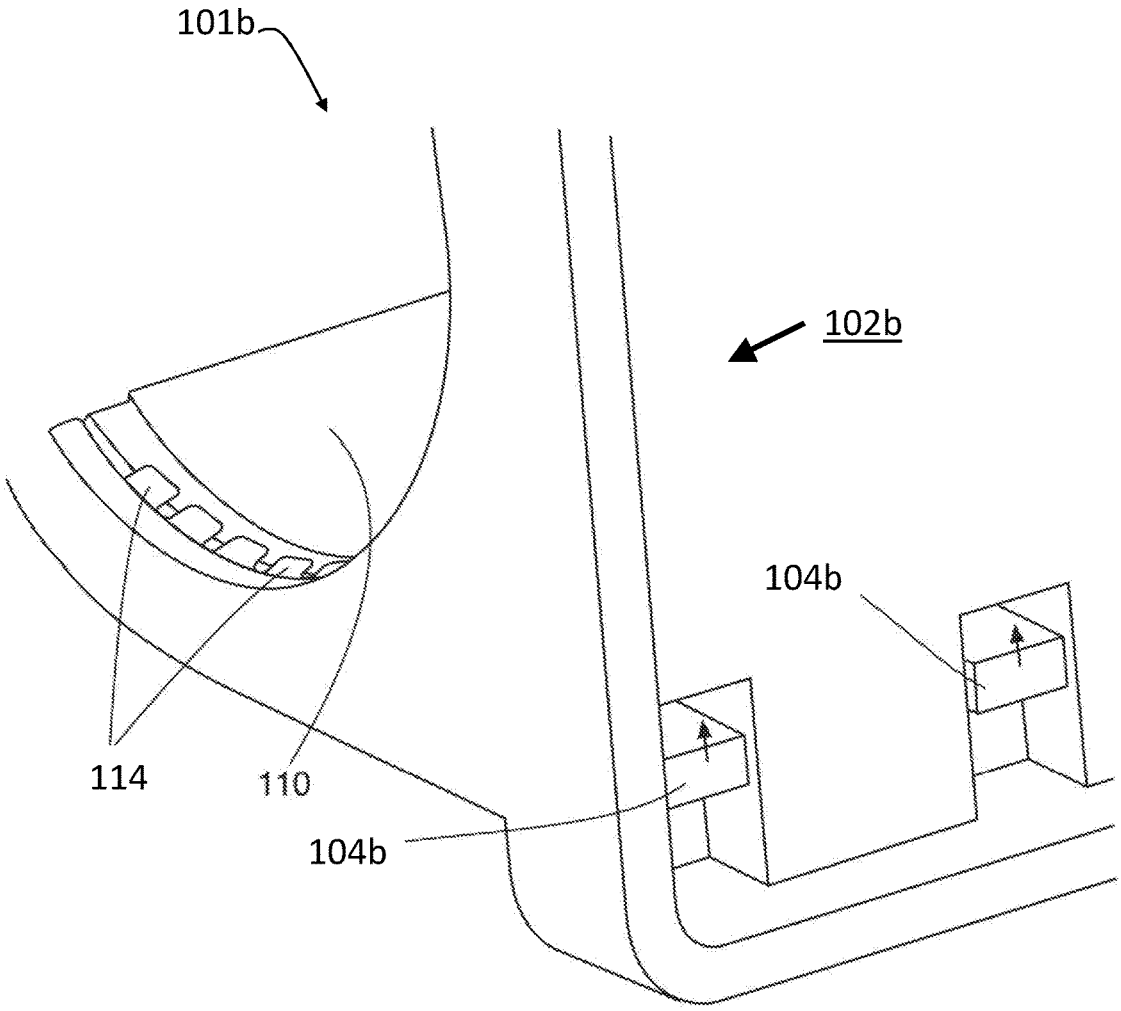

FIG. 9

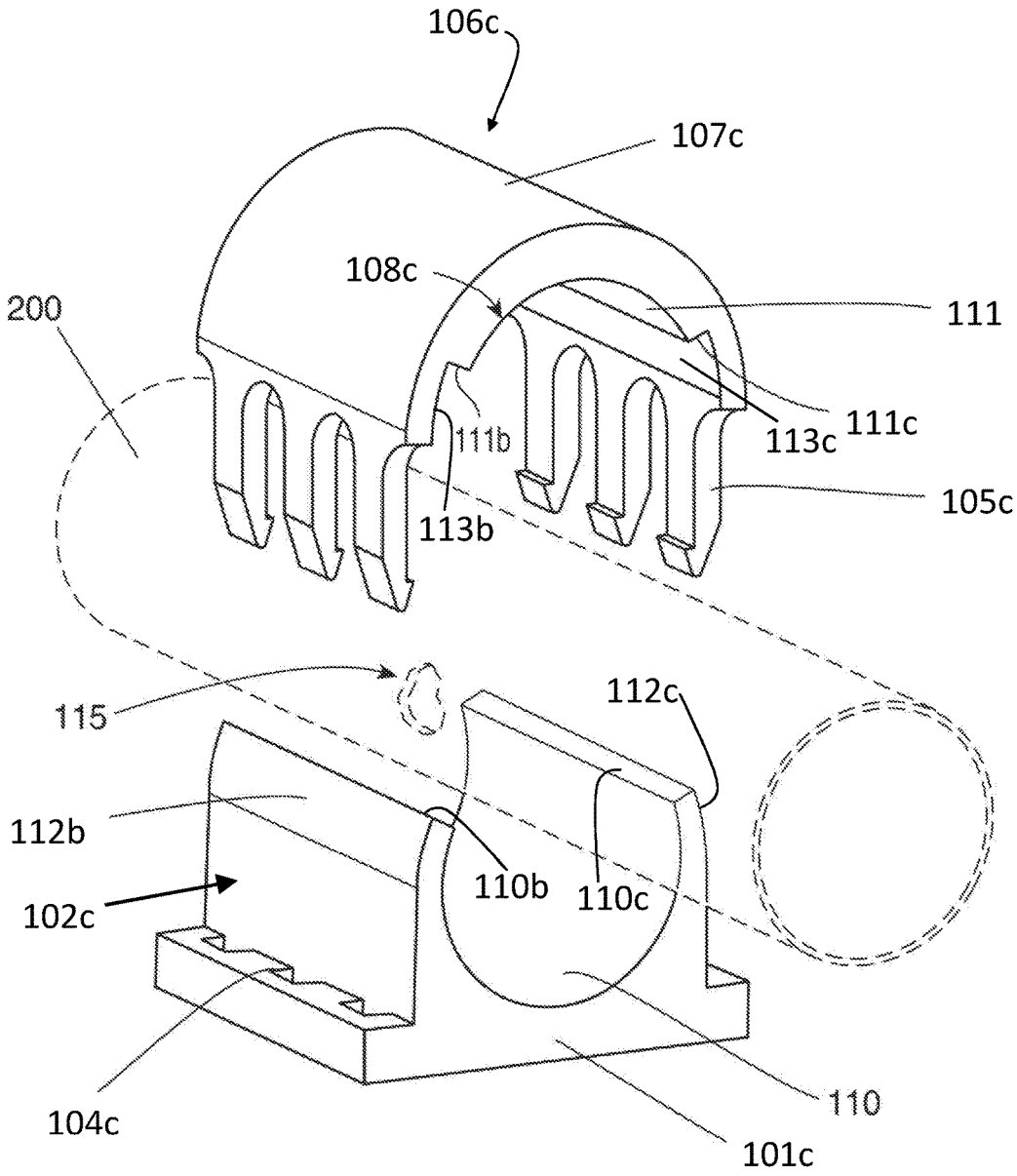
106c
107c
108c
200
111
111b
113c
111c
105c
113b
115
112c
112b
110b
110c
102c
104c
110
101c

FIG. 10

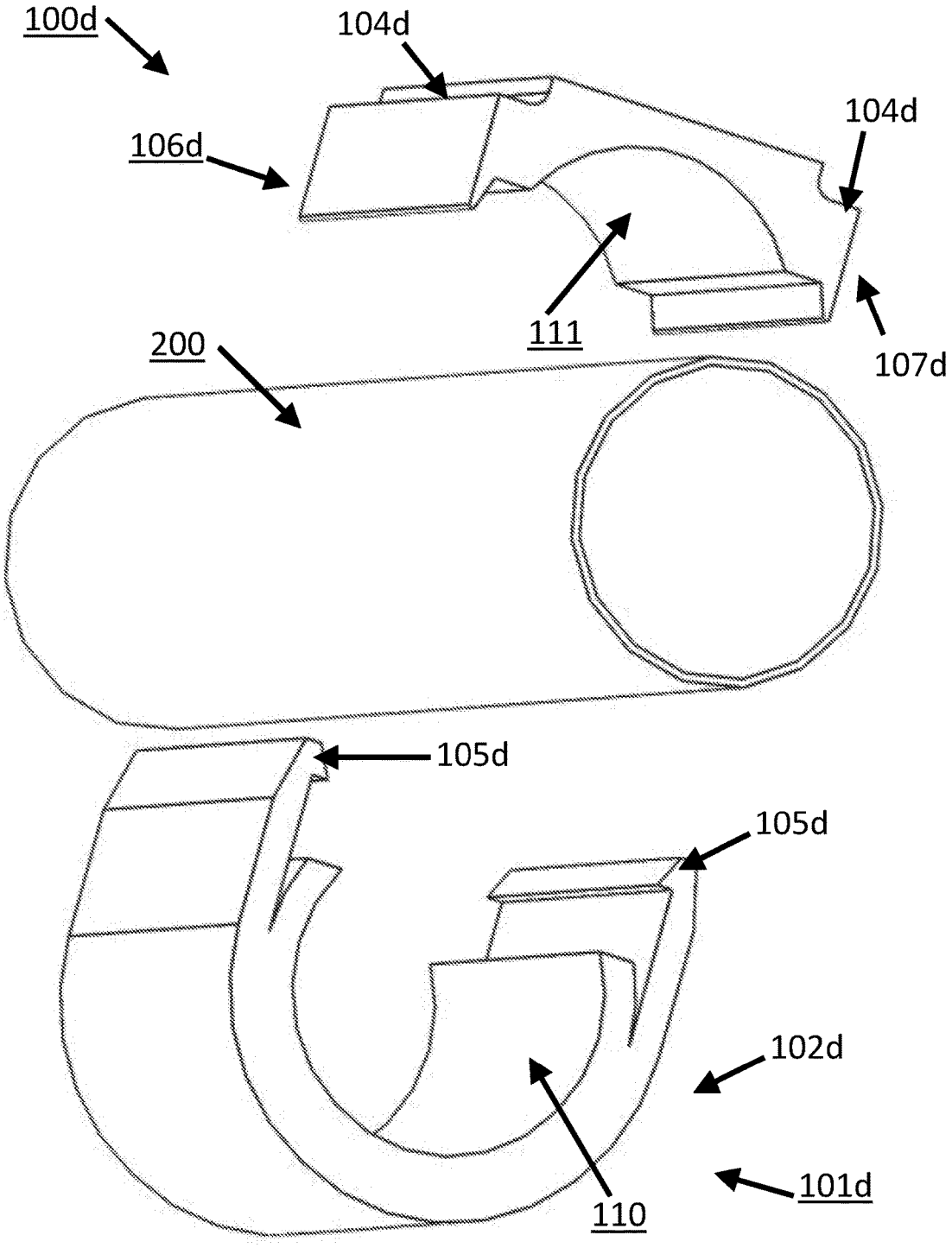

FIG. 11

FITTING DEVICE FOR JOINING PIPES AND RODS

PRIORITY CLAIM

[0001] This application claims the priority benefit of U.S. Provisional Patent Application No. 62/663,361 filed Apr. 27, 2018 for "Fitting Device For Joining Pipes And Rods" of Robert Warren and Applicant, Ridgway Holdings, LLC, hereby incorporated herein by reference for all that is disclosed therein as though fully set forth here.

BACKGROUND

[0002] A number of problems exist in plumbing and constructing with fittings for pipes or rods; generally all referred to herein as "pipes" herein.

[0003] One problem is that initially mating the fitting and pipe can be accomplished by thrusting or forcing the small female fitting over the long male end of the pipe along the longitudinal axis of the pipe. As the plumbing and constructing progresses, pipes and fittings become fixed within other building structures, and mating can only be accomplished by thrusting or forcing the longer and/or larger and/or more massive male pipe into the female fitting. This requires a movement along the pipe's longitudinal axis and presents significant challenges for the plumbing, construction, and repair process. Difficulties increase with diameter and rigidity of the pipe. These problems include, but are not limited to, increased cutting of the building structure and increased earth moving, both of which escalate costs and slow the process.

[0004] Another related problem is that for repair or modification of existing plumbing systems, access must be cut through finishes, dug up, or otherwise accessed. This increases the cost of the repair, and may result in damage to the structure and its surroundings which must then also be repaired.

[0005] Another problem is that in routing complex three-dimensional plumbing systems, and more generally constructing complex shapes using fittings with pipes, it is often advantageous to dry fit the pipes and fittings to test, and then refine both the lengths and orientations of pipes and orientation of the fittings in three dimensional space. To accomplish this, the pipes and fittings are often mated and unmated iteratively. Unfortunately, fittings often stick to pipes, and are often difficult to remove or twist for adjustment. The pipe must be iteratively moved along its longitudinal axis, which tends to exacerbate difficulties, escalate costs, and slow down the pipe fitting process.

[0006] Another problem is that in plumbing systems where a bonding agent is used, fittings can become fixed in an improper alignment. For example, when plumbing with PVC pipes and fittings, the bonding process requires that the user push, twist, and hold the pipes and/or fittings until the bond is established. In areas with limited access, and/or with complex arrangement of pipes, this can result in improper alignment of the pipe. To correct these alignment issues, parts may have to be cut out and replaced. This can introduce additional difficulties, escalate costs, and further slowdown the pipe fitting process.

[0007] Another problem is that for repair of conduit that contains a wire, fiber optic cable, or other type of strand, the repair must be accomplished without cutting the strand.

[0008] Another problem is repair of a pipe that contains a fluid or vacuum. The pipe cannot be cut without exacerbating the leakage and increasing flow outside the pipe further hampering the repair.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. **1** is an isometric view of an example portion of a fitting device for joining pipes and rods.

[0010] FIG. **2** is an isometric view of an example discrete portion of a fitting device for joining pipes and rods.

[0011] FIG. **3** is an exploded isometric view of the combination fitting device for joining pipes and rods.

[0012] FIG. **4** is an isometric view of an example assembled combination fitting device for joining pipes and rods.

[0013] FIG. **5** is an exploded isometric view of an alternative fitting device for joining pipes and rods.

[0014] FIG. **6** is an isometric view of an example combination of snap fitting first parts of a fitting device for joining pipes and rods.

[0015] FIG. **7** is an isometric view of an example lock collar second part of a device for joining pipes and rods.

[0016] FIG. **8** is an isometric view of an example snap collar subsystem of a device for joining pipes and rods.

[0017] FIG. **9** is an isometric view of a close-up example snap collar subsystem showing details of example hook and nest and anti-thrust subsystems of a device for joining pipes and rods.

[0018] FIG. **10** is an exploded isometric view of an example fitting device for joining pipes and rods repairing a pipe with a fluid or vacuum inside.

[0019] FIG. **11** is an exploded isometric view of an alternative example snap fitting.

DETAILED DESCRIPTION

[0020] A fitting device for joining pipes and rods is disclosed. In an example, the fitting device for joining pipes and rods is a general-purpose fitting for joining pipes, rods, or conduits. The fitting device may have application in the fields of plumbing or construction, but is not so limited. The example fitting device for joining pipes and rods can be implemented without needing movement of a fixed pipe, rod, conduit, or fitting (e.g., in the longitudinal direction) in order to assemble.

[0021] In an example, the fitting device for joining rods and pipes includes a snap portion and lock portion. The example snap portion of the overall fitting device is an individual component that includes one or more snap collar subsystems and can include (e.g., FIG. **1**, below) or be connectable (e.g., FIG. **6**, below) to a connecting architecture subsystem. A pipe, rod, or conduit is fitted into each snap collar subsystem thus joining the pipes in the geometry of the connecting architecture. The snap collar subsystem is substantially shaped as a hollow cylindrical arc sweeping out more than 180 degrees (but less than 360 degrees) such that it will have an open area in which a pipe may be disposed and snap over the cylindrical shape of the pipe by a motion perpendicular to the longitudinal axis of the pipe. Once snapped into place, the snap collar holds the pipe.

[0022] In an example, the lock collar is also substantially shaped as a hollow cylindrical arc sweeping out more than 180 degrees (but also less than 360 degrees), such that it will snap over the approximate cylindrical shape of the snap

collar and pipe. As the lock collar snaps into place through a motion perpendicular to the longitudinal axis of the pipe, there are hooks (or nests, see FIG. **11**, below) on the lock collar that fit into nests (or hooks, FIG. **11**) on the snap collar, completing the fitting and mating of the overlapping and sealing surfaces.

[0023] In an example, the connecting architecture is a non-limiting configuration, e.g., any configuration and/or shape connection for practically connecting pipes or rods or like devices. Examples include, but are not limited to, a straight coupling, reducing fitting, elbow, tee, cross, adapter, street fitting, and others, making the fitting device for joining rods and pipes a general solution for joining pipes in any geometry.

Note also that the discrete connecting architecture may not exist in some implementations. E.g., for repair or joining of conduit, or in an alternative where a strand may exist that cannot be cut, snap collars and lock collars may be employed without the connecting architecture, such that the two parts can be assembled around an existing conduit (see e.g., FIG. **10**, below a repair without a strand) For repair of pipe or tubing, where a fluid or vacuum may exist causing a leak, a snap collar and lock collar may be employed without the connecting architecture, such that the two parts can be assembled around an existing pipe repairing the leak without cutting the pipe.

[0024] In an example, the large, overlapping three dimensional surfaces between the snap fitting portion, lock collar portion, and pipe, provide for a strong mechanical joint, a large surface area for glue, solder, or other bonding agents, and a three-dimensional surface that enables pressure-tight seals. The snap fitting and lock collar can generally be assembled without tools, creating a mechanically strong and rigid fitting that can be bonded using glue, solder or other appropriate bonding agent on the sealing surfaces. To facilitate a pressure tight seal without a bonding agent, the mating surfaces which are also referred to herein as sealing surfaces can be manufactured at close tolerances, and/or can be made of a softer seal material, and/or may be strongly forced together. This forcing may be accomplished by using an external, plier like tool to mate the lock collar to the snap collar and pipe.

[0025] The example fitting device for joining rods and pipes can be implemented as a general solution for joining pipes, without having to move the pipes in the lateral direction, thus avoiding associated complications and saving time. This solution can be applied to all pipes (threaded or unthreaded), using either a mechanical seal or a bonding agent or both, and it makes dry fitting complex systems of pipes simpler and easier than was previously possible. In an example, the device may also be used to maintain proper alignment of the fitting within a complex system of pipes, e.g., while a bonding agent is applied. In an example, the device can be implemented in construction or repair of virtually any practical application of shaped pipe fitting, or for the construction and repair of conduits that contain a wire or other strand.

[0026] Before continuing to description with the drawings in detail, it is noted that as used herein, the terms "includes" and "including" mean, but are not limited to, "includes" or "including" and "includes at least" or "including at least." The term "based on" means "based on" and "based at least in part on." The term "pipe" is meant to be interpreted broadly such that it includes not only pipes but also rods, conduits, and other objects of any material, with circular or other cross-section whose longitudinal dimension significantly exceeds their lateral dimensions.

[0027] The drawing figures provide several views of alternative example snap fitting or snap fittings of one or more fitting devices for joining pipes and rods. In an example, the snap fitting portion is of a pipe joint or joining device, system or method hereof is a portion which may include one or more snap collar subsystems and may, but not necessarily, also include a connecting architecture subsystem, attached to or configured for attachment of pipes (note, no pipes are shown in FIG. **1** or **2**, inter alia, below, but, starting with FIG. **3**, etc., one or more pipes are shown typically in dashed line format using a reference numeral **200**).

[0028] In more particularity for an exemplar first implementation; FIGS. **1** and **2** show respective parts portions of a snap fitting combination **100** (element **100** is not shown in FIGS. **1** and **2**, but, see FIGS. **3** and **4**, described below). The portions of the overall device **100** are a snap portion **101** as shown separately in FIG. **1** and a lock portion **106** as shown in FIG. **2**. FIG. **3** shows an exploded view of the portions **101** and **106** (two such portions **106** in FIG. **3**) being brought together relative to two pipe portions **200***a* and **200***b*. FIG. **4** shows the assembled combination fitting device **100** formed of/from portions **101** and **106**.

[0029] In still further particularity, in FIG. **1**, a connecting architecture subsystem **103** is shown with two respective snap collars **102** on and connected to/at each end of the subsystem **103**. Each snap collar **102** is substantially shaped as a hollow cylindrical arc sweeping out more than 180 degrees (but typically less than 360 degrees) such that it can snap over the cylindrical shape of the pipe by a motion that is substantially perpendicular to the longitudinal axis of pipe (connection to a pipe is not shown in FIG. **1**, but, see FIGS. **3** and **4**, described further below). After snapping into place, the snap collars **102** will hold the pipe and provide friction and pressure to the plumbing joint as it mates to the mating or sealing surfaces generally identified by reference numerals **110**, et al. (which will be described more below).

[0030] Also shown in FIG. **1** are a variety of surfaces against which engagement is configured to occur. For a first example, the substantially semi-circular face or sealing **110** is shown as this would engage the outer surface of the pipe, but also shown are the circular end portion **110***a* of connecting architecture **103** which is configured to engage the end of the pipe as well as at least a portion of lock **106**. Moreover, introduced are edges **110***b* and **110***c* and surfaces **112***a*, **112***b* and **112***c* which will engage particular surfaces of lock portion **106** as described below. Lastly, FIG. **1** shows a nest **104** that will also engage a corresponding part of lock portion **106** as described below.

[0031] Shown in more particularity in FIG. **2** is the lock portion **106** of overall combination fitting device **100**. Lock **106** includes a lock collar **107** which cooperates with and co-acts with connecting architecture subsystem **103** and a respective snap collar **102** of FIG. **1**, as described further below. Also shown are hooks **105** and a seal protrusion **108**. Seal **108** is shown in most particularity in FIG. **2** (but, see also FIGS. **3**, **4**, **5**, **7** and **10**). The shape of the seal protrusion **108** is such that it fits like a cork into the mating surfaces on the snap collar **102** to form a continuous pressure tight fit between the snap lock fitting **100** and the pipe **200**. Collar **102** defines an open area of pipe into which the protrusion **108** is configured to fit. This pressure tight fit due to 3-D

shape of protrusion **108** and the corresponding engaging surfaces of snap collar **102** increases in effectiveness as the pressure exerted by the hook and nest in the locking mechanism increases (not hook and nest engagement described below). Also shown in FIG. **2** are surfaces **111**, **111***a*, **111***b* and **111***c* of seal protrusion **108**, as well as surfaces **113***a*, **113***b* and **113***c*. Surface **111** engages the pipe, where surface edge **111***a* engages corresponding semicircular surface **110***a* of connecting architecture **103** and surface edges **111***b* and **111***c* engage corresponding edges **110***b* and **110***c* of collars **102** (note, suffixes "b" and "c" are relatively arbitrary and do not require engagement in kind—a "b" element can engage either a "b" or a "c" depending upon the circumstances). Further surfaces **113***a*, **113***b* and **113** *c* of lock portion **106** are configured to engage relative portions **112***a*, **112***b* and **112***c* of collar portions **102**.

[0032] In one or more examples, various adhesives, sealants, fillers, tapes, and gaskets may also be incorporated to hold and seal in place a pipe **100** on the sealing surface or surfaces **110** and/or **111**, **112** and/or **113** (and or suffixed sub-parts "a"; "b"; or "c" thereof) of the snap collar **102** and lock collar **107**, although this is not required. As introduced briefly above, in one or more examples, the snap collar subsystem **102** is configured to incorporate one or more nests **104** as shown in FIG. **1**, et al., into which corresponding hooks **105**, see FIG. **2** et al., of a lock collar **107** may engage and/or attach, see FIGS. **3** and **4**, et al.

[0033] Before continuing, it should be noted that the examples described above are provided for purposes of illustration, and are not intended to be limiting. Other devices and/or device configurations may be utilized to carry out the operations described herein.

[0034] FIG. **2** is an isometric view of an example lock collar **107** of the fitting device for joining pipes and rods. In an example, the lock collar **107** is substantially shaped as a hollow cylindrical arc that may sweep out more than 180 degrees such that it will snap over the substantially cylindrical shape of the snap collar **102**, and the pipe **100**. The sealing surfaces **111** and **113** (and suffixed sub-parts a, b and/or c thereof) mate with the corresponding sealing surfaces **110** and **112** (and suffixed sub-parts a, b and/or c thereof) on the snap collar **102** and on the pipe **200** and/or **200***a* and/or **200***b*. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100**.

[0035] FIG. **3** is an exploded isometric view of an example snap lock fitting device **100** for joining pipes and rods; device **100** being the combination of sub-parts **101** and **106** from FIGS. **1** and **2**, as described above. The example overall snap lock fitting or fitting device **100** is a pipe joint comprising one or more or here two lock collars **107** attached over each of the snap collars **102** of the snap fitting combination **100**. As in FIG. **1**, the snap fitting portion **101** includes one or more snap collar **102** that join one or more pipes **200**, here **200***a* and **200***b* to a connecting architecture **103**. Each of the lock collars **107** provides hooks **105** that attach to the nests **104** in the snap collars. In an example, the nests and hooks lock the lock collars in place, cover and seal the attached pipe and snap collars, and provide additional pressure to the plumbing joint, beyond what is provided by the snap fitting **100** by itself.

[0036] In one or more examples, various adhesives, sealants, fillers, tapes, and gaskets that are known may also be incorporated to hold and seal the lock collar in place, although this is not required.

[0037] In one or more examples, the fitting device lock collar **107** forms a pressure seal, and presents a relatively smooth surface, and avoids the need to move the pipes or fittings along the direction of the longitudinal axis of the pipe **200** or pipe portions **200***a*, **200***b* in order to connect them. Instead, a lateral movement first snaps the pipe in place using the snap fitting portion **101**, and then locks the snap fitting **100** together using the lock fitting portion **106**, avoiding the difficulties described above.

[0038] In one or more examples the fitting device **100** for joining pipes and rods allows the repair of pipe using any shape of fitting, and reduces the size of the access needed for repairs and therefore limits and reduces the time and costs associated with gaining the access.

[0039] During an example construction operation, a pipe **200** may need to be iteratively moved along its longitudinal axis, which may exacerbate difficulties, escalate costs, and slow down the pipe fitting process. However, the fitting device **100** for joining pipes and rods allows dry fitting by using only a snap fitting collar portion **102** with overlaying lock collar **107** of the complete fitting device **100**. The snap fitting can easily and quickly be snapped onto pipes, then removed, reoriented, and snapped back on, saving time and reducing the difficulties associated with pipe fitting and repair.

[0040] In an example, as the lock collar **107** snaps into place through a motion perpendicular to the longitudinal axis of the pipe **200**, hooks **105** on the lock collar **107** fit into nests **104** on the snap collar **102**, completing the fitting and mating the overlapping and sealing surfaces.

[0041] In an example, various adhesives, solders, sealants, fillers, tapes, and gaskets that are known or as may yet reasonably be to be developed may also be incorporated to hold and seal the lock collar in place, although this is not required.

[0042] FIG. **4** is an isometric view of an example snap fitting completion of the end assembled fitting device **100** for joining pipes and rods. In an example the snap collar subsystem **102** is substantially shaped as a hollow cylindrical arc that sweeps out more than 180 degrees such that it will snap over the cylindrical shape of the pipe **200**, or respective portion **200***a*, or **200***b*.

[0043] In an example, the snap collar subsystem **102** snaps over the pipe **200**, or respective portion **200***a*, or **200***b* holding the pipe in place adjacent to the connecting architecture **103**.

[0044] In an example, various adhesives, solders, sealants, fillers, tapes, and gaskets that are known or as may reasonably yet be developed may also be incorporated to hold and seal the snap collar subsystem on the pipe, although this is not a requirement.

[0045] In one or more examples, the lock fitting device or portion **106** forms a pressure seal, and presents a relatively smooth surface or surfaces **111** and/or **113** (with or without suffixed appurtenant parts a, b and/or c), and avoids the need to move the pipes or fittings along the direction of the longitudinal axis of the pipe **200**, or respective portion **200***a*, or **200***b* in order to connect them. Instead, a lateral movement first snaps the pipe in place using the snap fitting **100**,

and then locks the snap fitting portion **101** together using the lock fitting portion **106**, avoiding the difficulties described above.

[0046] In an example the fitting device **100** for joining pipes and rods allows the repair of pipe using any shape of fitting, and reduces the size of the access needed for repairs and therefore limits and reduces the time and costs associated with gaining the access.

[0047] During an example construction operation, a pipe **200**, or respective portion **200***a*, and/or **200***b* may need to be iteratively moved along its longitudinal axis, which may exacerbate difficulties, escalate costs, and slow down the pipe fitting process. However, the fitting device **100** for joining pipes and rods allows dry fitting by using only a snap fitting portion **101** portion of the complete fitting device. The snap fitting can easily and quickly be snapped onto pipes, then removed, reoriented, and snapped back on, saving time and reducing the difficulties associated with pipe fitting and repair.

[0048] In addition, if a pipe is misaligned during a standard construction, fitting, or repair process, parts may need to be cut out and replaced. This may introduce additional difficulties, escalate costs, and further slowdown the pipe fitting process. In an example, the fitting device for joining pipes and rods allows for a snap fitting to be bonded to pipes without moving the pipes. This may further avoid improper alignment of the pipes.

[0049] Furthermore, though perhaps more applicable in other implementations as shown for example in FIG. **10**, described further below, or otherwise not shown, for the repair of a conduit that contains a wire, fiber optic cable, or other type of strand, the repair may need to be accomplished without cutting the strand. In an example, the fitting device for joining pipes and rods can be configured as a coupling without any connecting architecture, such that one or more snap collars and one or more lock collars are assembled into a straight coupling or a sweeping bend around the conduit without cutting the strand.

[0050] In an alternative, FIG. **5** is an exploded isometric view of an example fitting device **100***a* for joining pipes and rods. In an example, the snap fitting portion **101***a*, and the lock collar portion **106***a* are configured to connect with a somewhat discretely disposed lock collar seal subsystem **108***a*, which is herein still identified as part of portion **106***a*, though in some cases discrete therefrom. The lock collar portion **106***a* includes a lock collar lock subsystem **107***a* are shown in position to be assembled through a force perpendicular to the longitudinal axis of the fitting device **100***a*.

[0051] In one or more examples of the implementation of FIG. **5**, the snap fitting device **100***a* is configured of or from the snap collar subsystem **102***a* and a connecting architecture subsystem **103** a street fitting known or to be developed for accepting or connecting to pipes (not shown in FIG. **5**). The snap collar subsystem **102***a* is substantially shaped as a hollow cylindrical arc that sweeps out more than 180 degrees such that it will snap over the cylindrical shape of a pipe or rod and includes nests **104***a* for the hooks **105***a* of the lock collar subsystem **107***a* to snap onto.

[0052] In an example, the lock collar **106***a* is configured of/from the lock collar seal subsystem **108***a* and the lock collar lock subsystem **107***a* shown in an exploded view in FIG. **5**. Seal **108***a* is shown in FIG. **5** with some slight variations over that of prior described seal **108** of FIGS. **1-4**. First, as noted, it is configured separately from but coacts with collar **107***a*. The shapes of the seal surface **110** and corresponding relative surfaces or edges **110***a*, **110***b*, **110***c* are such that they fit with corresponding shape of seal protrusion **108***a* of FIG. **5** with protrusion **108***a* fitting like a cork into and/or against the mating surfaces **110**, **110***a*, **110***b*, **110***c* on the snap collar **102***a* to form a continuous pressure tight fit between the snap lock fitting **100***a* and the pipe (not shown in FIG. **5**). Collar **102***a* defines an open area of pipe into which the protrusion **108***a* is configured to fit. Moreover, this pressure tight fit due to 3-D shape of protrusion **108***a* and the corresponding engaging surfaces of snap collar **102***a* increases in effectiveness as the pressure exerted by the hook and nest in the locking mechanism increases (not hook and nest engagement described below). Also shown in FIG. **5** are surfaces **111**, **111***a*, **111***b* and **111***c* of seal protrusion **108**, as well as surface **113** of collar **107***a*. Surface **111** engages the semi-circular outer surface of the pipe, where surface edge **111***a* engages corresponding semi-circular surface **110***a* of collar **102***a* and surface edges **111***b* and **111***c* engage corresponding edges **110***b* and **110***c* of collar **102***a* (note, suffixes "b" and "c" are relatively arbitrary and do not require engagement in kind—a "b" element can engage either a "b" or a "c" depending upon the circumstances). Further shown are protrusion surfaces **111***d* and **111***e* on each side of seal portion **108***a* which are configured to fit into and engage relative correspondingly formed depression surfaces **110***d* and **110***e* on each side of collar portion **102***a*. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100**.

[0053] FIG. **6** is an isometric view of three alternative example snap fitting portions **101***b* for use with various pipe. Here also, these may be with or without the need of cement or other adhesive. The present example of FIG. **6** includes variations of collar **102***b*, nest **104**, seal **110**, and not before herein shown or described anti thrust **114** subsystems. The shapes of the seal surface **110** and corresponding relative surfaces or edges **110***a*, **110***b*, **110***c* are such that they fit with corresponding seal protrusion **108***b* of FIG. **7**, see below, with protrusion **108***b* fitting like a cork into and/or against the mating surfaces **110**, **110***a*, **110***b*, **110***c* on the snap collar **102***b* to form a continuous pressure tight fit between the snap lock fitting or fittings **101***b* and the pipe (not shown in FIGS. **6-9**). I.e., as before or at least in a similar fashion, collars **102***b* define respective open areas of pipe into which the protrusions **108***b* (FIG. **7**) of locks **106***b* (FIG. **7**) are configured to fit. This pressure tight fit due to 3-D shape of protrusion **108***b* and the corresponding engaging surfaces of snap collar **102***b* increases in effectiveness as the pressure exerted by the hook and nest in the locking mechanism increases (not hook and nest engagement described below). Note, FIGS. **8** and **9** are not unlike and yet includes only one separate snap portion **101***b*; the other parts hereof (see e.g., **102***b*, **104***b*, **110**, **110***a*, **110***b*, **110***c* and **114**) remaining substantially the same or similar. Interaction of part **106***b* of FIG. **7** will be described relative to all three of FIGS. **6**, **8** and **9**, which may be interchangeably understood as well.

[0054] Also shown in FIG. **7** particularly relative to protrusion **108***b* are surfaces **111**, **111***a*, and **111***c* (**111***b* unfortunately hidden here) of seal protrusion **108***b*, as well as surfaces **113***a* and **113***b* (surface **113***c* hidden here) of collar **107***b*. Surface **111** engages the semi-circular outer surface of the pipe, where surface edge **111***a* engages corresponding semicircular surface **110***a* of collar **102***b* (FIGS. **6**, **8** and **9**)

and surface edges **111***b* and **111***c* engage corresponding edges **110***b* and **110***c* of collar **102***b* (note, suffixes "b" and "c" for surfaces **110** and **111** and **112** and **113** are relatively arbitrary and do not require engagement in kind—a "b" element can engage either a "b" or a "c" depending upon the circumstances). Further shown are protrusion surfaces **111***d* (**111***e* hidden) on each side of seal portion **108***a* which are configured to fit into and engage relative correspondingly formed depression surfaces **110***d* and **110***e* on each side of respective collar portions **102***b*. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100**.

[0055] Returning to description of FIG. **6** for a moment, the present example uses what may in many implementations be every subsystem that may desirably be part of the snap fitting of the fitting device **101***b* for fitting pipes. Theses subsystems are the three snap collars **102***b*, nests **104***b*, seal **110**, **110***a*, **110***b*, **110***c*, **112***a*, **112***b*, **112***c*, anti-thrust **114**, and the connecting architecture **103***b*, a tee in the present example. The snap collars **102***b* are aligned on the connecting architecture **103***b* such that the "A" snap collar **102***b* can be snapped into place first in a longitudinal motion along the longitudinal axis of B and C collars, and the entire snap fitting **101***b* can be rotated to snap in the "B" and "C" snap collars **102***b*; the rotation can be about the longitudinal axis of the A collar—in one or more implementations of such, the opposing dispositions of the B and C collars **102***b* can provide for a single substantially simultaneous (similar in time but not necessarily absolutely identically timed) snap in connections to respective pipe portions for each of the B and C collars. This also demonstrates that in discrete implementations, the snap collars **102***b* and the connecting architecture **103***b* may be configured in various ways.

[0056] In an example, the snap collars **102**, **102***a*, **102***b* etc., have a sealing surface **110** made of a soft gasket type of or other type of sealing material; and may be a different material than the respective collars **102**, **102***a*, **102***b*, etc. The use of a separate material as an inner lining for seal surface **110** is shown best by the connection lines **109** in FIG. **8** (also shown in FIG. **6**, but less clearly). This example configuration may be specifically used for joining pipes without glues or adhesives. Protrusion devices **108**, **108***a*, **108***b* etc may similarly be of different sealing material than the corresponding collar **107**, **107***a*, **107***b* etc. The snap collars are also shown in this example and has an anti-thrust subsystem **114**, and active nests **104**, **104***a*, **104***b* etc. The anti thrust subsystem **114** is configured in the present example by using a thin, stiff, and springy material that will bite into the pipe and hold it against outward thrust due to pressure inside the pipe and fitting device. The anti thrust subsystem **114** on the lock collar **107***b* is similar to the same on the snap fitting **101***b*.

[0057] FIG. **7** is an isometric view of an example lock portion **106***b* with lock collar **107***b*. In an example, the snap collar of FIG. **7** has a sealing surface **111** (with sub-parts **111***a*, **111***b*, **111***c* and **111***d*), **113** (with sub-parts **113***a* and **113***b*), seal **108***b* hooks **105***b*, and anti-thrust **114** subsystems with a continuous 3-D sealing surface. The shape of the seal **108***b* is such that it fits like a cork into the mating surfaces on the snap collar **102***b* to form a continuous pressure tight fit between the snap lock fitting and the pipe **200** (not shown in FIGS. **6-9**). This pressure tight fit due to 3-D shape increases in effectiveness as the pressure exerted by the hook and nest in the locking mechanism increases. The anti thrust subsystem **114** on the Lock Collar **107***b* is similar to the analogous subsystem on the snap fitting **101***b*. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100**.

[0058] FIG. **8** is an isometric view of an example snap portion **101***b* including a snap collar subsystem **102***b*. The present example has nest **104***b*, seal **110**, **112**, and anti thrust **114** subsystems. The nest subsystem is configured such that the nests **104***b* in the present example are embedded in holes that provide a method to securely hold the hook subsystem **105***b* (shown in FIG. **7**) of the lock collar. To insert the hooks **105***b* into the nests **104***b* the hooks **105***b* flex outward (see FIG. **7**) as they clear the body of the snap collar **102***b*. As the fitting is pushed together the hooks **105***b* insert into the holes where the hooks **105***b* begin to flex back inward and cause the nests **104***b* to flex inward also (this is shown by the motion arrows for nests **104***b* in FIG. **9**). Upon mating the nests **104***b* snap back under the hooks **105***b* and the fitting is complete. The seal subsystem **110** is configured with a gasket material such that the seal is accomplished without the need of cement or adhesive. The anti thrust subsystem **114** is configured in the present example by using a thin, stiff, and springy material that will bite into the pipe and hold it against outward thrust due to pressure inside the pipe and fitting device.

[0059] FIG. **9** is an isometric view of an example snap collar **102***b* shown from the bottom of **102***b* showing detail of the nests **104***b*. The present example shows one configuration of the nests **104***b* where the hooks fit inside a hole such that once the hooks **105***b* are snapped into place the holes **104***b* keep the hooks **105***b* from slipping back off the nests **104***b*. The arrows show how the nests **104***b* flex when the hooks **105***b* are snapped into place. The seal **110** and the anti thrust subsystem **114** are also shown.

[0060] FIG. **10** is an exploded isometric view of an example snap portion **101***c* and lock portion **106***c* used to repair an existing pipe **200** either by itself or in some implementations without disturbing any material, strand, fluid, vacuum or other contained within the pipe. The snap portion **101***c* has a snap collar **102***c* that snaps onto a pipe **200**. An interior sealing surface **110** as this would engage the outer surface of the pipe is shown, as are **110***b* and **110***c* (**110***a* would typically not appear in this version). Any of the alternative implementations involving sealing surfaces may be applicable here as well. Exterior surfaces **112***b* and **112***c* are also shown as these would/could be used here (**112***a* would typically not appear here). The lock portion **106***c* as it would include a lock collar **107***c*, sealing protrusion **108***c* and hooks **105***c* are shown in position to be assembled. In the present example, the snap fitting **101***c* has a snap collar subsystem **102***c*, and the nest subsystem **104***c*. The lock collar portion **106***c* has a lock collar subsystem **107***c*, a seal subsystem **111**, with sub-surfaces **111***b* and **111***c* and **113***b* and **113***c*, and the hook subsystem **105***c*. Surfaces **110** and **111** engage the pipe. In the present example, the pipe **200** is shown as a transparent pipe **200** with an irregular hole **115** to be repaired. The hole **115** would be covered over with one or the other or both of snap collar **102***c* and lock collar **107***c* and be sealed shut thereby. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100**. E.g., Surfaces **110***b* and **111***b* may engage and **110***c* and **111***c* may

engage, to complete the sealing of the connection. Surface **112***b* may engage surface **113***b* and surfaces **112***c* and **113***c* may engage.

[0061] In some other examples, and alternative disposition of nests and hooks may be presented. FIG. **11** shows where the lock collar can alternately be configured with a nest subsystem and the snap collar can be configured with the hook subsystem. In this example as the lock collar snaps into place through a motion perpendicular to the longitudinal axis of the pipe, the hooks on the snap collar fit into the nests on the lock collar, completing the fitting and mating of the overlapping and sealing surfaces. FIG. **11** is an exploded isometric view of an example snap fitting **101***d*, pipe **200** and lock collar **106***d* that demonstrates the hook **105***d* and nest **104***d* subsystems may be associated with either the respective snap collar **102***d* or the lock collar **107***d*. In the present example, the snap fitting **101***d* is made of the snap collar **102***d* and hook **105***d* subsystems while the lock collar **107***d* is made of the nest **104***d* subsystem. Both the snap collar **102***d* and the lock collar **107***d* have respective continuous sealing surfaces **110**, **111** that mate with the pipe and corresponding collar. Note, surfaces **110** and **111** engage and seal the circumference of the pipe. The other surfaces engage one another parts of the device **100***d*.

[0062] Furthermore, for the repair of a conduit that contains a wire, fiber optic cable, or other type of strand, the repair may need to be accomplished without cutting the strand. In an example, the fitting device for joining pipes and rods can be configured as a coupling without any connecting architecture, such that one or more snap collars and one or more lock collars are assembled into a straight coupling or a sweeping bend around the conduit without cutting the strand.

[0063] The components, arrangements, and operations shown and described herein are provided to illustrate example implementations. It is noted that the operations are not limited to the ordering shown. Still other operations, arrangements, and components may also be implemented to achieve a desired effect. For example, the components may work with or be configured to work with threaded pipes and unthreaded connecting architecture, or with unthreaded pipes and threaded connecting architecture, or with pipes and connecting architecture of mismatched size or shape. The connecting architecture could come in two or more pieces, and could itself be held together using snap collars and lock collar, and may form a lock fitting comprised of two or more lock collar subsystems and a connecting architecture. These and other variations will be readily appreciated by those having ordinary skill in the art after becoming familiar with the teachings herein.

[0064] It is noted that the examples shown and described are provided for purposes of illustration and are not intended to be limiting. Still other examples are also contemplated.

1. A method of joining pipes, comprising:

positioning two pipes adjacent to one another along their longitudinal axes;

snapping a respective snap collar onto both of the pipes such that each snap collar covers the ends of both pipes; and

snapping a lock collar onto the snap collar such that the pipes are joined, the lock collar having a sealing protrusion to seal the connection of the snap collar and lock collar on the pipe.

2. The method of claim **1**, further comprising adding any of an adhesive, solder, sealant, filler, tape, or gasket between any two or more pipes, snap collars, and lock collars, to strengthen and/or seal the joint.

3. The method of claim **1**, further comprising providing snap collars and/or lock collars that, by their shape, dimensions, materials, and/or manufacturing tolerances, create enough friction and inward pressure on the pipe or pipes to secure or seal the joint without the need for adhesives, solders, sealants, fillers, tapes or gaskets

4. The method of claim **1**, the pipe being a conduit containing a wire, cable, or other strand, and the joint is made without severing the wire, cable, or other strand.

5. The method of claim **1**, a single pipe being repaired without cutting the pipe.

6. The method of claim **1**, one or more of:

the sealing protrusion of the lock collar having one or more sealing protrusions to engage corresponding depressions in the snap collar to seal the connection of the snap collar and lock collar on the pipe; and,

the snap collar having one or more external surfaces and the lock collar having one or more corresponding internal surfaces to be engaged with or by the one or more external surfaces of the snap collar to seal the connection of the snap collar to the lock collar.

7. A method of joining pipes, comprising:

positioning one or more pipes into a geometry that is an extension of the connecting architecture subsystem, such that the connecting architecture fit on the ends of each pipe, forming a joint, bend, intersection, adapter or street fitting;

snapping one snap collar subsystem over each pipe end that is adjacent to the connecting architecture subsystem such that the pipes are securely held into the connecting architecture subsystem by the snap collar subsystem; and

snapping one lock collar over each of the snap collar subsystems, such that the snap collar subsystems are held in place are covered and sealed by the lock collars, the lock collar having a sealing protrusion to seal the connection of the snap collar and lock collar on the pipe thus securing the joint.

8. The method of claim **7**, further comprising adding any of an adhesive, solder, sealant, or filler between any two or more pipes, connection architectures, snap collars, and lock collars, in order to strengthen and/or seal the connection.

9. The method of claim **7**, further comprising one or more of:

providing snap collars and/or lock collars that, by their shape, dimensions, materials, and manufacturing tolerances, create enough friction and inward pressure on the pipe or pipes to secure or seal the joint without the need for adhesives, solders, sealants, fillers, tapes or gaskets;

the sealing protrusion of the lock collar having one or more sealing protrusions to engage corresponding depressions in the snap collar to seal the connection of the snap collar and lock collar on the pipe; and,

the snap collar having one or more external surfaces and the lock collar having one or more corresponding internal surfaces to be engaged with or by the one or more external surfaces of the snap collar to seal the connection of the snap collar to the lock collar.

10. The method of claim **7**, further comprising providing a connecting architecture that assembles from two or more pieces and is itself held together with one or more snap collars and one or more lock collars, either with or without adhesives, solders, sealants, fillers, tapes, or gaskets.

11. A fitting device for joining pipes or rods, comprising:

one or more snap collars; and

one or more lock collars, the lock collar having a sealing protrusion to seal the connection of the snap collar and lock collar on the pipe;

the one or more snap collars being configured to be snapped in place over a pipe, and the lock collars being configured to be snapped in place over the pipe and the snap fittings, the sealing protrusion engaging the pipe to seal the connection of the snap collar and lock collar on the pipe so that a sealed joint will be formed.

12. The fitting device of claim **11**, the pipe being a conduit having one or more wires, cables, or strands, and a joint is formed without severing the wires, cables, or strands.

13. The fitting device of claim **11**, one or more of:

the sealing protrusion of the lock collar having one or more sealing protrusions to engage corresponding depressions in the snap collar to seal the connection of the snap collar and lock collar on the pipe; and,

the snap collar having one or more external surfaces and the lock collar having one or more corresponding internal surfaces to be engaged with or by the one or more external surfaces of the snap collar to seal the connection of the snap collar to the lock collar.

14. The fitting device of claim **11**; further comprising a connecting architecture, such that the ends of the two or more pipes are placed into the connecting architecture rather than end-to-end against one another, and the fitting device secures the pipes in the connecting architecture, forming a joint, bend, or intersection.

15. The fitting device of claim **14**, further comprising any of an adhesive, solder, sealant, filler, tape or gasket placed between one or more pipes, connecting architectures, snap collars, and lock collars, to strengthen and/or seal the connection.

16. The fitting device of claim **14**, the snap collars and/or lock collars that, by their shape, dimensions, materials, and manufacturing tolerances, creating enough friction and inward pressure on the pipe or pipes to secure or seal the joint without the need for adhesives, solders, sealants, fillers, tapes or gaskets.

17. The fitting device of claim **14**, further comprising a multi-part connecting architecture that is itself held together with one or more snap collars and one or more lock collars, or with a lock fitting comprised of lock collar subsystems and connecting architecture subsystem, with or without adhesives, solders, sealants, fillers tapes, or gaskets.

18. The fitting device of claim **14**, the connecting architecture being an intersection that is attached to a middle section of a rod without severing the rod.

19. The fitting device of claim **14**, the fitting device being configured to be employed to repair a conduit containing one or more wires, cables, fibers or strands, without severing the wires, cables, fibers or strands.

20. The fitting device of claim **16**, the lock collars being made of two separate subsystems, a lock collar seal subsystem and a lock collar lock subsystem, made of differing materials and manufacturing tolerances.

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