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(54) **PIPE AND COUPLING PROTECTION ASSEMBLY**

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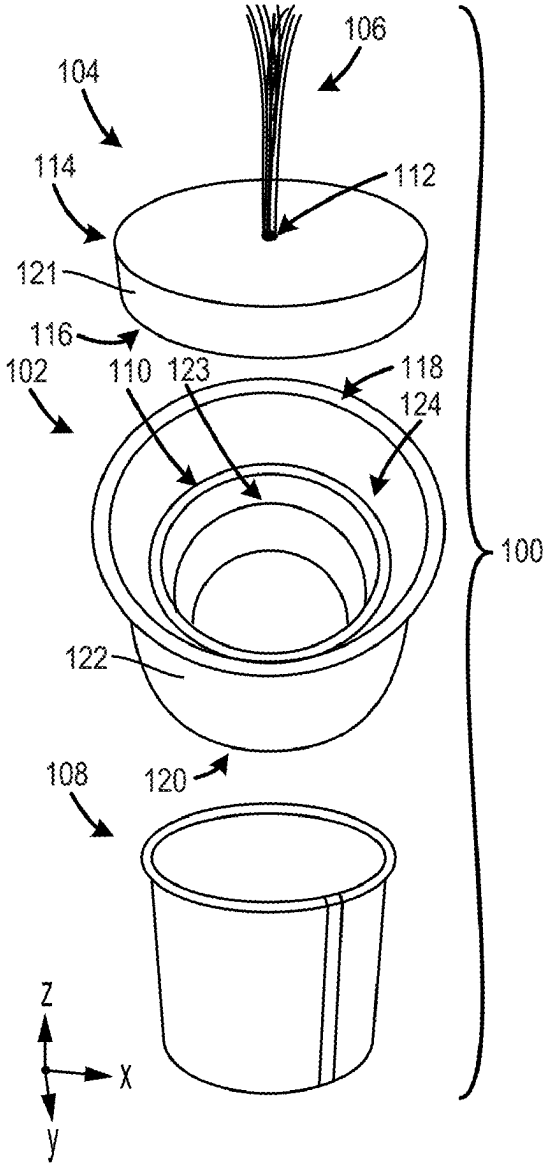
(52) **U.S. Cl.**
CPC ***F16L 55/11*** (2013.01)

(57) **ABSTRACT**

A pipe and coupling protection assembly in a pipe system. The pipe and coupling protection assembly includes, in one example, a base shroud configured to mate with a pipe coupling, a top plug mated with the base shroud, and a handle coupled to the top plug and vertically extending therefrom. In the assembly, the pipe coupling is configured to attach to a pipe stub and at least one of the base shroud and the top plug include an outer surface that tapers in a downward direction.



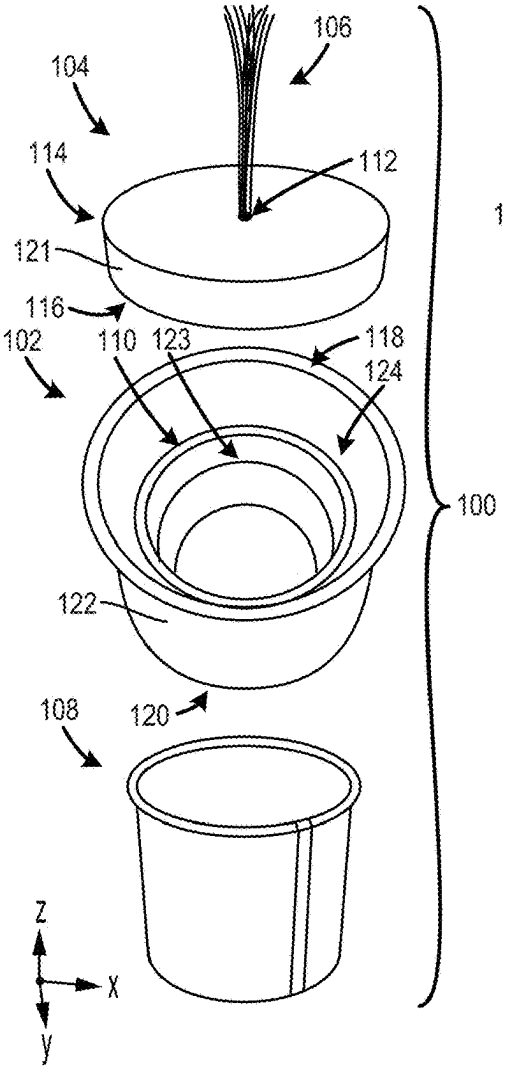


FIG. 1

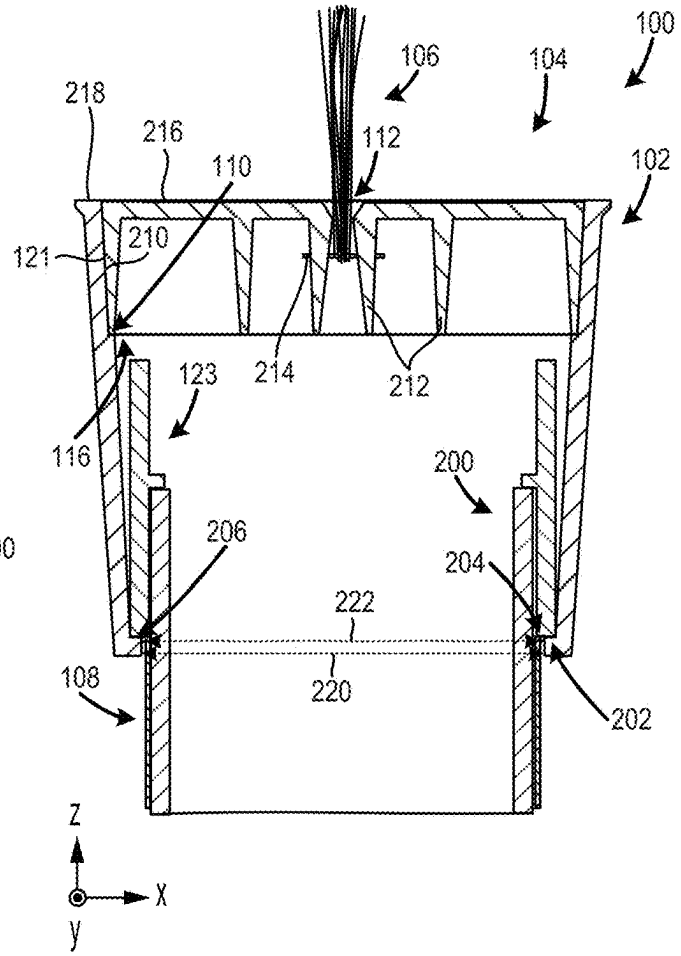


FIG. 2

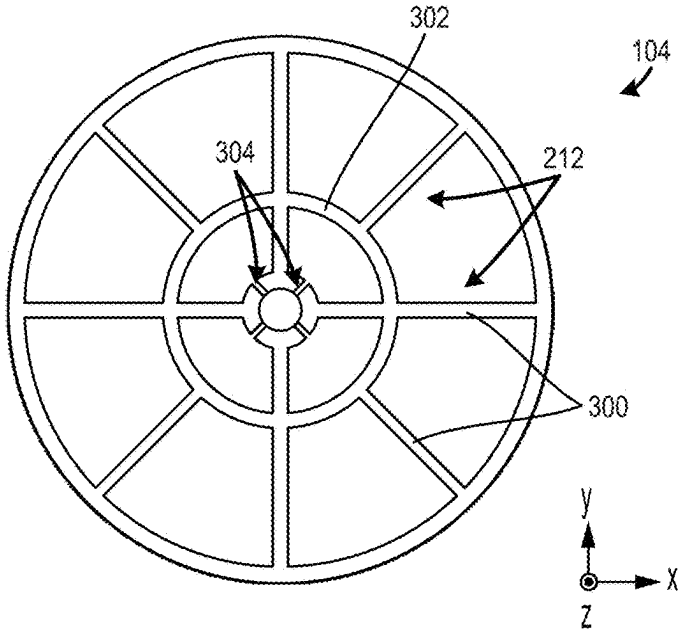


FIG. 3

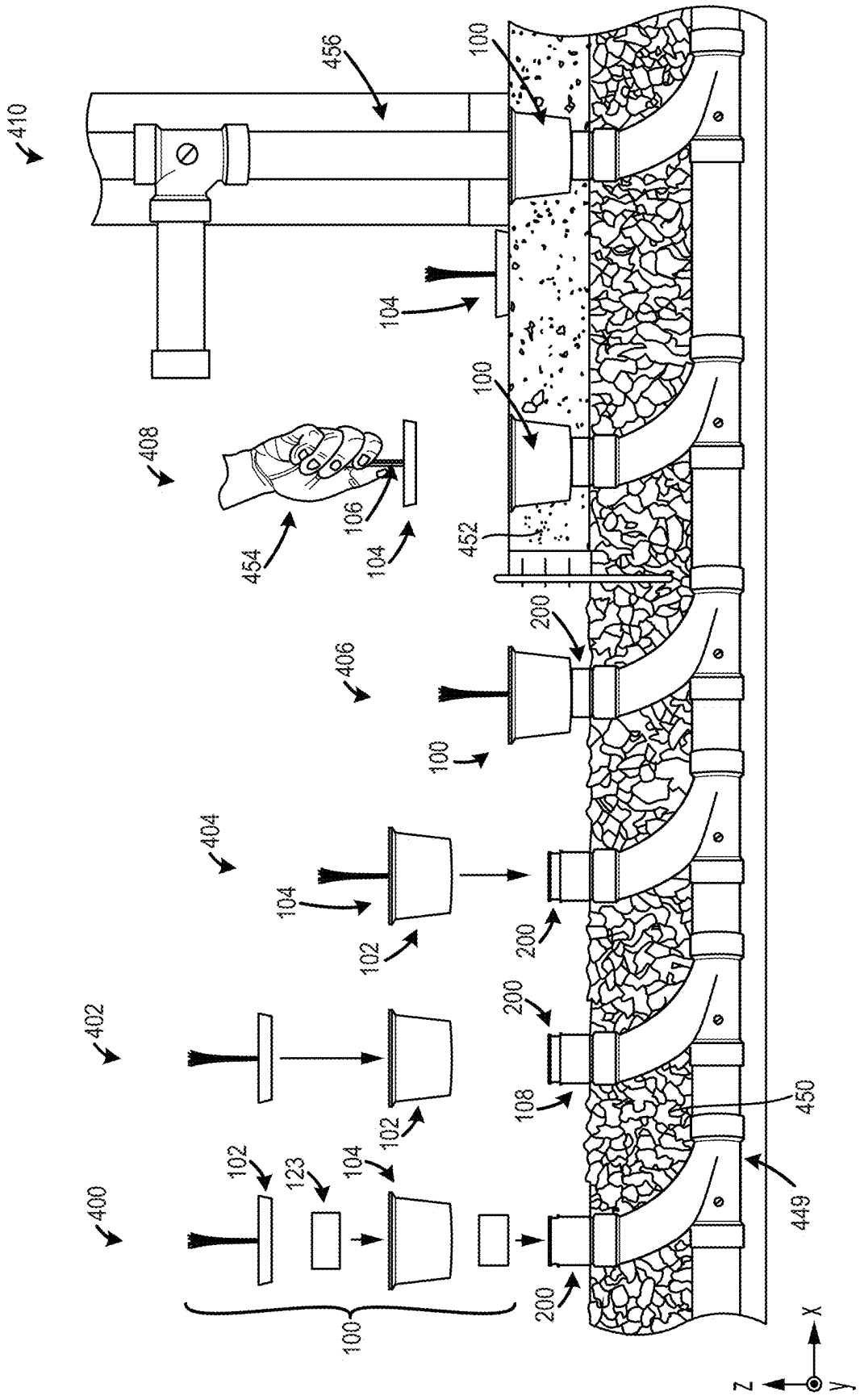

410
456
100
104
100
408
454
106
104
452
200
406
100
404
104
102
200
200
402
102
108
450
102
123
104
400
449
200
100
X
Z
y

FIG. 4

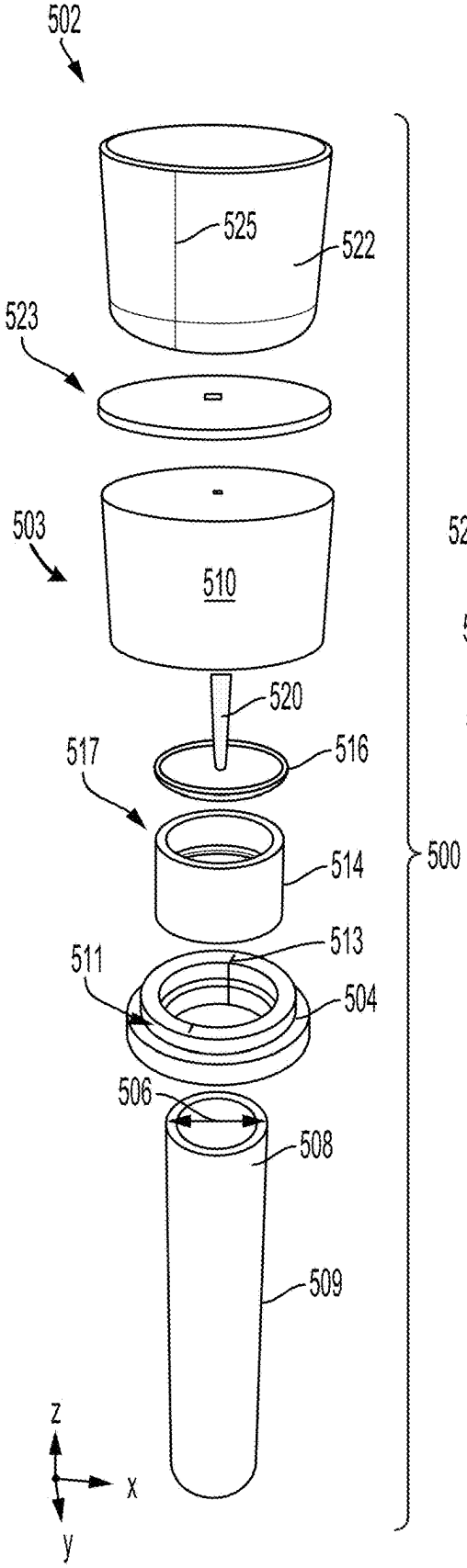

502
525
522
523
503
510
520
516
517
514
513
511
504
506
508
509
500
z
x
y

FIG. 5

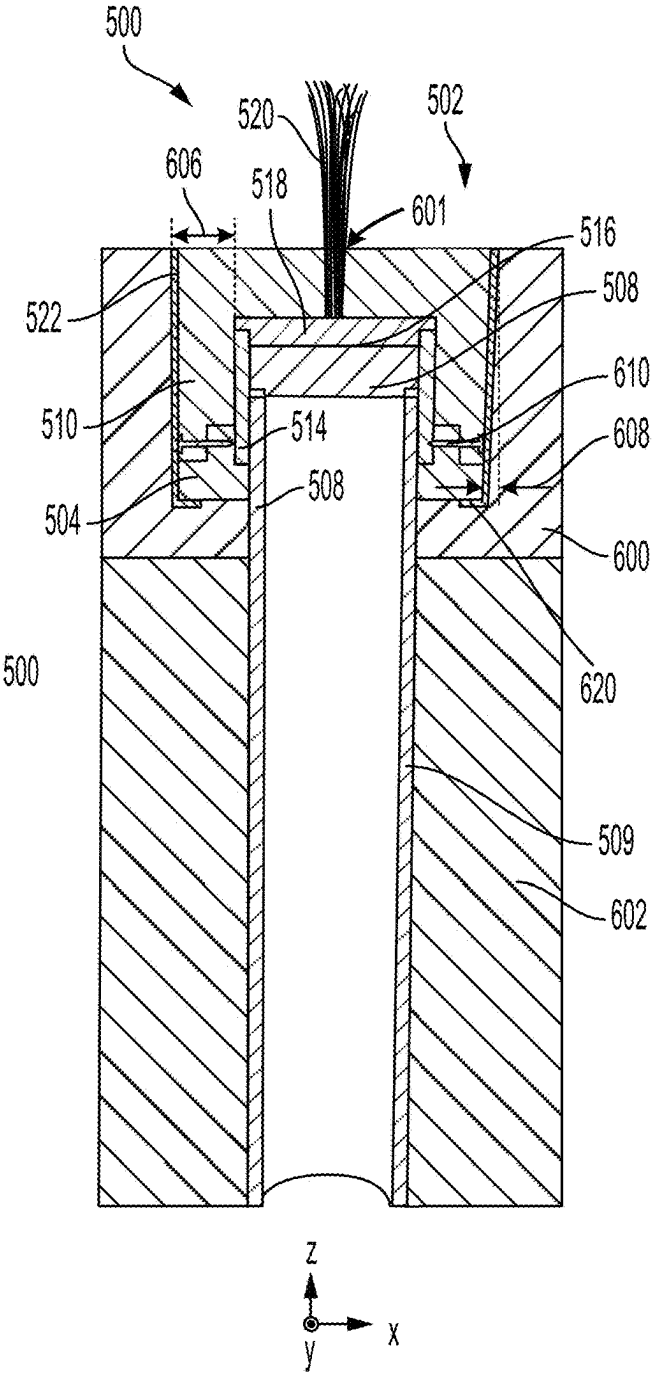

500
520
502
606
518
601
516
522
508
610
510
514
608
504
508
600
620
509
602
z
x
y

FIG. 6

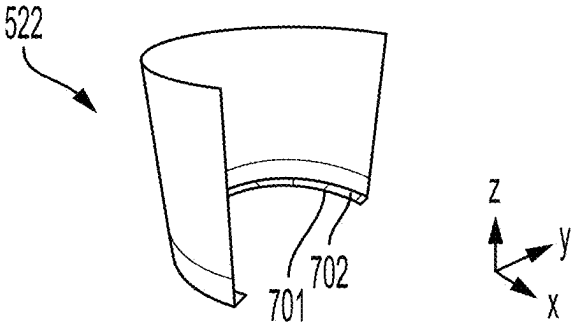


FIG. 7

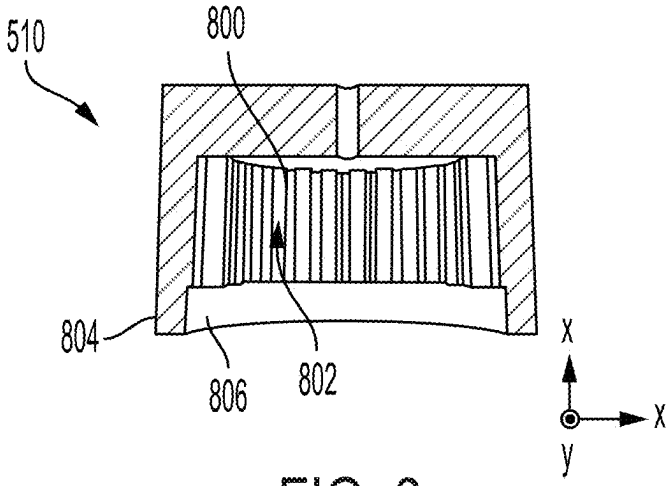


FIG. 8

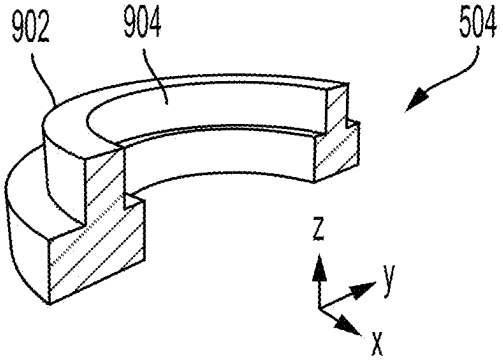


FIG. 9

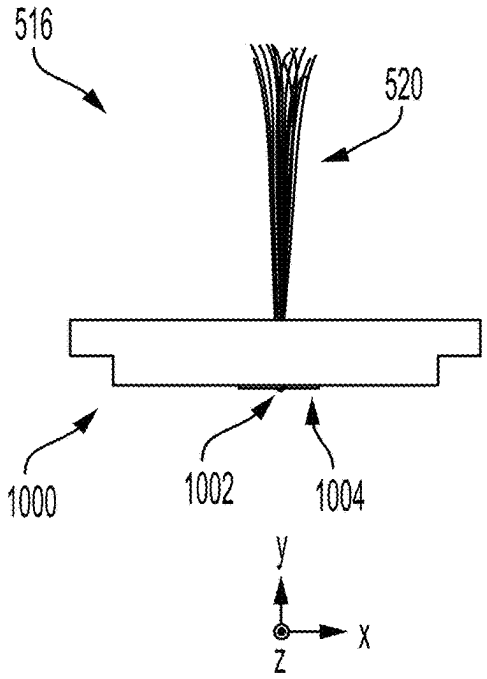


FIG. 10A

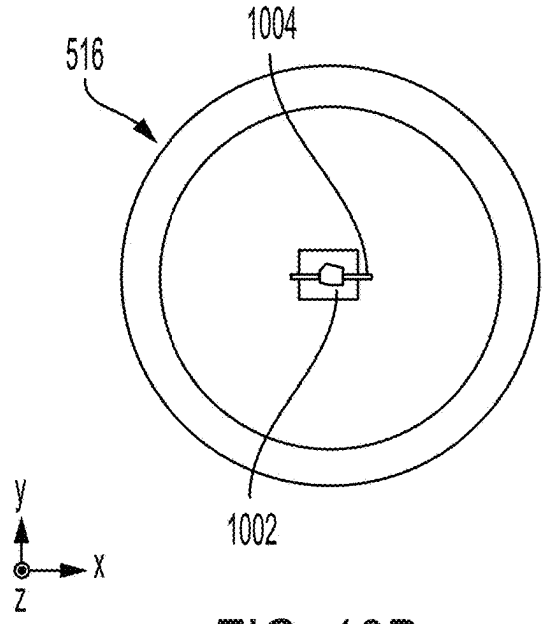


FIG. 10B

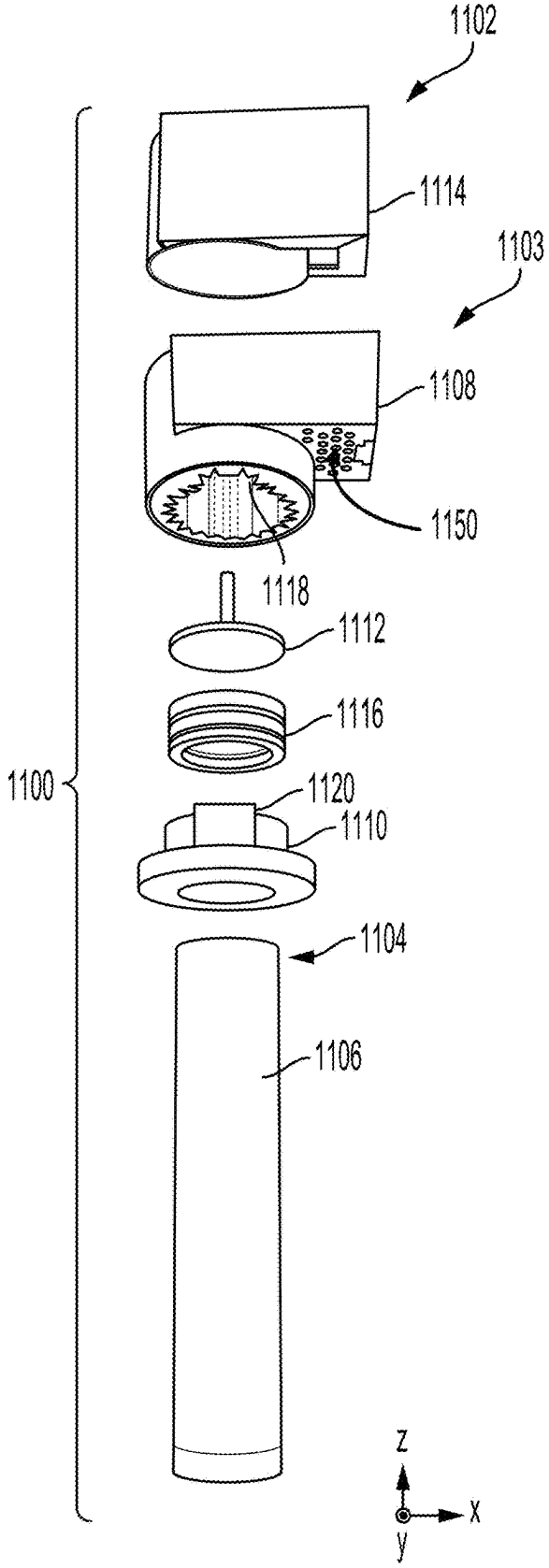


FIG. 11

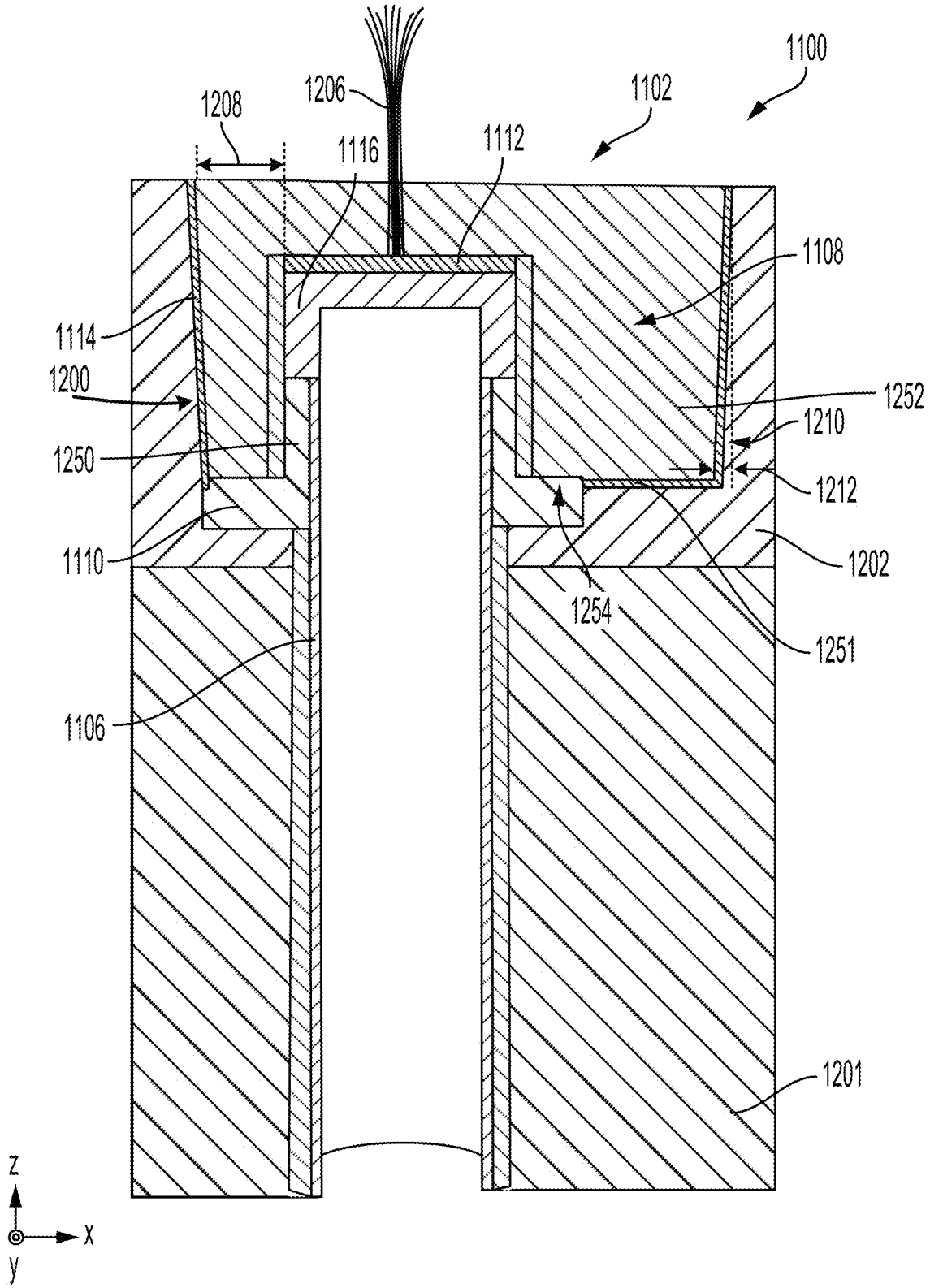

1100
1102
1206
1208
1116
1112
1108
1114
1200
1252
1210
1250
1212
1110
1202
1254
1251
1106
1201
z
x
y

FIG. 12

PIPE AND COUPLING PROTECTION ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present application claims priority to U.S. Provisional Application No. 63/555,843, entitled "PIPE AND COUPLING PROTECTION ASSEMBLY", and filed on Feb. 20, 2024. The entire contents of the above-listed application are hereby incorporated by reference for all purposes.

FIELD

[0002] The present description relates generally to a pipe and coupling protection assembly for a pipe system.

BACKGROUND AND SUMMARY

[0003] In certain building construction processes, plumbing systems are installed within and below concrete slabs at an early stage in the construction process. For instance, plumbing pipes may be installed in earthwork trenches and concrete slabs to provide under slab plumbing that enables above ground plumbing to be efficiently installed at later stages in construction. In these under slab plumbing layouts, stubs of the pipes protrude above the concrete slab and earthwork to enable connection and the location of the pipe to be identified for above ground plumbing installation.

[0004] The inventors have recognized several drawbacks with previous under slab plumbing layouts. For instance, during topside building construction, heavy equipment, machinery, and construction personnel move around the concrete slab in a multitude of directions, thereby increasing the chance of degradation (e.g., cracking, shearing, etc.) to the protruding pipe stubs. Repair of these pipe stubs can involve demolition of portions of the concrete slab through the use of equipment such as jackhammers and concrete saws, for instance. If pipe degradation extends into the earthwork, excavation of the soil may additionally be needed for pipe repair. For instance, earthwork may be excavated until an unbroken section of the pipe is revealed. Next the damaged pipe section is cut and debris may be removed from the unbroken pipe section. Later in the repair process, a new pipe coupling is installed, the earthwork is refilled, and a new section of concrete is poured. The new pipe again protrudes above the concrete, leaving it susceptible to equipment strikes.

[0005] Facing the aforementioned challenges, the inventors developed a pipe and coupling protection assembly to at least partially overcome the challenges. The pipe and coupling protection assembly includes, in one example, a base shroud that configured to mate with a pipe coupling that is configured to mate with a pipe stub and its coupling. The assembly further includes a top plug mated with the base shroud and a handle that is coupled to the top plug and vertically extends therefrom. Additionally, in the assembly, at least one of the base shroud and the top plug include an outer surface that tapers in a downward direction. In this way, the pipe and coupling protection assembly may be installed on a pipe and its coupling with the assembly flush with or below a concrete slab to avoid pipe degradation caused by strikes from machinery, equipment, construction personnel, and the like while allowing the assembly to be quickly identified by the handle. Further, the handle allows the top plug to be efficiently removed from the pipe stub for subsequent plumbing installation, for instance.

[0006] In one example, the pipe and coupling protection assembly may further include a sleeve that is configured to mate with an outer diameter of the pipe stub. The sleeve allows the pipe to be protected from concrete that is poured around the assembly and the pipe stub.

[0007] In another example, the base shroud may include an upper landing that is in contact with a lower side of the top plug. The upper landing allows the base shroud to support the top plug and prevents the top plug from being forced downward and wedged beyond a desirable amount when traffic drives over the top of the plug, for instance.

[0008] In another example, the pipe stub may be constructed out of metal. In such an example, the base shroud may include a tooling extension that is profiled to enable a tool to be used to tighten the pipe coupling when the upper plug is removed.

[0009] It should be understood that the summary above is provided to introduce in simplified form a selection of concepts that are further described in the detailed description. It is not meant to identify key or essential features of the claimed subject matter, the scope of which is defined uniquely by the claims that follow the detailed description. Furthermore, the claimed subject matter is not limited to implementations that solve any disadvantages noted above or in any part of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIGS. **1-2** show a first example of a pipe and coupling protection assembly.

[0011] FIG. **3** shows a detail view of a top plug that is included in the pipe and coupling protection assembly depicted in FIGS. **1-2**.

[0012] FIG. **4** shows an installation sequence for the pipe and coupling protection assembly depicted in FIGS. **1-2**.

[0013] FIGS. **5-6** show a second example of a pipe and coupling protection assembly.

[0014] FIGS. **7-10**B show detailed view of components in the pipe and coupling protection assembly depicted in FIGS. **5-6**.

[0015] FIGS. **11-12** show a third example of a pipe and coupling protection assembly.

DETAILED DESCRIPTION

[0016] The pipe and coupling protection assemblies described herein protect pipe systems and surrounding concrete by enabling the pipe and its fittings to be placed below the striking zone of equipment and personnel that may damage the pipe and/or the fittings during certain construction phases. The pipe and coupling protection assemblies further allow for strategic timing for the piping to continue above a concrete slab, if desired. As a result, schedule delays and undesirable monetary impacts may be prevented. Further, the pipe and coupling protection assemblies additionally consistently provide a common elevation for future standard or prefabricated connections. Still further, the pipe and coupling protection assemblies enable a water tight seal in the concrete to be formed to prevent ground water seepage into the occupied building space through the use of a modular elastomer sealing system, O-rings, extruding fins, and/or hydraulic grout and a cleaner work environment with less obstructions (e.g., tripping hazards and pinch points) for

all construction trades, if desired. Further, the pipe and coupling protection assemblies may be used during concrete tilt, enabling tilt panels to be poured directly over the pipe and coupling protection assembly. Consequently, the construction process is able to more efficiently unfold with less likelihood of pipe system and concrete damage. To achieve the aforementioned characteristics, the pipe and coupling protection assembly includes a base shroud that is profiled to mate with an outer diameter of a pipe stub and its coupling. The pipe and coupling protection assembly further includes a top plug that is profiled to mate with the base shroud. Additionally, a handle is coupled to the top plug to enable efficient removal of the top plug after concrete is poured around the assembly. The pipe and coupling protection assembly may further include a sleeve that either mates with the pipe or surrounds the top plug to allow the assembly to be more easily removed from the concrete. The pipe and coupling protection assemblies described herein may be conceptually referred to as a coupling castle, in one example. In such an example, the base shroud may be referred to as a moat base and the top plug may be referred to as a battlement top.

[0017] FIG. **1** shows an example of a pipe and coupling protection assembly **100**. The pipe and coupling protection assembly **100** is in a disassembled configuration in FIG. **1**. The pipe and coupling protection assembly **100** includes a base shroud **102** a top plug **104**, and a handle **106** coupled to the top plug in the illustrated example. However, other pipe and coupling protection assembly configurations have been contemplated as elaborated upon herein.

[0018] The base shroud **102** is formed as a single piece in the illustrated example. However, the base shroud may be formed in multiple sections as discussed in greater detail herein. The pipe and coupling protection assembly **100** further includes a sleeve **108** in the illustrated example. The sleeve **108** is profiled to mate with a pipe stub as discussed in greater detail herein. However, in other examples, the sleeve may be profiled to surround the base shroud or may be omitted from the assembly in different examples.

[0019] The base shroud **102** includes an upper landing **110** that is designed to support the top plug **104** and prevents the top plug from being wedged into the base shroud when traffic drive over the top plug, for instance. The handle **106** is coupled to the top plug **104** to allow the top plug **104** to be easily removed subsequent to installation of the assembly and after concrete has been poured around the assembly and cured. The handle **106** specifically extends through an opening **112** in the top plug **104**. The handle **106** also allows the location of the assembly to be quickly identified after concrete is poured around the assembly.

[0020] An outer surface **121** of the top plug **104** tapers in a downward direction, in the illustrated example. As such, a top **114** of the top plug **104** has a larger diameter than a lower side **116** of the top plug. Tapering the top plug allows the top plug to securely mate with the base shroud **102**. In other examples, the top plug may not taper in a downward direction.

[0021] An outer surface **122** of the base shroud **102** tapers in a downward direction, in the illustrated example. As such, a top **118** of the base shroud **102** has a larger diameter than a bottom **120** of the base shroud. Tapering the base shroud allows the plug to be more easily removed from concrete. A pipe coupling **123** is shown mated with an inner opening **124** of the base shroud **102**.

[0022] In this way, a standard pipe coupling may be efficiently installed in the assembly. Further, the top **118** of the base shroud **102** also functions to leave a breakaway surface from the concrete in cases where the concrete is over-poured and encroaches the upper surface of the top plug **104**. In this way, the concrete may be more easily chipped away and removed from the top plug **104**.

[0023] FIG. **2** shows a cross-sectional view of the pipe and coupling protection assembly **100** installed on a pipe stub **200**. Specifically, the sleeve **108** is mated with the pipe stub **200**. Next, the base shroud **102**, with the pipe coupling mated therewith, is mated with the pipe stub **200**. In particular, a lower side **202** of the pipe coupling **123** abuts a top lip **204** of the sleeve **108**.

[0024] The tapered outer surface **121** of the top plug **104** is again depicted. In the illustrated example, the base shroud **102** includes a lower landing **206** that is in contact with the lower side **202** of the pipe coupling **123**.

[0025] The top plug **104** further includes an upper landing **110** that is in contact with the lower side **116** of the top plug **104**. The base shroud **102** further includes a tapered inner surface **210** that is in face sharing contact with the tapered outer surface **121** of the top plug **104**.

[0026] The top plug **104** additionally includes multiple walls **212**. The walls are discussed in greater detail herein with regard to FIG. **3**. The handle **106** shown removably attached to the top plug **104** via a keeper pin **214**. However, the handle may be coupled to the top plug using other suitable techniques. Further, a top surface **216** of the top plug **104** is planar in the illustrated example. Further, the base shroud **102** may also include an upper circumferential surface **218** that aligns with the top surface **216** of the top plug **104** and may lay substantially flush with the top surface. In this way, damage to the pipe and coupling protection assembly **100** by vehicles, personnel, etc. moving around the construction zone is avoided. However, the handle **106** vertically extends through the opening **112** and above the top plug **104** to enable the location of the assembly to be identified and the top plug **104** to be effectively removed. The sleeve **108** has a cylindrical shape in the illustrated example. Thus, an outer diameter and an inner diameter of the sleeve **108** are constant along their lengths. Additionally, an outer diameter **220** of the sleeve **108** may be less than an inner diameter **222** of the lower landing **206**.

[0027] FIG. **3** shows a bottom view of the top plug **104**. The walls **212** of the top plug **104** are again illustrated. The walls **212** allow the structural integrity of the top plug to be increased. A portion **300** of the walls **212** are radially aligned in the illustrated example. Further, one of the walls **302** has a circular profile, in the illustrated example. Recesses **304** that are profiled to receive keeper pins are further depicted in FIG. **3**. As previously discussed, the keeper pins, allow the handle to be removably attached to the top plug. However, the handle may be coupled to the top plug in another suitable manner in alternate embodiments.

[0028] FIG. **4** shows an installation and removal sequence for the pipe and coupling protection assembly **100**. It will be understood that that other pipe and coupling protection assemblies described herein may also be sequentially installed prior to concrete is poured and sequentially removed after the concrete is cured.

[0029] Steps **400**, **402**, **404**, and **406** in the installation sequence are depicted. Further, steps **408** and **410** in the removal sequence. The pipe stub **200** is shown connected to

below ground plumbing **449** in each step in both sequences. Earthwork **450** surrounds the below ground plumbing **449** in the illustrated example.

[0030] In step **400**, the components in the pipe and coupling protection assembly **100** are disassembled. Specifically, the top plug **104** and the base shroud **102** are spaced away from one another in step **400**.

[0031] In step **402**, the pipe coupling **123**, shown in step **400**, is inserted into the base shroud **102** and the sleeve **108** is mated with the pipe stub **200**. After this insertion, the pipe coupling **123** may then be permanently attached to the base shroud **102** via friction and/or chemical bonding. Next in step **404**, the top plug **104** is mated with the base shroud **102**. Next in step **406**, the pipe and coupling protection assembly **100** is mated with the pipe stub **200** with the sleeve **108** mated therewith. During the mating between the assembly and the pipe stub, the assembly may then be permanently attached to the pipe stub via mechanical and/or chemical bonding.

[0032] Next in step **408**, a concrete layer **452** is poured around the pipe and coupling protection assembly **100**. After the concrete is poured, it is cured and it will be understood that construction machinery, construction equipment, construction personnel, and the like may move around the worksite on top of the concrete to carry out various construction tasks.

[0033] After the concrete is cured, a person **454** grips the handle **106** to remove the top plug **104** from the base shroud **102**, the pipe coupling, and the pipe stub at step **408**. Next in step **410**, above ground plumbing **456** is attached to the pipe coupling in the pipe and coupling protection assembly **100** with the top plug **104** removed.

[0034] FIG. **5** shows an exploded view of a second example of a pipe system **500** which includes a pipe and coupling protection assembly **502**. The pipe and coupling protection assembly **502** a base shroud **503**. The base shroud **503** is formed with a two-piece construction in the illustrated example. As such, the base shroud **503** includes a lower section **504** that is profiled to mate with an outer diameter **506** of a pipe stub **508** of a pipe **509**. The lower section **504** further includes an outer portion **511** that is profiled to mate and an upper section **510** of the base shroud **503**.

[0035] The upper section **510** is profiled to mate with a pipe coupling **514**. The pipe coupling **514** is profiled to attach to the pipe stub **508**. The pipe and coupling protection assembly **502** further includes a top plug **516** that is contoured to extend across the top to the outer edges **517** and into the upper portion of the pipe coupling **514**. The top plug **516** includes a handle **520** which extends vertically through a hole in the upper plug. The handle **520** may be constructed out of a flexible material which allows the handle to protrude vertically upward when installed and then bend when struck or otherwise contacted by construction machinery, equipment, personnel, and the like. The handle **520** allows the location of the pipe stub to be quickly identified without exposing an above ground section of the pipe to potential degradation caused by strikes from machinery, equipment, or personnel, for instance. The pipe and coupling protection assembly **502** may further include a sleeve **522**. A traffic rated top **523** may further be included in the assembly to further protect the assembly from degradation caused by machinery, equipment, and the like which travel over the concrete after it is poured around the assembly. The traffic rated top **523** may sit on top of the upper section **510** and inside the sleeve **522**. The sleeve **522** may be split from top to bottom along a line **525** which allows the sleeve to be snapped around the upper section **510** during installation, if desired. Further, the lower section **504** may include relief slits **513** to provide a breaking point if the part needs to be installed after the pipe coupling has already been glued.

[0036] FIG. **6** shows an assembled cross-sectional view of the pipe system **500** with the pipe and coupling protection assembly **502**. Specifically, the lower section **504**, the upper section **510**, and the top plug **516** of the pipe and coupling protection assembly **502** along with the pipe coupling **514** and the pipe stub **508** of the pipe **509** are again shown. The sleeve **522** is also shown in FIG. **6**. The upper section **510** is shown mated with the lower section **504** and the upper plug and the lower section enclose the pipe coupling **514**. Further, the handle **520** in the top plug **516** extends through a hole **601** in the upper section **510**. In this way, the handle is able to extend upward for quick pipe and coupling protection assembly identification and allows the upper plug to be rapidly vertically removed by pulling the handle upward, the handle being rigidly attached to the top plug **516** and supports the inner bottom of the upper section **510** to support the upward force when removing the handle, the cover, and the upper plug from the concrete. The traffic rated top **523** is again depicted in FIG. **6**.

[0037] FIG. **6** shows the pipe system **500** incorporated into concrete **600** and earthwork **602**. The concrete **600** may be in the form of a slab or serve another suitable purpose in a construction project. The lower section **504**, the upper section **510**, the top plug **516**, the sleeve **522**, and the pipe coupling **514** are again depicted. The handle **520** enables the location of the pipe system **500** to be efficiently identified by construction personnel. Further, the handle **520** may also enable a portion of the pipe and coupling protection assembly **502** which includes the upper section of the base shroud and the top plug to be quickly removed after the concrete **600** has been poured by pulling the handle upward. The top plug **516** spans and intrudes the opening **518** of the pipe coupling **514**. The top plug **516** reduces the chance of (e.g., prevents) debris from entering the pipe system during construction by providing a traffic rated structure that supports the upper section **510** from caving under downward force. The top plug **516** may be constructed to prevent vertical implosion, thereby increasing the assembly's durability.

[0038] The sleeve **522** may be in the form of a split sleeve which provides a thin and slick lining between outer surfaces of the upper section **510**, the lower section **504** and the inner surface of the concrete **600**. In this way, the sleeve **522** may be easily removed after the concrete is poured.

[0039] The upper section **510** and the sleeve **522** may be designed with a targeted annular spacing **606** when removed from cured concrete to accept an elastomer scaling device (e.g., a hydrostatic sealing device) or poured hydraulic grout to enable a permanent ground water seal to be formed around the assembly, if desired. Exterior surfaces of the upper section **510** and the sleeve **522** may be tapered (from top to bottom) as indicated at **608**. Consequently, a removal process from the concrete involving upwards motion of the parts in low friction (e.g., friction free) manner may be carried out, if desired.

[0040] The upper section **510** and the lower section **504** function in conjunction to protect the pipe coupling **514** during the concrete pouring process. To elaborate, the upper section **510** may mate with the lower section **504** to form a

slurry tight seal while allowing access for future above ground piping construction. After the concrete is poured, the upper section **510** may be flush with or positioned below the upper concrete surface, thereby preventing the plug from being struck by construction equipment, machinery, personnel, and the like which move across the construction site and perform various tasks. Thus, the pipe coupling may stay in place and protect the pipe stub **508** and the pipe coupling **514** until a time is available on the job site to install above ground pipes, fixtures, and the like. The pipe coupling **514** (e.g., pipe fitting) may be standardized fittings (e.g., ASTM fittings), in one use-case example.

[0041] In one example, the pipe and coupling protection assembly **502** may be conceptually referred to as a coupling castle. In such an example, the sleeve may be referred to as a moat, the upper plug may be referred to as a battlement part, the top plug may be referred to as a draw bridge, and the lower section may be referred to as a curtain wall.

[0042] Pins **610** may be included in the pipe and coupling protection assembly to attach the upper section **510** to the lower section **504**. To elaborate, the pins **610** may radially extend through the upper plug and the lower section of the base shroud. Additionally or alternatively, adhesive, caulk, and the like may be used to couple the upper plug and the lower section. In this way, the upper plug may be secured to the lower section when they are removed from the concrete using the handle, which is discussed in greater detail herein.

[0043] The sleeve **522** may have a different configuration in alternate embodiments. For instance, the sleeve **522** may be contoured such that a lower lip **620** is positioned between the upper section **510** and the lower section **504**. However, in the example illustrated in FIG. **6**, the lower lip **620** of the sleeve **522** wraps under the lower section **504**.

[0044] FIG. **7** shows a cross-sectional view of the sleeve **522**. The sleeve may be split from top to bottom along a line which allows the sleeve to be snapped around the upper plug during installation, if desired. Further, the sleeve **522** may include relief grooves **701** in a lip **702**. The relief grooves assist in opening during the installation process.

[0045] FIG. **8** shows a cross-sectional view of the upper section **510**. As shown in FIG. **8**, the upper section **510** may include multiple grooves **800** (e.g., vertically extending grooves) on an interior surface **802**. The grooves allow the upper plug to be more quickly and efficiently removed from the concrete.

[0046] Further, the upper section **510** may include tapered side wall **804** which allows the plug to be more easily removed. However, in alternate examples, the upper plug may have a straight side wall. Still further, the upper section **510** may have an elliptical inner surface **806** that is profiled to interface with an outer surface of the lower section. The elliptical profile of the upper section **510** allows the plug to be mated with the lower section and a small turn (e.g., a 90° turn, in one use-case example) with the curtain wall part which creates friction between the upper plug and a wall of the lower section, thereby providing cohesion and a slurry tight seal for the assembly.

[0047] FIG. **9** shows different detailed views of the lower section **504**. As discussed above, relief slits may be provided in the lower section **504** to provide a breaking point if the part needs to be installed after the pipe coupling has already been glued.

[0048] As shown in FIG. **9**, the lower section **504** may include an elliptical outer surface **902** that is profiled to mate with the elliptical surface in the upper plug. Further, the lower section **504** may include a coping **904** for fitting with the pipe coupling. The elliptical shape of the lower section **504** as well as the upper plug, which is discussed above, allow the likelihood of the mated unit formed between the upper plug and the lower section undesirably floating in the wet concrete to be reduced.

[0049] In one example, the sleeve may be sprayed or packed with a release agent (e.g., grease, glycerin, silicone spray, and the like) prior to installation of the sleeve. In this way, the top plug and the lower section of the base shroud are able to be more easily removed after the concrete is poured around the assembly.

[0050] FIGS. **10**A and **10**B show different detailed views of the top plug **516**. The handle **520** and the top plug **516** of the cover are again depicted. The top plug **516** includes a section **1000** that is shaped to fit within an opening of a coupling. The handle **520** may extend through the section **1000** and have a loop **1002** on a lower side of the cover. A keeper pin **1004** may extend through the loop **1002** to secure the handle in a desired manner.

[0051] FIGS. **11** and **12** show another example of a pipe and coupling protection assembly **1102**. Specifically, FIG. **11** shows an exploded view of another example of a pipe system **1100** which includes a pipe and coupling protection assembly **1102** that is designed to attach to a stub **1104** of a pipe **1106** (e.g., a metal pipe such as a cast iron pipe). The pipe and coupling protection assembly **1102** includes a base shroud **1103** and a top plug **1112**. The base shroud **1103** includes an upper section **1108** and a lower section **1110**. Further, in the illustrated example, the pipe and coupling protection assembly **1102** further includes a sleeve **1114**. However, in alternate examples, the sleeve may be omitted from the pipe and coupling protection assembly. A rubber cap **1116** in the pipe system **1100** is further shown in FIG. **11**.

[0052] In the illustrated example, the upper section **1108** includes a female key-way **1118** that mates with a male key-way **1120** in the lower section **1110** when assembled. However, the key-ways may be omitted from the upper plug and the lower section, in other examples. The upper section **1108** may include relief holes **1150**.

[0053] FIG. **12** shows an assembled view of the pipe system **1100** with the pipe and coupling protection assembly **1102**. Specifically, the sleeve **1114**, the upper section **1108**, the top plug **1112**, the rubber cap **1116**, the lower section **1110**, and the pipe **1106** are again depicted. Exterior sides **1200** of the sleeve **1114** and the upper section **1108** may be tapered from top to bottom to allow the pipe and coupling protection assembly to be easily removed after concrete is poured around the assembly. An upper portion **1250** of the lower section **1110** mates with the upper section **1108**.

[0054] FIG. **12** specifically shows the pipe system **1100** installed in earthwork **1201** and concrete **1202**. The earthwork **1201** may specifically include gravel. The pipe and coupling protection assembly **1102** may have a modified upper section where an underside **1251** of a tooling extension **1252** is vertically lengthened (along the z-axis) to a lower lip **1254** of the lower section **1110**. The sleeve **1114** is again depicted in FIG. **12**.

[0055] The upper section **1108** includes a tooling extension **1252** that is in the form of an enlarged side. The top

plug **1112** enables the upper section **1108** to be quickly removed via construction personnel by pulling a handle **1206** upward.

[0056] The sleeve **1114** may be in the form of a split sleeve which provides a slick and comparatively thin lining between the concrete **1202** and the upper section **1108**. Consequently, the upper section **1108** is able to be easily removed after the concrete is poured.

[0057] The upper section **1108** may be designed with an annular spacing **1208** when removed from the cured concrete to accept a modular elastomer sealing system and/or hydraulic grout to assist in a permanent ground water seal. Exterior sides **1210** of the upper section **1108** and the sleeve **1114** are tapered as indicated at **1212** from the top to bottom to create less friction during an upward removal process from the concrete.

[0058] The upper section **1108** mates with the lower section **1110** and both surround the rubber cap **1116** to protect the pipe coupling and coupling space with a slurry tight seal which allows for access when future above ground piping construction continuation is desired. After the concrete is poured, the pipe and coupling protection assembly **1102** keeps the pipe **1106** from being struck by construction equipment, machinery, construction personnel, and the like which move across a construction site to carry out various job activities until a more viable and productive time is available with a reduced chance of pipe strike to continue above ground plumbing system construction.

[0059] It will be understood that the components in any of the pipe and coupling protection assemblies described herein may be constructed out of plastic. To elaborate, in one specific example, the top plug and the base shroud may be constructed out of acrylonitrile butadiene styrene (ABS) and the handle may be constructed out of nylon and/or latex rubber.

[0060] An axis system is provided in FIGS. **1-12**, for reference. The z-axis may be a vertical axis (e.g., parallel to a gravitational axis), the x-axis may be a lateral axis (e.g., horizontal axis), and/or the y-axis may be a longitudinal axis, in one example. However, the axes may have other orientations, in other examples. FIGS. **1-12** are drawn approximately to scale. However, other relative component dimensions may be used in other embodiments.

[0061] FIGS. **1-12** show example configurations with relative positioning of the various components. If shown directly contacting each other, or directly coupled, then such elements may be referred to as directly contacting or directly coupled, respectively, at least in one example. Similarly, elements shown contiguous or adjacent to one another may be contiguous or adjacent to each other, respectively, at least in one example. As an example, components laying in face-sharing contact with each other may be referred to as in face-sharing contact. As another example, elements positioned apart from each other with only a space therebetween and no other components may be referred to as such, in at least one example. As yet another example, elements shown above/below one another, at opposite sides to one another, or to the left/right of one another may be referred to as such, relative to one another. Further, as shown in the figures, a topmost element or point of element may be referred to as a "top" of the component and a bottommost element or point of the element may be referred to as a "bottom" of the component, in at least one example. As used herein, top/bottom, upper/lower, above/below, may be relative to a vertical axis of the figures and used to describe positioning of elements of the figures relative to one another. As such, elements shown above other elements are positioned vertically above the other elements, in one example. As yet another example, shapes of the elements depicted within the figures may be referred to as having those shapes (e.g., such as being circular, straight, planar, curved, rounded, chamfered, angled, or the like). Further, elements shown intersecting one another may be referred to as intersecting elements or intersecting one another, in at least one example. Further still, an element shown within another element or shown outside of another element may be referred as such, in one example. An elements inner and outer diameter may be referred to as such. Further an element with a smaller or greater diameter or radius than another element may be referred to as such.

[0062] The invention will further be described in the following paragraphs. In one aspect, a pipe and coupling protection assembly is provided that comprises a base shroud configured to mate with a pipe coupling; wherein the pipe coupling is configured to attach to a pipe stub; a top plug coupled to the base shroud; and a handle coupled to the top plug and vertically extending therefrom; wherein at least one of the base shroud and the top plug include an outer surface that tapers in a downward direction. In one example, the pipe and coupling protection assembly may further comprise a sleeve configured to mate with an outer diameter of the pipe stub. In another example, the base shroud may include a lower landing; and an outer diameter of the sleeve may be less than an inner diameter of the lower landing. In another example, the base shroud may include an upper landing that is in contact with a lower side of the top plug. In another example, the base shroud may include a tapered inner surface. In another example, the base shroud may have a tapered outer surface with a larger circumference at a top than a bottom. In another example, the top plug may have a tapered outer surface with a larger circumference at a top than a bottom. In another example, the top plug may include a plurality of walls. In another example, at least a portion of the plurality of walls may be radially aligned. In another example, the handle may be coupled to the top plug via a keeper pin. In another example, the base shroud and the top plug may be constructed out of plastic. In another example, the top plug may be configured to remove at least a portion of the base plug when pulled vertically. In another example, the handle may be constructed out of nylon and/or latex rubber. In another example, the base shroud may include a top section and a bottom section. In another example, the top section may include a tooling extension that profiled to enable tooling access to the pipe coupling. In yet another example, the top plug may include a planar top surface.

[0063] In another aspect, a method for installation of a pipe and coupling protection assembly is provided that comprises installing a base shroud onto a pipe stub; and installing a top plug within the base shroud; wherein at least one of the top plug and the base shroud is tapered in a downward direction; and wherein a handle is coupled to the top plug and vertically extends therefrom. In one example, the method may further comprise, prior to installing the base shroud onto the pipe stub, installing a sleeve on the pipe stub. In another example, the method may further comprise removing the top plug via pulling the handle upwards. In yet another example, the handle may be coupled to the top plug via a keeper pin. In another example, both of the top plug

and the base shroud include a tapered outer surface with a larger circumference at a top than a bottom.

[0064] It will be appreciated that the configurations and routines disclosed herein are exemplary in nature, and that these specific embodiments are not to be considered in a limiting sense, because numerous variations are possible. For example, the above technology can be applied to a broad range of construction environments. The subject matter of the present disclosure includes all novel and non-obvious combinations and sub-combinations of the various systems and configurations, and other features, functions, and/or properties disclosed herein.

[0065] The following claims particularly point out certain combinations and sub-combinations regarded as novel and non-obvious. These claims may refer to "an" element or "a first" element or the equivalent thereof. Such claims should be understood to include incorporation of one or more such elements, neither requiring nor excluding two or more such elements. Other combinations and sub-combinations of the disclosed features, functions, elements, and/or properties may be claimed through amendment of the present claims or through presentation of new claims in this or a related application. Such claims, whether broader, narrower, equal, or different in scope to the original claims, also are regarded as included within the subject matter of the present disclosure.

1. A pipe and coupling protection assembly, comprising:
a base shroud configured to mate with a pipe coupling;
wherein the pipe coupling is configured to attach to a pipe stub;
a top plug mated with the base shroud; and
a handle coupled to the top plug and vertically extending therefrom;
wherein at least one of the base shroud and the top plug include an outer surface that tapers in a downward direction.

2. The pipe and coupling protection assembly of claim **1**, further comprising a sleeve configured to mate with an outer diameter of the pipe stub.

3. The pipe and coupling protection assembly of claim **2**, wherein:
the base shroud includes a lower landing; and
an outer diameter of the sleeve is less than an inner diameter of the lower landing.

4. The pipe and coupling protection assembly of claim **1**, wherein the base shroud includes an upper landing that is in contact with a lower side of the top plug.

5. The pipe and coupling protection assembly of claim **1**, wherein the base shroud includes a tapered inner surface.

6. The pipe and coupling protection assembly of claim **1**, wherein the base shroud has a tapered outer surface with a larger circumference at a top than a bottom.

7. The pipe and coupling protection assembly of claim **6**, wherein the top plug has a tapered outer surface with a larger circumference at a top than a bottom.

8. The pipe and coupling protection assembly of claim **1**, wherein the top plug includes a plurality of walls.

9. The pipe and coupling protection assembly of claim **8**, wherein at least a portion of the plurality of walls are radially aligned.

10. The pipe and coupling protection assembly of claim **1**, wherein the handle is coupled to the top plug via a keeper pin.

11. The pipe and coupling protection assembly of claim **1**, wherein the base shroud and the top plug are constructed out of plastic.

12. The pipe and coupling protection assembly of claim **1**, wherein the top plug is configured to remove at least a portion of the base plug when pulled vertically.

13. The pipe and coupling protection assembly of claim **1**, wherein the base shroud includes a top section and a bottom section.

14. The pipe and coupling protection assembly of claim **13**, wherein the top section includes a tooling extension that is profiled to enable tooling access to the pipe coupling.

15. The pipe and coupling protection assembly of claim **1**, wherein the top plug includes a planar top surface.

16. A method for installation of a pipe and coupling protection assembly, comprising:
installing a base shroud onto a pipe stub, wherein a pipe coupling is mated with the base shroud; and
installing a top plug within the base shroud;
wherein at least one of the top plug and the base shroud is tapered in a downward direction; and
wherein a handle is coupled to the top plug and vertically extends therefrom.

17. The method of claim **16**, further comprising, prior to installing the base shroud onto the pipe stub, installing a sleeve on the pipe stub.

18. The method of claim **16**, further comprising removing the top plug via pulling the handle upwards.

19. The method of claim **16**, wherein the handle is coupled to the top plug via a keeper pin.

20. The method of claim **16**, wherein both of the top plug and the base shroud include a tapered outer surface with a larger circumference at a top than a bottom.

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