



(51) International Patent Classification:

F16L 15/08 (2006.01) *F16L 37/14* (2006.01)
F16L 17/025 (2006.01) *F16L 47/16* (2006.01)

(21) International Application Number:

PCT/IB2019/055752

(22) International Filing Date:

05 July 2019 (05.07.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

201841025359 06 July 2018 (06.07.2018) IN

(71) Applicant: **ASHIRVAD PIPES PVT. LTD** [IN/IN]; 4-B,
Attibele Industrial Area, Hosur Road, -562107, Karnataka,
Bangalore 562107 (IN).

(72) Inventor: **PODDAR, Deepak**; # 102, Redwood Block, Ra-
heja Residency, Koramangala 3rd Block, -, Karnataka, Ban-
galore 560 034 (IN).

(74) Agent: **SHANKARARAJ, Gopinath Arenur** et al.; K&S
PARTNERS Intellectual Property Attorneys, 4121/B, 6th
Cross, 19A Main, HAL II Stage (Extension), Karnataka,
Bangalore 560038 (IN).

(81) Designated States (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN,
TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(54) Title: PIPE AND COUPLER JOINT WITH GROOVE AND MULTI LIP SEAL

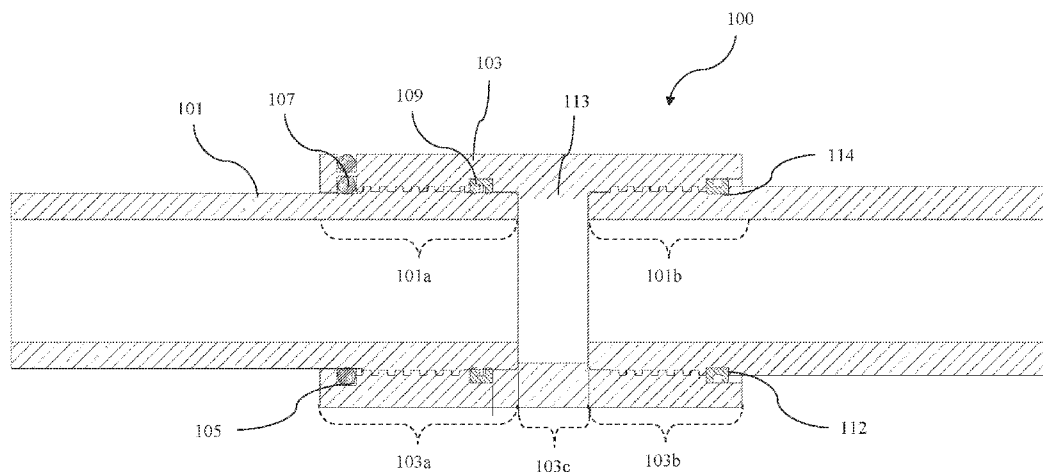


FIGURE. 1

(57) Abstract: The present disclosure discloses a pipe and coupler assembly (100) made of polyvinyl chloride is disclosed. The assembly include a pipe (101) having a first end (101a) and a second end configured with a plurality of outer threads (102). The assembly includes a coupler (103), comprising, a first coupling end and a second coupling end having a plurality of an inner threads (104). The first end of the pipe is non-removably coupled to the first coupling end. A locking means (107) is inserted in a first annular groove (105) formed in the first coupling end, to lock the first end of the pipe with the first coupling end. Further, a second annular groove (108) is defined in the flat portion (103c) of the coupler, and a first multi-lip sealing ring (109) is accommodated in the second groove (108) to form a fluid seal between the first end of the pipe and the first coupling end.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

5 **Title: PIPE AND COUPLER JOINT WITH GROOVE AND MULTI LIP SEAL**

TECHNICAL FIELD

10 The present disclosure in general relates to a field of pipes and pipe joints. Particularly, but not exclusively, the disclosure relates to a pipe and coupler assembly made of polyvinyl chloride (PVC). Further, embodiments of the disclosure disclose the pipe and coupler assembly with a locking means and a multi-lip sealing arrangement.

15

BACKGROUND OF THE DISCLOSURE

Generally, pipes are used for conveying fluids from one point to another. The application of pipes are many, and hence the pipes may be joined using suitable pipe joining means such as couplers or collars for conveying the fluid to farther distances from the source. Some applications of the pipe and coupler assembly may include sanitation, water supply, supply of chemicals, and the like. The pipe and coupler assembly may be used for both aboveground applications, and for underground applications. The underground applications of the pipe and coupler system may include borewells, where the pipe may extend several meters below the surface of the earth, and a large capacity motor or pump may be used to draw the water from a source. Conventionally, the pipes used for underground applications are manufactured of metallic materials, owing to their strength and load bearing capacity. These metallic pipes may be threaded at both sides and may be joined to one another through threaded couplings. The conventional metallic pipes may pose several challenges, and one such challenge may include corrosion or rusting of the pipe and couplers over a period of time, which may result in breakage and thereby damaging the whole underground piping assembly. In addition, the metallic pipes being heavy requires additional efforts or special equipment's for assembling and dismantling.

35

To overcome the drawbacks associated with the metallic pipe and coupler assemblies, many efforts have been made, and some alternative light weight, high strength, long life assemblies have been developed. One such alternative to the metallic pipes may include development of pipe and coupler assembly made of polyvinyl chloride (PVC)

5 material. The conventional, PVC pipe and coupler assemblies may be formed by push fitting the pipe in a coupler and sealing rings may be provided to prevent leakage. The pipe and coupler may be fixed together with a plugging arrangement, such as a screw in order to prevent the rotation of the pipe inside the coupler. However, such pipe and coupler assembly may not be suitable for the underground applications, since, the load
10 bearing is being done by plugging system, which may be insufficient to take the load. One more alternative in the art, may include making inner threads integral to the pipe by heat expanding one end of the pipe. However, when such arrangement is used in underground applications, the hanging loads are heavy and the top clamping system may damage the top expanded inner thread end of the pipe and the pipe end would
15 notch or break due to heavy loads, resulting in burial of the pump and the pipe.

With ongoing developments in the pipe industry, pipe and coupler assembly made of polyvinyl chloride (PVC) for use in underground applications such as borewells have been developed and used. The pipe and coupler assembly may include a pipe with
20 male threads on both the ends, and the coupler with female threads receiving the male threads. The conventional pipe and coupler assemblies made of polyvinyl chloride are configured such that, one end of the pipe may be non-removably fixed to the coupler, and the other end of the pipe may be joined adjacent to the coupler to form the joint. For non-removably fixing one end of the coupler with the pipe, various arrangements
25 have been proposed, and such arrangements may include use of adhesive bonding, locking units such as pins, wire locks and the like. Also, the coupler end accommodating the fixed end of the pipe may be provided with a narrow groove for accommodating a circular sealing ring to form a fluid seal between the pipe and the coupler. However, the conventional couplers will have substantially semi-circular
30 narrow groove in the inner circumference which accommodates a circular sealing ring. The provision of a semi-circular narrow groove will increase stress concentration in the location of the groove and may result in notching when the load is acting on the pipe and coupler assembly. This may cause failure of the pipe and coupler assembly due to various loads such as axial load of the pump and motor, turbulent loads created
35 by water, and vibrational loads created in the borewell.

The present disclosure is directed to overcome one or more limitations stated above or

5 any other limitation associated with the prior arts.

SUMMARY OF THE DISCLOSURE

10 The shortcomings of the prior art are overcome, and additional advantages are provided through the provision of assembly as claimed in the present disclosure.

Additional features and advantages are realized through the techniques of the present disclosure. Other embodiments and aspects of the disclosure are described in detail herein and are considered a part of the claimed disclosure.

15 In one non-limiting embodiment of the disclosure, a pipe and coupler assembly made of polyvinyl chloride is disclosed. The assembly comprises a pipe having a first end, wherein at least a portion of an outer surface of the first end is provided with a plurality of outer threads. A coupler, comprising, a first coupling end and a second
20 coupling end having a plurality of inner threads in an inner surface, divided by a flat portion, wherein, the first end of the pipe is configured to be coupled to the first coupling end. A locking means is inserted in a first annular groove, formed between the first coupling end and the first end of the pipe, the locking means is configured to lock the first end of the pipe (101) with the first coupling end. The assembly further
25 comprising a second annular groove defined in the flat portion of the coupler, wherein, the second annular groove is defined with a substantially flat bottom portion with curved ends. A first multi-lip sealing ring accommodated in the second groove to form a fluid seal between the first end of the pipe and the first coupling end of the coupler.

30 In an embodiment, the first multi-lip sealing ring comprises a flat base portion on an outer surface and a plurality of inner projections projecting in an inner surface. Further, each of the plurality of inner projections is divided by a cavity, wherein, the plurality of inner projections abuts the outer surface of the first end of the pipe.

35 In an embodiment, a width of the second annular groove is greater than pitch of the plurality of the inner square shaped threads. The width of the second annular groove is at least two times of the pitch of the plurality of the inner square shaped threads.

- 5 In an embodiment, the locking means is a made of a deformable member. The locking means is made of a metallic material or a polymeric material.

In an embodiment, the locking means is a wire lock.

- 10 In an embodiment, the coupler includes a slot defined on the outer surface of adjoining the tangential hole to fold the locking means within an outer diameter of the coupler.

- In an embodiment, a plurality of ribs on the outer surface of the coupler to hold a
15 pipe-wrench during assembling and dismantling of the coupler and the pipe.

In an embodiment, the second end of the pipe is receivable by the second coupling end of an adjoining coupler for joining two pipes.

- 20 In an embodiment, the assembly comprises a second multi-lip sealing ring provided on the second end of the pipe. The second multi-lip sealing ring is adapted to abut the inner surface of the second coupling end to form a fluid seal between the second end of the pipe and the second coupling end of the coupler.

- 25 In an embodiment, the second multi-lip sealing ring is provided in a portion of the second end adjoining the plurality of outer square-shaped threads.

In an embodiment, the coupler comprises an annular rib extending in the inner surface of the coupler in the flat portion.

- 30 It is to be understood that the aspects and embodiments of the disclosure described above may be used in any combination with each other. Several of the aspects and embodiments may be combined together to form a further embodiment of the disclosure.

- 35 The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

5

BRIEF DESCRIPTION OF THE ACCOMPANYING FIGURES

The novel features and characteristic of the disclosure are set forth in the appended claims. The disclosure itself, however, as well as a preferred mode of use, further
10 objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying figures. One or more embodiments are now described, by way of example only, with reference to the accompanying figures wherein like reference numerals represent like elements and in which:

15

Figure 1 illustrates a sectional view of the pipe and coupler assembly, in accordance with an embodiment of the present disclosure.

Figure 2 illustrates a sectional front view of the pipe and coupler assembly with the
20 wire lock, in accordance with an exemplary embodiment of the present disclosure.

Figure 3 illustrates a sectional view of the coupler, according to an embodiment of the present disclosure.

25 Figures 4A and 4B illustrates perspective views of a first multi-lip sealing ring, according to an embodiment of the present disclosure.

Figure 5 illustrates a sectional view of the first multi-lip sealing ring of Figure. 4A.

30 Figure 6 illustrates a sectional view of the second end of the pipe, according to an embodiment of the present disclosure.

Figures 7A and 7B illustrates perspective views of a second multi-lip sealing ring, according to an embodiment of the present disclosure.

35

Figure 8 illustrates a schematic view of the pipe and coupler assembly fixed to a submersible pump inside a borewell, in accordance with an exemplary embodiment of the present disclosure.

5 The figures depict embodiments of the disclosure for purposes of illustration only. One skilled in the art will readily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles of the disclosure described herein.

10 **DETAILED DESCRIPTION**

The foregoing has broadly outlined the features and technical advantages of the present disclosure in order that the detailed description of the disclosure that follows may be better understood. Additional features and advantages of the disclosure will be described hereinafter which form the subject of the claims of the disclosure. It should
15 be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present disclosure. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the disclosure as set forth in the appended claims. The
20 novel features which are believed to be characteristic of the disclosure, both as to its organization and method of operation, together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however, that each of the figures is provided for the purpose of illustration and description only
25 and is not intended as a definition of the limits of the present disclosure.

The terms “comprises”, “comprising”, or any other variations thereof, are intended to cover a non-exclusive inclusion, such that an assembly, device or method that comprises a list of components or steps does not include only those components or
30 steps but may include other components or steps not expressly listed or inherent to such setup or device or method. In other words, one or more elements in a system or apparatus preceded by “comprises... a” does not, without more constraints, preclude the existence of other elements or additional elements in the system or apparatus.

35 Embodiments of the present disclosure disclose a pipe and coupler assembly made of polyvinyl chloride (PVC). The pipe and coupler assembly may be used in borewells for drawing the water or other fluids from source to a point of interest. Since, the pipe

5 and coupler of the assembly is made of the polyvinyl chloride material, the problems associated with the metallic pipes such as corrosion or rusting may be prevented. This significantly improves life of the pipe and coupler assembly, and also prevents any accidental breakage of the assembly during use. However, the pipe and coupler assembly made of polyvinyl chloride material may pose certain challenges such as
10 accidental dismantling of the pipe with coupler due to various forces such as torsion, axial, and undulations acting on the assembly. Also, the couplers made of polyvinyl chloride may break due to notching effect at a narrow groove region, because stress concentration acting in the narrow groove region. To reduce the stress concentration acting in the narrow groove region, the groove for accommodating the sealing ring is
15 widened. Widening of the groove may relieve the stresses acting in the groove region and may improve life of the pipe and coupler unit. However, widening of the groove may require bigger sealing ring to be used which may be challenging to accommodate in the given dimensions of the pipe and coupler, since it may pose issues such as compression. To compensate this, if a groove depth is increased either in pipe or
20 coupler, then the section may become weak which may again result in failure.

The pipe and coupler assembly of the present disclosure is also employed with a locking means such as wire lock, such that one end of the pipe is non-removably coupled to the coupler, and other end of the pipe can be coupled to an adjacent
25 coupler for forming a joint, thereby prevent dismantling of the assembly. In the present disclosure, the groove for accommodating a sealing in the coupler is widened and thereby the stress acting in the groove region may be relieved. Further, the widened groove may be fitted with a multi-lip sealing ring, which seals the complete portion of the groove, and provides easy compression. The multi-lip sealing ring may
30 provide multiple sealing effect between the pipe and coupler. Thereby ensuing, fluid seal of the pipe and coupler unit, and maintain structural rigidity.

In some embodiment, the locking means is a flexible member and may be of any configuration.

35

5 The following paragraphs describe the present disclosure with reference to Figures 1 to 9. In the figures the same element or elements which have the same functions are indicated by the same reference numerals.

Figure 1 is an exemplary embodiment of the present disclosure which illustrates a
10 sectional view of the pipe (101) and coupler assembly (100). The pipe (101) and coupler assembly (100) includes a pipe (101) manufactured of polyvinyl chloride material (PVC). The pipe (101) has a first end (101a) and a second end (101b), with a plurality of outer square shaped threads (102). The plurality of outer square shaped threads (102) are defined on an outer surface of the pipe (101) and may extend on at
15 least a portion of the pipe (101) from either ends (101a and 101b). In an embodiment of the disclosure, pitch of the plurality of outer square shaped threads (102) may be configured based on diameter of the pipe (101). The pipe (101) may be configured to be joined by a coupler (103) for attaching another pipe (101), and thereby forming a piping system. The pipe (101) is adapted such that the first end (101a) may be non-removably coupled to the coupler (103), and the second end (101b) may be receivable
20 by an adjacent coupler (103). The coupler (103) and the coupler assembly (100) may also be manufactured of the polyvinyl chloride material and may be used to connect two pipes (101) to form the joint. The coupler (103) includes a first coupling end (103a) and a second coupling end (103b) extending from either ends. The first
25 coupling end (103a) and a second coupling end (103b) may be divided by a flat portion (103c). The coupler (103) may be configured with a plurality of internal square shaped threads (104) in both the first coupling end (103a) and the second coupling end (103b). The plurality of internal square shaped threads (104) may extend in an inner surface of the coupler (103) up to the flat portion (103c). The plurality of
30 internal square shaped threads (104) are adapted to form meshing engagement with the plurality of the outer square shaped threads (102) on the pipe (101). The coupler (103) may comprise an annular rib (113) extending in the inner surface of the coupler (103) in the flat portion (103c).

35 Referring to Figure 2 in conjunction with Figure.1, the first end (101a) of the pipe (101) is non-removably coupled to the first coupling end (103a) of the coupler (103). The second coupling end (103b) of the coupler (103) may be adapted to receive the

5 second end (101b) of another pipe (101). As shown in Figure. 2, a locking mechanism is provided in the pipe and coupler assembly (100) for locking the first end (101a) of the pipe (101) with the first coupling end (103a). In an embodiment, the locking mechanism may prevent axial and rotational movement of the pipe (101) with respect to the coupler (103). The locking mechanism may include a locking means such as but
10 not limiting to wire lock (107) inserted in a first annular groove (105) formed between the first coupling end (103a) and the first end (101a) of the pipe (101). Figure. 2, depicts the first annular groove (105) which is partially in the coupler (103), and partially in the pipe (101). The first annular groove (105) is formed such that it extends in the coupler (103) and co-operates with the pipe (101) to form the complete
15 groove. Further, the coupler (103) also includes a tangential hole (106) extending from an outer surface to the inner surface. The tangential hole (106) may intersect with the first annular groove (105), such that the wire lock (107) may be inserted into the first annular groove (105) through the tangential hole (106). In an embodiment of the disclosure, a portion of groove in the coupler (103) is made longer with respect to
20 the groove in the pipe (101), to ensure the wire lock (107) does not share the axial load in the usage. In an embodiment of the disclosure, the wire lock (107) may be made of any flexible material. As an example, the material of the wire lock (107) may include polymeric material, metallic material, and composite material. The wire lock (107) may be inserted to the first annular groove (105) through the tangential hole
25 (106) using any suitable mechanism. During the process, the wire lock (107) resides in the first annular groove (105) and abuts a portion of the wire lock (107). Then, the wire lock (107) may be cut and folded in a slot (110) configured on the outer surface of the coupler (103). In an embodiment, the slot (110) may be formed by a machining process, and profiled to accommodate the wire lock (107). As an example, the slot
30 (110) may be formed by milling process. Folding of the wire lock (107) in the slot (110) acts as a lock for holding the first end (101a) of the pipe (101) in the coupler (103), and also acts as an enveloping circle of outer diameter of coupler (103). Figure 2 also shows a closure (115) around the slot (110). The closure may be provided to enclose the wire lock (107). The closure (115) may be removed to access the bent
35 portion of the wire lock (107). The bent portion of wire lock (107) may be straightened for pulling the wire lock (107) out of the first annular groove (105) for

5 dismantling the threaded joint.

In an embodiment of the disclosure, the first annular groove (105) may be formed at mouth region of threading in the first coupling end (103a) of the coupler (103) to accommodate the wire lock (107). The first end (101a) of the pipe (101) may be non-removably coupled to the coupler (103) in a factory and is locked with the wire lock (107) such that, there will not be any disturbance of removing this end while assembling/dismantling the complete piping system.

The coupler (103) includes a plurality of ribs (111) on the outer surface, and the plurality of ribs (111) acts as the holding supporters for the wrench during tightening or loosening operations. As there are two threaded joints in each coupler (103) [shown in Figure. 3], one end of the coupler (103) i.e. first coupling end (103a) of the coupler (103) may be non-removably fixed to the first end (101a) of the pipe (101). The inner surface of the coupler (103) includes a plurality of the internal square shaped threads (104) in both the first coupling end (103a) and the second coupling end (103b), and the two coupling ends are divided by a flat portion (103c). The flat portion (103c) may act as a space for accommodating a sealing member between the first coupling end (103a) and the first end (101a) of the pipe (101). The sealing member as known in the art, may be provided in the groove to act as fluid seal to prevent leakage. However, the provision of the groove may induce stress concentration in the coupler (103). To mitigate the problem associated with the groove, the groove in the coupler (103) i.e. second annular groove (108) as shown in Figure 3, is widened to relieve the stresses. The second annular groove (108) is defined in the flat portion (103c) of the coupler (103). The second annular groove (108) is defined with a substantially flat base portion (108a) with curved edges (108b). In an embodiment, the edges (108b) may be defined with a radius to relieve the stresses.

In an exemplary embodiment, the width of the second annular groove (108) is greater than pitch of the plurality of the inner square shaped threads (104). As an example, the width of the second annular groove (108) is at least two times of the pitch of the plurality of the inner square shaped threads (104) in the coupler (103).

As shown in Figure. 1, the second annular groove (108) accommodates the sealing

5 member, which acts as a fluid seal between the first coupling end (103a) and the first end (101a) of the pipe (101). In an embodiment, the second annular groove (108) may be provided in a flat portion (1013c) of the coupler (103) or may be provided in a first coupling end (103a) of the coupler (103). The sealing member employed in the second annular groove (108) is a first multi-lip sealing ring (109) as shown in Figures.

10 4A and 4B. The first multi-lip sealing ring (109) may be made of any material which acts as a seal between the pipe (101) and coupler (103). As an example, the first multi-lip sealing member may be made of a polymeric material. Referring to Figure. 5, the first multi-lip sealing ring (109) comprises a flat base portion (109a) on an outer surface and a plurality of inner projections (109b) projecting in an inner surface. Each

15 of the plurality of inner projections (109b) is divided by a cavity (109c). The first multi-lip sealing ring (109) may be positioned in the second annular groove (108) such that, the flat base portion (109a) rests in the second annular groove (108), and the plurality of inner projections (109b) protrude out from the second annular groove (108). When, the first end (101a) of the pipe (101) is threaded to the first coupling end

20 (103a), the plurality of inner projections (109b) may abut the surface of the pipe (101) in the first end (101a). Thereby forming the fluid seal. In an embodiment, the number of the inner projections (109b) may depend on the requirement of fluid sealing. The Figures. 4A and 4B illustrates the first multi-lip sealing ring (109) with two and three inner projections (109b) divided by cavities (109c). Such illustration is for the purpose

25 of understanding and the same should not be considered as limitation. Also, the inner projections (109b) extending from the flat surface (109a) are illustrated in the form of curved edges, and the same should not be considered as limitation. One may configure edges of the inner projections (109b) as tapered edges or any other configuration which serve the purpose. The configuration of the first multi-lip sealing ring (109)

30 ensures better sealing between the coupler (103) and the first end (101a) of the pipe (101), and thereby prevents any possible leakage of the fluid from the pipe (101) and coupler assembly (100). Also, the second annular groove (108) reduces stress concentration, and thereby notching effect may be avoided at the groove region. Thus, enhances life of the coupler (103). In an embodiment, lip portion of the multi-lip

35 sealing ring (109) extends from the flat base portion (109a) outwardly on the inner side of the multi-lip sealing ring (109). The lip portion may also be inferred to as a

5 seal member, as the lip portion of the multi-lip sealing ring performs the action of sealing, thereby preventing leakage.

Figure. 6 is an exemplary embodiment of the present disclosure which illustrates a sectional view of the second end (101b) of the pipe (101). The second end (101b) of the pipe (101) may be considered as a temporary end, which is receivable by the second coupling end (103b) of the coupler (103). The second end (101b) is coupled to the coupler (103) such that, the plurality of inner square shaped threads (104) in the second coupling end (103b) completely accommodates the outer square shaped threads (102) in the second end (101b) of the pipe (101). This stage starts at the mouth of the borewell where assembling/dismantling of the whole piping system takes place. Second end (101b) of the pipe (101) may be defined with a third annular groove (114) to accommodate the sealing member. In an embodiment, the third annular groove (114) may be provided at a bottom of the plurality of outer square shaped threads (102) [shown in figure 6]. The third annular groove (114) may be profiled to match with the sealing member. In an embodiment, the third annular groove (114) may include a substantially flat base portion (114a) with curved edges (114b). The sealing member may be accommodated in the third annular groove (114), and the sealing member is a second multi-lip sealing ring (112). The second multi-lip sealing ring (112) is adapted to abut the inner surface of the second coupling end (103b) to form the fluid seal between the second end (101b) of the pipe (101) and the second coupling end (103b) of the coupler (103). The second multi-lip sealing ring (112) may be provided in a portion of the second end (101b) adjoining the plurality of outer square-shaped threads (102). Referring to Figures. 7A and 7B, the second multi-lip sealing ring (112) comprises a flat base portion (112a) in an inner surface and a plurality of outward projections (112b) projecting on an outer surface, and each of the plurality of outward projections (112b) is divided by a cavity (112c). The second multi-lip sealing ring (112) may be positioned in the second annular groove (108) such that, the flat base portion (112a) rests in the third annular groove (114), and the plurality of outward projections (112b) protrude out from the third annular groove (114). When, the second end (101b) of the pipe (101) is threaded to the second coupling end (103b), the plurality of outward projections (112b) may abut the surface of the coupler (103) in the second coupling end (103b). Thereby, forming the fluid

5 seal. In an embodiment, the number of outward projections may depend on the requirement of the fluid sealing. The Figures 7A and 7B illustrates the second multi-lip sealing ring (112) with two and three projections divided by cavities. Such illustration is for the purpose of understanding and the same should not be considered as limitation. Also, the projections extending from the flat surface may have any
10 shape such as but not limiting to curved edges, tapered edges or any other configuration which serve the purpose.

Referring now to Figure 8, which is an exemplary embodiment of the disclosure illustrating a schematic view of the pipe (101) and coupler (103) assemblies fixed to a
15 submersible pump inside the borewell for drawing the water from source to the point of interest. For the installation in the site i.e. borewell, the pipe and coupler assembly (100) will be delivered with the first end (101a) of the pipe (101) and non-removably coupled to the first coupling end (103a). This fixing operation may be carried out in the factory. During the process of assembly (100), the submersible pump may be
20 coupled to one of the pipe (101) and coupler assembly (100) using a suitable connector [not shown]. Then, the user will thread the second end (101b) of the pipe (101) with the second coupling end (103b) of the coupler (103), then the process continues till the submersible pump reaches the source. Then, the piping system may be clamped at the top for holding it in place. For any maintenance purpose the user is
25 supposed to unthread only the temporary joint i.e. second end (101b) of the pipe (101) with the second coupling end (103b) which may be possible by holding the coupler (103) with a pipe wrench and unscrew the pipe (101) mating at a top portion. During this condition, a clamp may be used just below the coupler (103) to give support and grip the pipe and coupler assembly (100). This process is repeated during
30 disassembly of every pipe (101) joint to hold the coupler (103) positively with the pipe wrench, the provision has been given in the form of two external ribs (111) on the outer surface of the coupler (103).

It is to be noted that the use of the pipe and coupler assembly (100) in the borewell
35 application is an exemplary application of the pipe and coupler assembly (100) of the present disclosure. The assembly (100) may be used in any other applications including the ground applications to serve the purpose of fluid supply.

5

In an embodiment of the disclosure, the pipe and coupler assembly (100) manufactured of Polyvinyl Chloride are rigid, lightweight and user friendly.

10

In an embodiment of the disclosure, the pipe and coupler assembly (100) having square type threads will have high load holding capacity. Also, the configuration of annular grooves and multi-lip sealing rings ensures leak proof joint at high pump pressure.

15

Equivalents:

With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

20

It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as “open” terms (e.g., the term “including” should be interpreted as “including but not limited to,” the term “having” should be interpreted as “having at least,” the term “includes” should be interpreted as “includes but is not limited to,” etc.). It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases “at least one” and “one or more” to introduce claim recitations.

30

However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles “a” or “an” limits any particular claim containing such introduced claim recitation to inventions containing only one such recitation, even when the same claim includes the introductory phrases “one or more” or “at least one” and indefinite articles such as “a” or “an” (e.g., “a” and/or “an” should typically be interpreted to mean “at least one” or “one or more”); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly

35

5 recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean at least the recited number (e.g., the bare recitation of “two recitations,” without other modifiers, typically means at least two recitations, or two or more recitations). Furthermore, in those instances where a convention analogous to “at least one of A, B, and C, etc.” is used, in general such a construction is intended in
10 the sense one having skill in the art would understand the convention (e.g., “a system having at least one of A, B, and C” would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to “at least one of A, B, or C, etc.” is used, in general such a construction is
15 intended in the sense one having skill in the art would understand the convention (e.g., “a system having at least one of A, B, or C” would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or
20 more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase “A or B” will be understood to include the possibilities of “A” or “B” or “A and B.”

25 While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

30 Referral Numerals:

Reference Number	Description
100	Pipe and coupler assembly
101	Pipe
101a	First end of the pipe
101b	Second end of the pipe

102	Outer squire-shaped threads
103	Coupler
103a	First coupling end
103b	Second coupling end
103c	Flat portion
104	Inner square shaped threads
105	First annular groove
106	Tangential hole
107	Wire lock
108	Second annular groove
108a	Flat base portion
108b	Edges
109	First multi-lip sealing ring
109a	Flat base portion
109b	Plurality of inner projections
109c	Cavity
110	Slot
111	Ribs
112	Second multi-lip sealing ring
112a	Flat base portion
112b	Plurality of outward projections
112c	Cavity
113	Annular rib
114	Third annular groove
114a	Flat portion
114b	Curved edges
115	Closure

5 **Claims:**

1. A pipe and coupler assembly (100) made of polyvinyl chloride, the assembly (100) comprising:

10 a pipe (101) having a first end (101a), wherein at least a portion of an outer surface of the first end (101a) is provided with a plurality of outer threads (102);

 a coupler (103), comprising, a first coupling end (103a) and a second coupling end (103b) having a plurality of inner threads (104) in an inner surface, divided by a flat portion (103c), wherein, the first end (101a) of the pipe (101) is configured to be coupled to the first coupling end (103a);

15 a locking means (107) inserted in a first annular groove (105), formed between the first coupling end (103a) and the first end (101a) of the pipe (101), the locking means is configured to lock the first end (101a) of the pipe (101) with the first coupling end (103a);

characterized in that the assembly further comprising:

20 a second annular groove (108) defined in the flat portion (103c) of the coupler (103), wherein, the second annular groove (108) is defined with a substantially flat bottom portion (108a) with curved ends (108b); and

 a first multi-lip sealing ring (109) accommodated in the second groove (108) to form a fluid seal between the first end (101a) of the pipe (101) and the
25 first coupling end (103a) of the coupler (103).

2. The assembly (100) as claimed in claim 1, wherein the first multi-lip sealing ring (109) comprises a flat base portion (109a) on an outer surface and a plurality of inner projections (109b) projecting in an inner surface.

30 3. The assembly (100) as claimed in claim 2, wherein each of the plurality of inner projections (109b) is divided by a cavity (109c).

4. The assembly (100) as claimed in claim 2, wherein the plurality of inner
35 projections (109b) abuts the outer surface of the first end (101a) of the pipe (101).

5. The assembly (100) as claimed in claim 1, wherein a width of the second annular groove (108) is greater than pitch of the plurality of the inner square shaped

- 5 threads (104).
6. The assembly (100) as claimed in claim 5, wherein the width of the second annular groove (108) is at least two times of the pitch of the plurality of the inner square shaped threads (104).
- 10 7. The assembly (100) as claimed in claim 1, wherein the locking means (107) is a deformable member.
- 15 8. The assembly (100) as claimed in claim 7, wherein the locking means (107) is made of a metallic material or a polymeric material.
9. The assembly (100) as claimed in claim 1, wherein the locking means (107) is a wire lock.
- 20 10. The assembly (100) as claimed in claim 1, wherein the coupler (103) includes a slot (110) defined on the outer surface of adjoining the tangential hole (106) to fold the locking means (107) within an outer diameter of the coupler (103).
- 25 11. The assembly (100) as claimed in claim 1, comprises a plurality of ribs (111) on the outer surface of the coupler (103) to hold a pipe-wrench during assembling and dismantling of the coupler (103) and the pipe (101).
- 30 12. The assembly (100) as claimed in claim 1, wherein the second end (101b) of the pipe (101) is receivable by the second coupling end (103b) of an adjoining coupler (103) for joining two pipes (101).
13. The assembly (100) as claimed in claim 1 comprises a second multi-lip seal sealing ring (112) provided on the second end (101b) of the pipe (101).
- 35 14. The assembly (100) as claimed in claim 13, wherein the second multi-lip sealing ring (112) is adapted to abut the inner surface of the second coupling end (103b) to form a fluid seal between the second end (101b) of the pipe (101) and the second coupling end (103b) of the coupler (103).

- 5 15. The assembly (100) as claimed in claim 13, wherein the second multi-lip sealing
ring (112) is provided in a portion of the second end (101b) adjoining the
plurality of outer square-shaped threads (102).
- 10 16. The assembly (100) as claimed in claim 1, wherein the coupler (103) comprises
an annular rib (113) extending in the inner surface of the coupler (103) in the flat
portion (103c).
- 15 17. The assembly (100) as claimed in claim 1, wherein the plurality of outer threads
(102) and the plurality of inner threads (104) are square shaped threads.

15

20

25

30

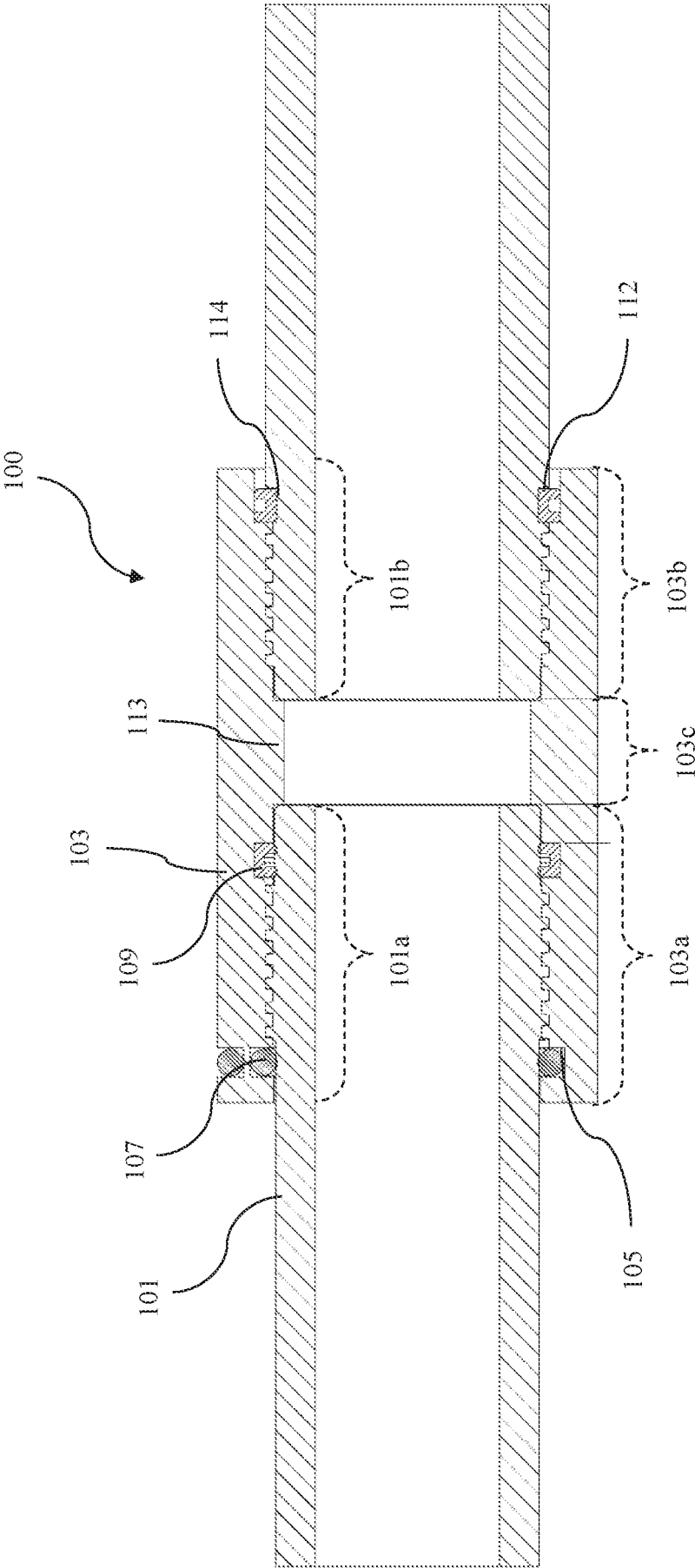


FIGURE.1

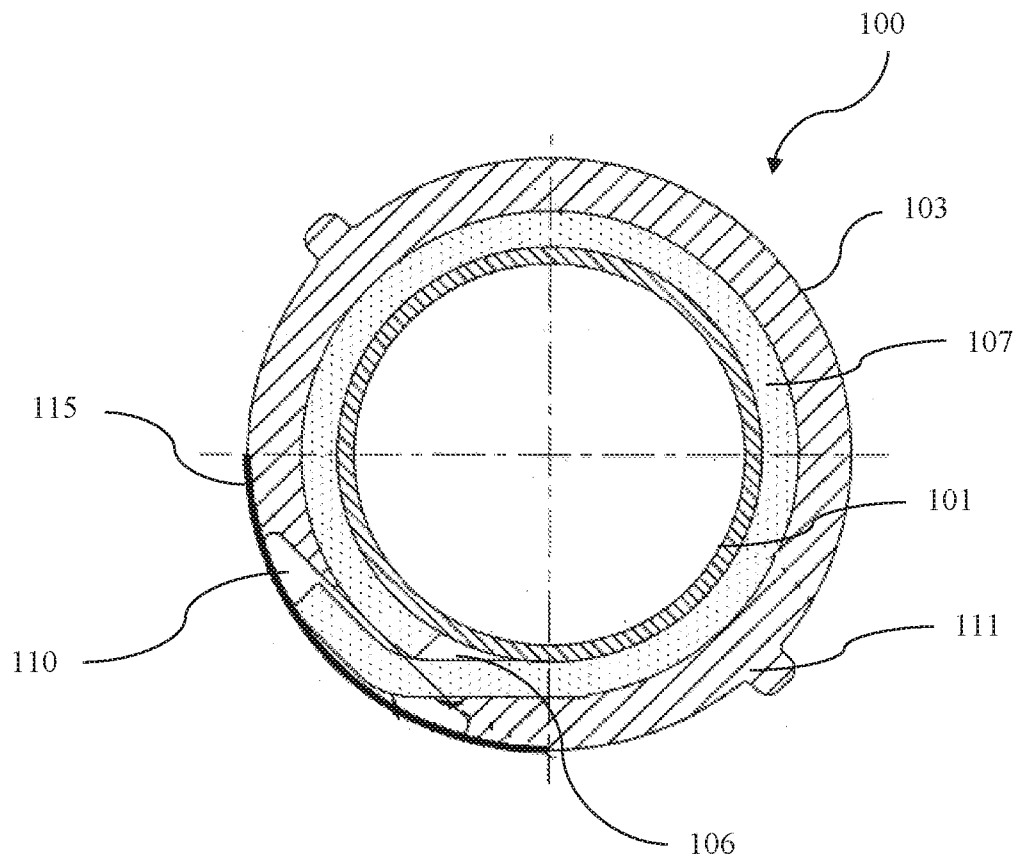


FIGURE 2

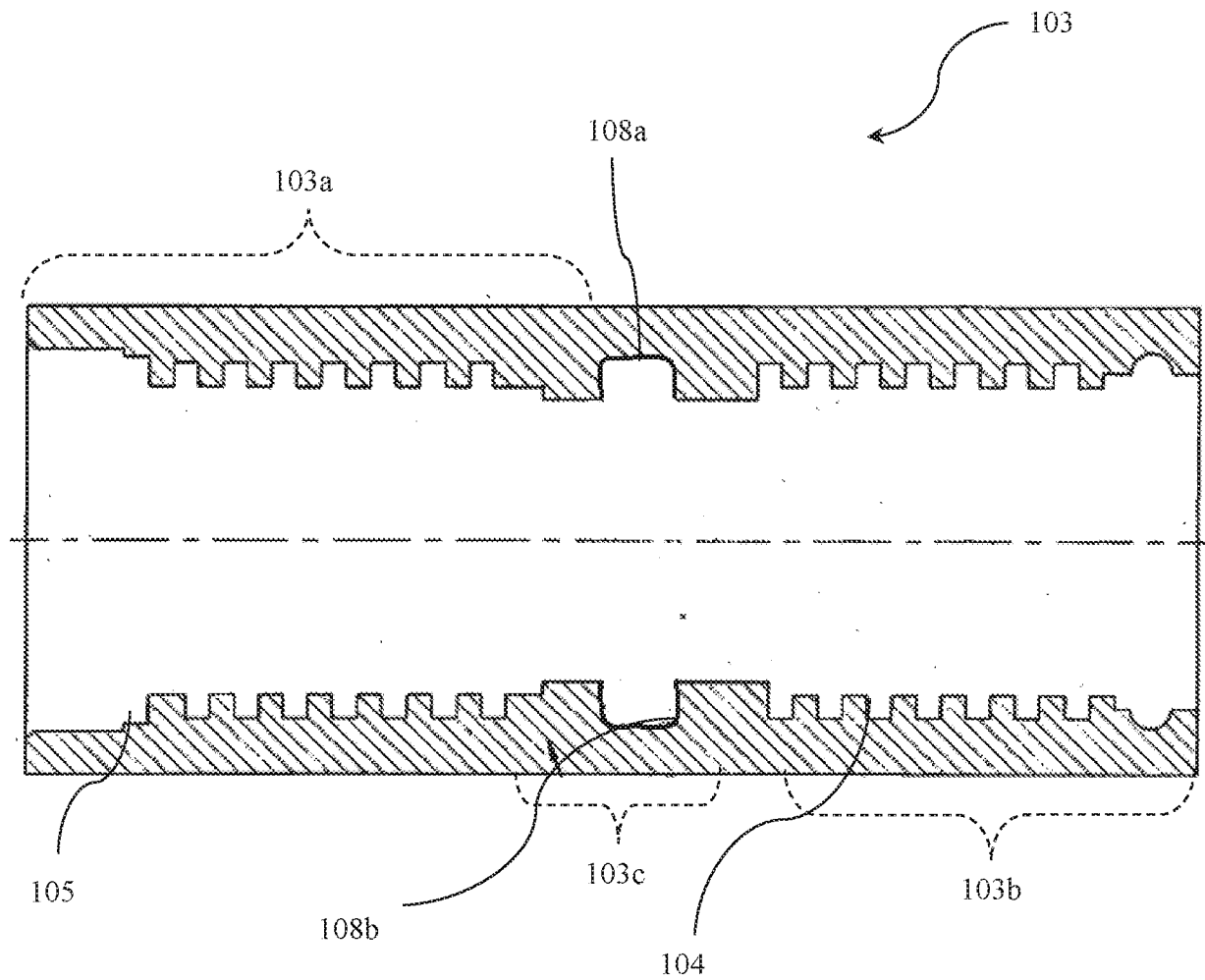


FIGURE 3

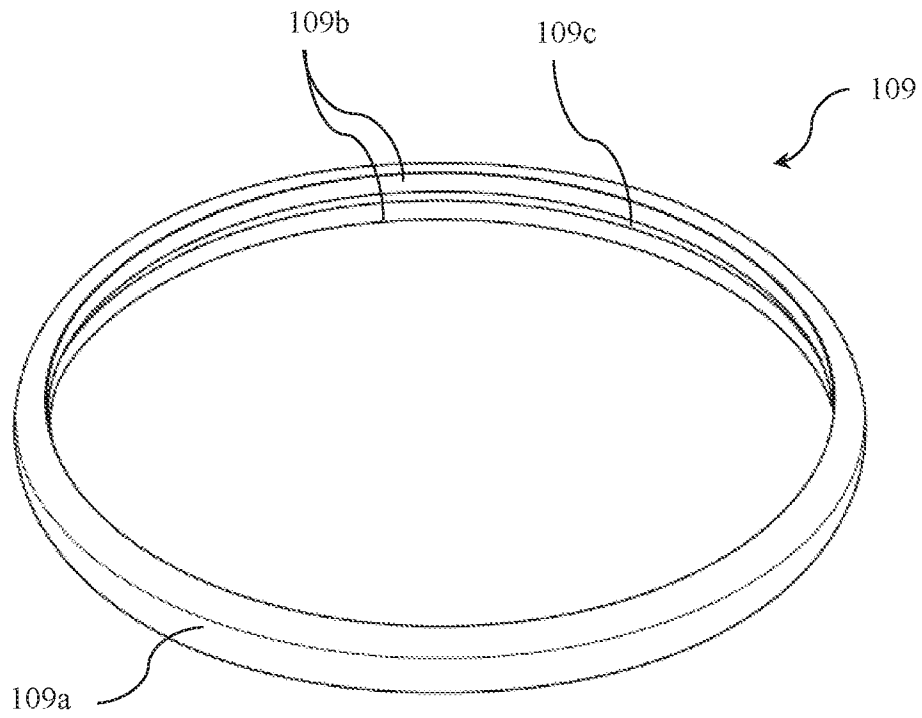


FIGURE 4A

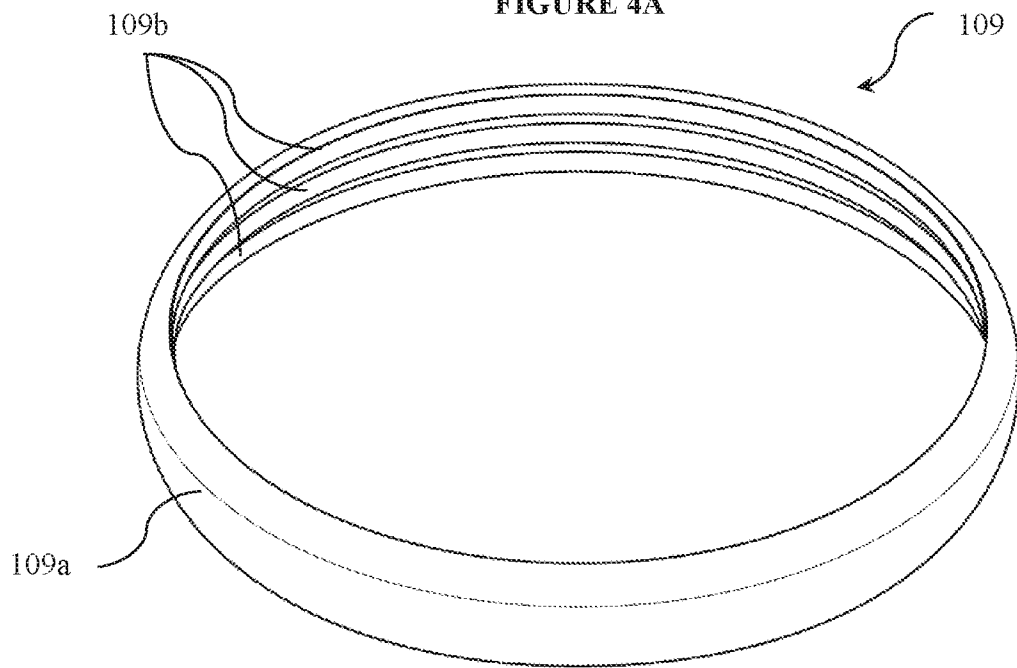


FIGURE 4B

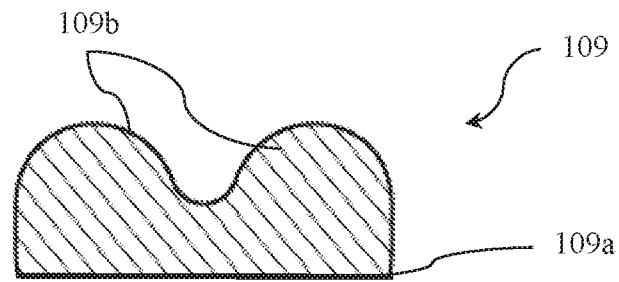


FIGURE 5

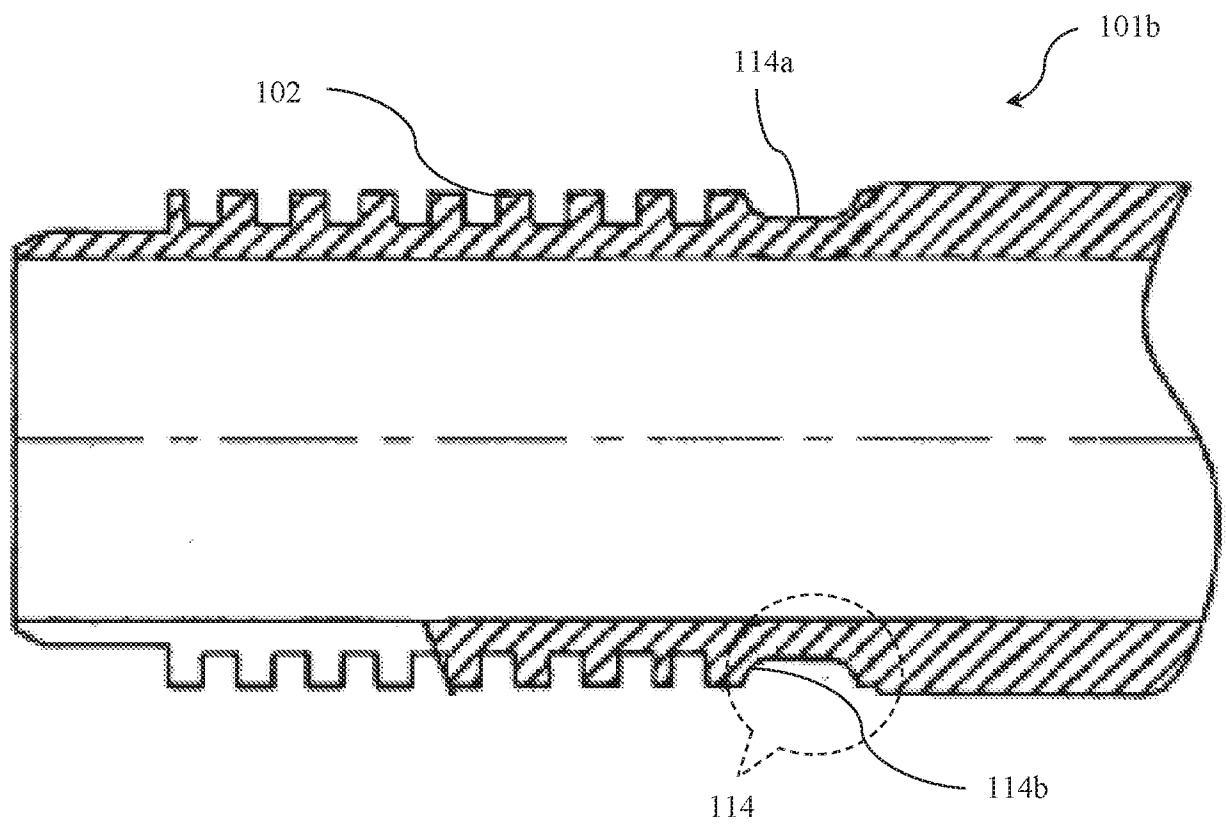


FIGURE 6

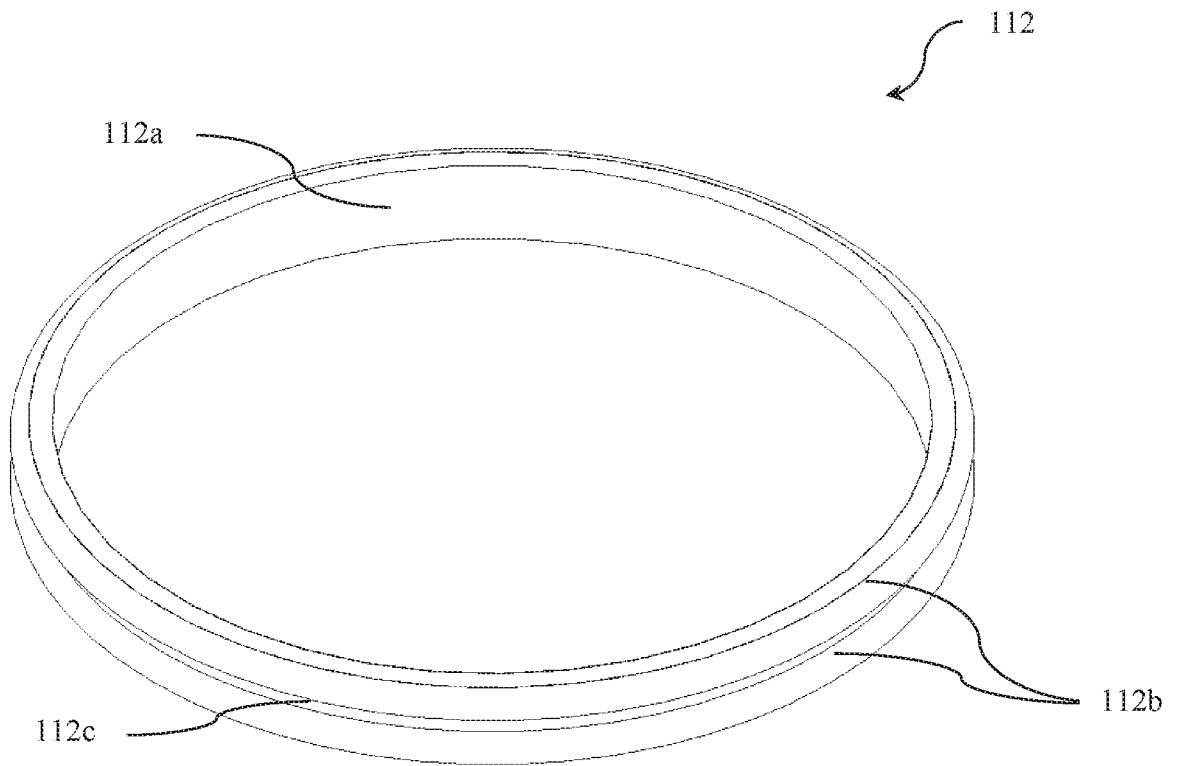


FIGURE 7A

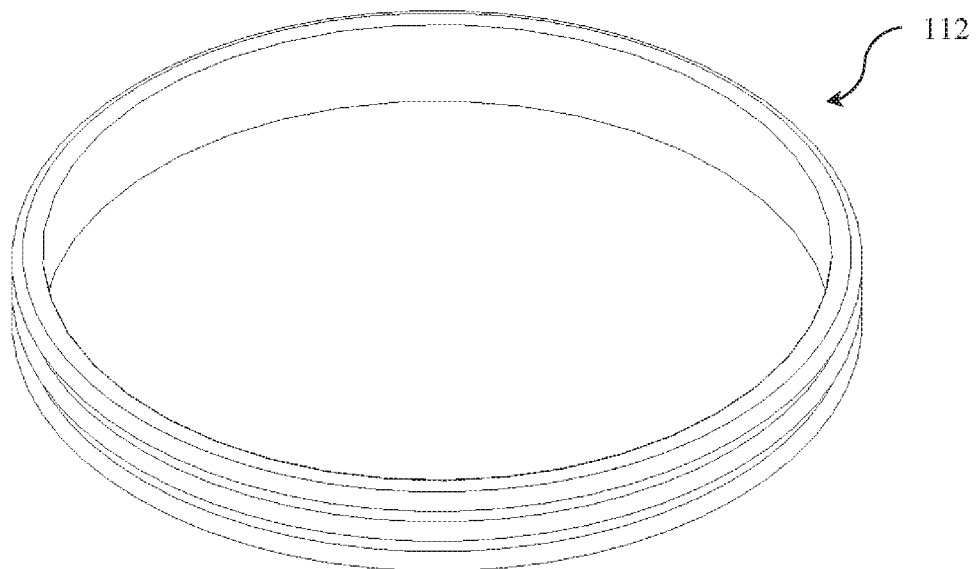


FIGURE 7B

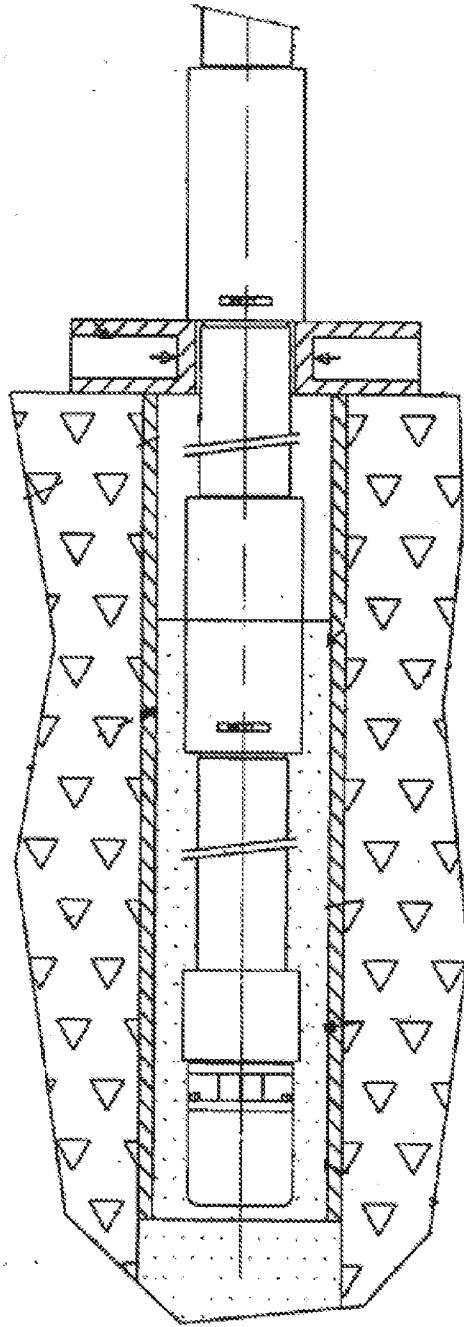


FIGURE 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2019/055752

A. CLASSIFICATION OF SUBJECT MATTER

INV. F16L15/08 F16L17/025 F16L37/14 F16L47/16
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2005/116511 A1 (ASHIRVAD PIPES PRIVATE LTD [IN]; PODDAR DEEPAK [IN]) 8 December 2005 (2005-12-08) abstract; figures pages 6-12	1-17
Y	----- WO 2016/174687 A1 (VECTUS IND LTD [IN]) 3 November 2016 (2016-11-03) abstract; figures paragraphs [0024] - [0052]	1-17
Y	----- WO 2012/090227 A2 (SHAND AJAY [IN]) 5 July 2012 (2012-07-05) abstract; figures paragraphs [0010], [0020] - [0043] ----- -/-	1-17

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

23 October 2019

Date of mailing of the international search report

04/11/2019

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Untermann, Nils

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2019/055752

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3 592 491 A (GLOVER JOHN BENJAMIN) 13 July 1971 (1971-07-13) abstract; figures column 2, lines 67,68 -----	1-17
Y	US 2005/001388 A1 (TRAVERS THIERRY [FR]) 6 January 2005 (2005-01-06) abstract; figures paragraph [0027] -----	1-17
Y	US 2006/125193 A1 (CORBETT BRADFORD G JR [US] ET AL) 15 June 2006 (2006-06-15) abstract; figures paragraphs [0005], [0030]; table 1 -----	1-17
Y	EP 0 622 577 A1 (THYSSEN POLYMER GMBH [DE]) 2 November 1994 (1994-11-02) abstract; figures columns 2,3 -----	1-17

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2019/055752

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005116511 A1	08-12-2005	AT 456765 T AU 2004320136 A1 BR PI0418897 A CN 1973161 A CY 1109982 T1 DK 1751463 T3 EP 1751463 A1 ES 2340165 T3 PT 1751463 E US 2008067808 A1 WO 2005116511 A1	15-02-2010 08-12-2005 27-11-2007 30-05-2007 10-09-2014 17-05-2010 14-02-2007 31-05-2010 23-04-2010 20-03-2008 08-12-2005
WO 2016174687 A1	03-11-2016	NONE	
WO 2012090227 A2	05-07-2012	AP 3966 A AU 2011350636 B2 CN 103403289 A EP 2659084 A2 ES 2623541 T3 PT 2659084 T US 2014035280 A1 WO 2012090227 A2	27-12-2016 03-11-2016 20-11-2013 06-11-2013 11-07-2017 15-03-2017 06-02-2014 05-07-2012
US 3592491 A	13-07-1971	NONE	
US 2005001388 A1	06-01-2005	AT 327464 T DE 602004000959 T2 EP 1493958 A1 ES 2265625 T3 FR 2857076 A1 PL 1493958 T3 US 2005001388 A1	15-06-2006 04-01-2007 05-01-2005 16-02-2007 07-01-2005 31-10-2006 06-01-2005
US 2006125193 A1	15-06-2006	US 2006125193 A1 WO 2007067414 A2	15-06-2006 14-06-2007
EP 0622577 A1	02-11-1994	CN 1095458 A CZ 282106 B6 DE 4313957 A1 EP 0622577 A1 HU 214405 B PL 173240 B1 SK 44294 A3	23-11-1994 14-05-1997 19-01-1995 02-11-1994 30-03-1998 27-02-1998 09-11-1994