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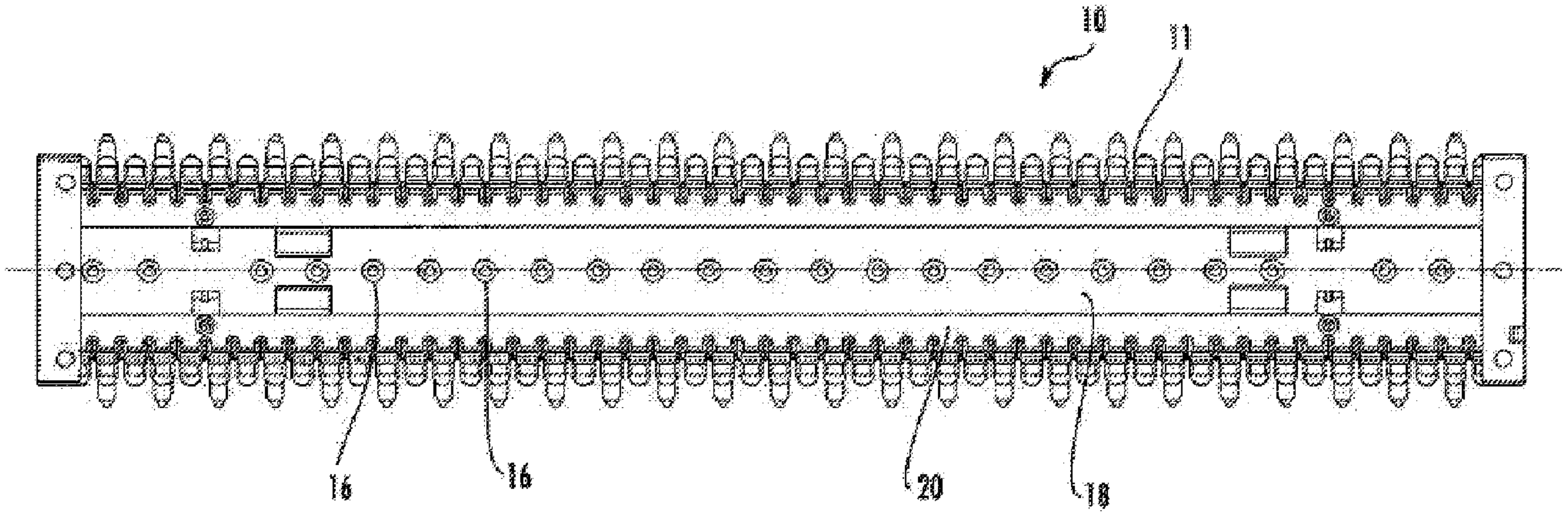

FIG. 1

(57) **Abrégé/Abstract:**

A connector assembly that includes an insulation displacement member including a hydrophobic organosilane mono-layer protective coating is disclosed. In one embodiment, the connector assembly may be manufactured by a method that includes assembling the connector assembly, contacting the connector assembly with an organosilane coating solution, and curing the organosilane coating solution. The connector assembly may be assembled by mechanically supporting the insulation displacement member with a connector framework. The connector assembly may be contacted with the organosilane coating solution by contacting at least the wire engaging portion of the insulation displacement member and at least a portion of the connector assembly with the organosilane coating solution.

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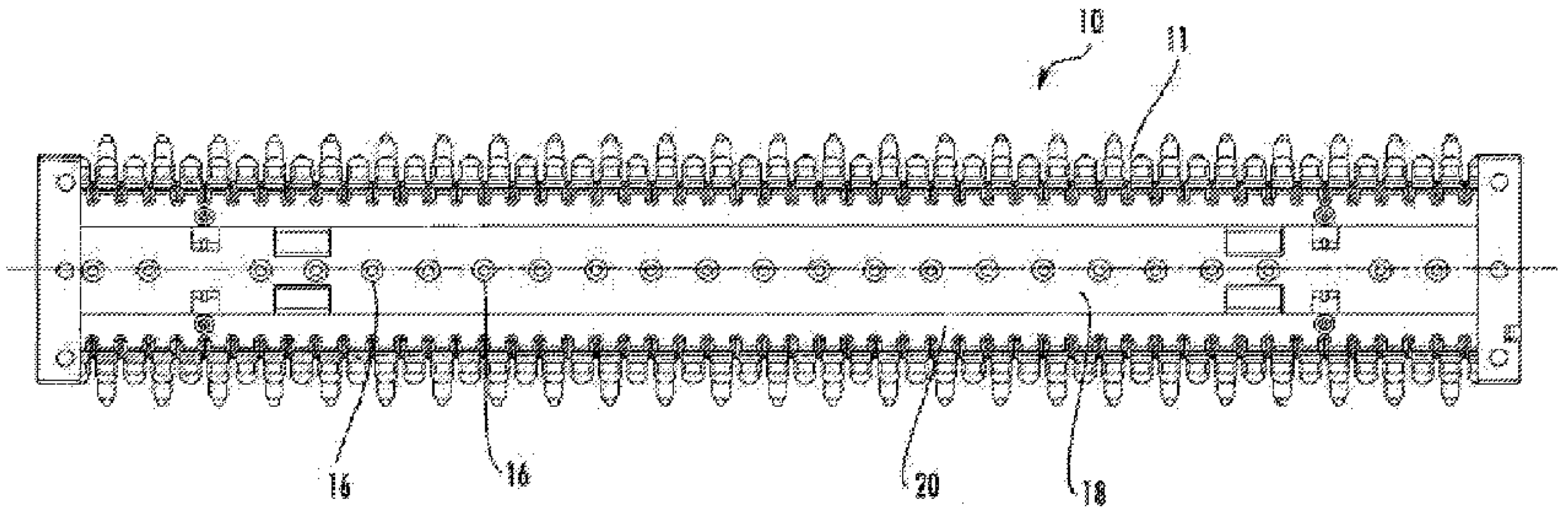

FIG. 1

(57) Abstract: A connector assembly that includes an insulation displacement member including a hydrophobic organosilane monolayer protective coating is disclosed. In one embodiment, the connector assembly may be manufactured by a method that includes assembling the connector assembly, contacting the connector assembly with an organosilane coating solution, and curing the organosilane coating solution. The connector assembly may be assembled by mechanically supporting the insulation displacement member with a connector framework. The connector assembly may be contacted with the organosilane coating solution by contacting at least the wire engaging portion of the insulation displacement member and at least a portion of the connector assembly with the organosilane coating solution.

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CONNECTOR ASSEMBLIES AND METHODS OF MANUFACTURE

RELATED APPLICATIONS

[0001] This application claims the benefit of priority under 35 U.S.C § 120 of U.S. Application No. 13/927,537 filed on June 26, 2013, the content of which is relied upon and incorporated herein by reference in its entirety.

BACKGROUND

Field

[0002] The subject matter of the present disclosure generally relates to electrical connectors comprising insulation displacement members.

Technical Background

[0003] Electrical circuits, and in particular telecommunications networks, make extensive use of electrical connectors, sometimes referred to herein as connector assemblies, to quickly and easily establish electrical connections with insulated electrical conductors, such as insulated wires. For example, electrical connections need to be established between a service provider, such as a telephone company or an internet service provider, and the subscriber. In telecommunications networks, electrical connectors are typically disposed within wire termination devices, such as line modules, protected terminal devices, and station protectors, and establish the necessary electrical connections throughout the network.

[0004] Some electrical connectors utilize insulation displacement type connectors, which contain an insulation displacement member that serves to break through the insulation of an electrical conductor. In these types of connectors, the insulation on the electrical conductor may not need to be removed prior to connection between the electrical conductor and the electrical connector. For example, an insulation displacement member may cut through the insulation of the insulated electrical conductor, such as an insulated wire, to establish electrical continuity between the insulation displacement member and the electrical conductor.

BRIEF SUMMARY

[0005] Insulation displacement members used in the above-described electrical connectors may be formed from materials that corrode or are otherwise damaged by environmental conditions over a period of time, especially if the electrical connector is utilized in an outdoor environment. For example, a copper insulation displacement member may corrode over time when exposed to moisture.

[0006] In accordance with one embodiment, a connector assembly may comprise a connector framework and at least one insulation displacement member. The connector framework may comprise an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire. The insulation displacement member may comprise a conductive wire engaging portion and may be mechanically supported by the connector framework to permit forcible engagement of the wire engaging portion with the insulated electrically conductive wire. The insulation displacement member may define an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly. At least the wire engaging portion of the insulation displacement member may be coated with a cured hydrophobic organosilane mono-layer protective coating such that may seals the insulation displacement member from environmental moisture or otherwise protect the insulation displacement member from damage.

[0007] In accordance with another embodiment, a method to manufacture a connector assembly comprising an insulation displacement member comprising a hydrophobic organosilane mono-layer protective coating is disclosed. The connector assembly may be manufactured by a method that includes assembling the connector assembly, contacting the connector assembly with an organosilane coating solution, and curing the organosilane coating solution. The connector assembly may be assembled by mechanically supporting the insulation displacement member with a connector framework. The connector framework may comprise an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire. The insulation displacement member may comprise a conductive wire engaging portion permitting forcible engagement of the wire engaging portion with the insulated electrically conductive wire when mechanically supported by the connector framework. The insulation displacement member may define an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly. The connector assembly may be contacted with the organosilane coating solution by contacting at least the wire engaging portion of the insulation displacement member and at least a portion of the connector assembly with the organosilane coating solution. The organosilane coating solution may be cured at a temperature of at least about 50°C.

[0008] In accordance with yet another embodiment, a method to manufacture a connector assembly comprising an insulation displacement member comprising a hydrophobic organosilane mono-layer protective coating is disclosed. The connector assembly may be manufactured by a method that includes contacting the insulation displacement member with an organosilane coating solution, curing the organosilane coating solution, and assembling the connector assembly. The insulation displacement member may be contacted with an organosilane coating solution contacting by contacting at least a wire engaging portion of the insulation displacement member with an organosilane coating solution. The organosilane coating solution may be cured at a temperature of at least about 50°C to form an insulation displacement member comprising a hydrophobic organosilane mono-layer protective coating. The connector assembly may be assembled by mechanically supporting the insulation displacement member comprising the hydrophobic organosilane mono-layer protective coating with a connector framework. The connector framework may comprise an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire. The insulation displacement member may comprise a conductive wire engaging portion permitting forcible engagement of the wire engaging portion with the insulated electrically conductive wire when mechanically supported by the connector framework. The insulation displacement member may be formed primarily of a material that is hydrophilic relative to a material of the connector framework and may define an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly.

[0009] Additional features and advantages of the technology disclosed herein will be set forth in the detailed description which follows, and in part will be readily apparent to those skilled in the art from that description or recognized by practicing the technology as described herein, including the detailed description which follows, the claims, as well as the appended drawings.

[0010] It is to be understood that both the foregoing general description and the following detailed description present embodiments of the technology, and are intended to provide an overview or framework for understanding the nature and character of the technology as it is claimed. The accompanying drawings are included to provide a further understanding of the technology, and are incorporated into and constitute a part of this specification. The drawings illustrate various embodiments and together with the description serve to explain the principles and operations of the technology. Additionally, the drawings and descriptions are meant to be merely illustrative, and are not intended to limit the scope of the claims in any manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The following detailed description of specific embodiments of the present disclosure can be best understood when read in conjunction with the following drawings, where like structure is indicated with like reference numerals and in which:

[0012] FIG. 1 schematically depicts a side view of a connector assembly, according to one or more embodiments disclosed herein;

[0013] FIG. 2 schematically depicts an enlarged side view of the connector assembly of FIG. 1, according to one or more embodiments disclosed herein.

DETAILED DESCRIPTION

[0014] Reference will now be made in greater detail to various embodiments, some embodiments of which are illustrated in the accompanying drawings. Whenever possible, the same reference numerals will be used throughout the drawings to refer to the same or similar parts. Generally, disclosed herein are various embodiments of connector assemblies and their methods of manufacture. A connector assembly may comprise a connector framework and at least one insulation displacement member. As described herein, at least a portion of the insulation displacement member may have a protective coating. In one embodiment, the protective coating is a cured hydrophobic organosilane mono-layer protective coating. The protective coating seals the insulation displacement member from environmental moisture or otherwise protects the insulation displacement member.

[0015] FIGS. 1 and 2 illustrate a connector assembly 10 comprising at least one insulation displacement member 12. For example, the connector assembly 10 may be representative of a number of different types of connector assemblies, such as, but not limited to, an interface connector (e.g., a UMOXS1A connector available from Corning Cable Systems LLC of Hickory, N.C., hereinafter "CCS"), a bridging connector (e.g., a UMOXS2A connector also available from CCS), or a multiplexing connector (e.g., a UMOXS5A connector also available from CCS). However, it should be appreciated that the connector assemblies described herein are not limited to the specific connector assemblies identified above, and as such, the protective coatings described herein may be suitable for other connector assembly designs. For example, the protective coatings described herein may be suitable for use on the connector assemblies described in U.S. Pat. No. 5,571,029, 6,299,475, 6,468,103, 7,168,992, and 7,540,759. The connector assembly 10 of FIGS. 1 and 2 comprises a connector framework 18 and at least one insulation displacement member 12 which, upon engagement with a conductor of an insulated electrical wire positioned in one of the insulated-wire passages 11 of the connector assembly 10, defines an electrically conductive path extending from the conductor and the wire engaging portion 14 of the displacement member to an electrical coupling node of the connector assembly 10.

[0016] The connector framework 18 may comprise at least one insulated-wire passage 11 that is sized and oriented to receive an insulated electrically conductive wire. In the embodiment shown in FIGS. 1 and 2, the connector framework 18 comprises a plurality of insulated-wire passages 11. In some embodiments, the connector framework 18 may be configured as a housing, and the insulation displacement members 12 may be partially or entirely disposed within the housing. In some embodiments, each insulated-wire passage 11 is coupled with two insulation displacement members 12. Generally, the connector framework 18 may be formed from an electrically non-conductive material, such as a plastic. In one embodiment, the connector framework 18 is formed from polycarbonate. In some embodiments, the connector framework 18 may comprise one or more openings 16 which lead to the interior of the connector framework 18, such as a cavity area below a portion 20 of the connector framework 18 which may house interior portions of the insulation displacement members 12.

[0017] As seen in FIG. 2, insulated-wire passage 11 includes two insulation displacement members 12 which each end at a top portion, referred to herein as the wire engaging portion 14. The wire engaging portion 14 of the insulation displacement member 12 is formed from a conductive material and, in a connected state, the tip of the wire engaging portion 14 displaces the insulation of the wire and makes direct contact with the electrical conductor of the wire with which it is engaged. The insulation displacement member 12 may be formed from a metal, and may be further plated with a metal. For example, in one embodiment, the insulation displacement member 12 is formed from copper and is plated with tin. In the embodiments described herein, at least the wire engaging portion 14 of the insulation displacement member 12 may be coated with a protective coating, such that it seals the insulation displacement member 12 from environmental moisture or otherwise protects the insulation displacement member 12 from damage.

[0018] Generally, the insulation displacement member 12 defines an electrically conductive path extending from the wire engaging portion 14 to an electrical coupling node of the connector assembly 10. As used herein, an "electrical coupling node" refers to any point where an electrical signal is made available for conductive transfer. The insulation displacement members 12 may be mechanically supported by the connector framework 18 to permit forcible engagement of the wire engaging portion 14 with insulated electrically conductive wire. For example, the insulation displacement members 12 may be supported such that they allow for the wire engaging portion 14 of the insulation displacement members 12 to pierce through the insulation of an insulated wire, thus making direct contact with the conductive portion of the wire.

[0019] The insulation displacement member 12 may be mechanically supported in a static or motive state. For example in a static state, the insulation displacement members 12 are supported such that an insulated wire may be pushed into at least one stationary insulation displacement member 12, such as to allow the wire engaging portion 14 of the insulation displacement member 12 to pierce through the insulation of the wire and make direct electrical contact with the conductor of the wire. In this embodiment, an operator may push the wire into the insulation displacement members 12 to pierce the insulation. In a motive state, the insulation displacement members 12 are supported such that a the wire engaging portion 14 of the insulation displacement member 12 may be engaged with a stationary insulated wire held in the connector framework 18, whereby the wire engaging portion 14 of the insulation displacement member 12 pierces through the insulation of the wire and makes direct electrical contact with the conductor of the wire. For example, in the motive embodiment, an operator may put an insulated wire into place and then clamp down at least one insulation displacement member 12 onto the insulated wire to pierce the insulation.

[0020] In the connector assemblies 10 described herein, at least the wire engaging portion 14 of the insulation displacement member 12 is coated with a protective coating. The protective coating may be applied as a coating solution and cured. The protective coatings described herein seal the coated section of the insulation displacement member 12 from environmental moisture or otherwise protect the insulation displacement member 12 from damage. It is contemplated, for example, that the protective coating may seal the coated portion of the insulation displacement member 12 from contaminants, such as water, dust, dirt, or other materials to which the connector assembly 10 may be exposed.

[0021] In one embodiment, the protective coating comprises a mono-layer coating. Mono-layer coatings, as described herein, includes coatings that comprise a single layer of atoms or molecules. For example, a mono-layer coating, such as the protective coatings described herein, may have a thickness of the length of a molecule of the coating, such as a thickness of less than or equal to about 100 nm. The small thickness of the protective coatings described herein allows for the connector assembly 10 to function without any bulk physical sealing material that may inhibit movement of the connector assembly 10 or insulated wire.

[0022] The mono-layer coating may comprise an organosilane chemical composition. Organosilane chemical compositions include chemical compounds derived from silanes that comprise one or more organic groups. For example, protective coating may comprise an alkylsilane, alkoxysilane, or both. Organosilanes may react with water to form silanol groups, such as when present in solution. As used herein, organosilanes include silanes that have silanol groups. In some embodiments, the protective coating may be hydrophobic. In such a hydrophobic protective coating, the organic group of the organosilane may be hydrophobic, such as to impart hydrophobic characteristics when applied as a mono-layer coating.

[0023] In one embodiment, the protective coating comprises an alkylsilane chemical composition that can form a mono-layer. For example, the protective coating may comprise octylsilane, nonylsilane, decylsilane, undecylsilane, dodecylsilane, tridecylsilane, tetradecylsilane, pentadecylsilane, hexadecylsilane, heptadecylsilane, octadecylsilane, nonadecylsilane, icosylsilane, heneicosylsilane, docosylsilane, tricosylsilane, etracosylsilane, pentacosylsilane, hexacosylsilane, heptacosylsilane, octacosylsilane, nonacosylsilane, triacontylsilane, hentriacontylsilane, dotriacontylsilane, tritriacontylsilane, tetratriacontylsilane, pentatriacontylsilane, hexatriacontylsilane, or combinations thereof. In one embodiment, the alkyl functionality of the alkylsilane comprises a carbon chain having a length of greater than or equal to 8 carbons and less than or equal to 36 carbons. In another embodiment, the alkyl functionality of the alkylsilane comprises a carbon chain having a length of greater than or equal to 12 carbons and less than or equal to 28 carbons. In yet another embodiment, the alkyl functionality of the alkylsilane comprises a carbon chain having a length of greater than or equal to 16 carbons and less than or equal to 24 carbons. In yet another embodiment, the alkyl functionality of the alkylsilane comprises a carbon chain having a length of 18 carbons. In one embodiment, the protective coating is formed from a commercially available octadecylsilane, Glassclad 18, available from United Chemical Technologies, Inc.

[0024] In another embodiment, the protective coating comprises an alkoxysilane chemical composition that can form a mono-layer. For example, the alkoxysilane may be a dimethylsilioxane monomer or oligomer. In one embodiment, the protective coating may comprise methyltrimethoxysilane as the reactive functional group and a silicone oligomer chain as the insulation layer. In one embodiment, the protective coating is formed from a commercially available methyltrimethoxysilane, PS233 Glassclad RC, available from United Chemical Technologies, Inc.

[0025] Generally, the protective coatings described herein may be applied to an insulation displacement member 12 by contacting at least a portion the insulation displacement member 12 with a coating solution and subsequently curing the coating solution present on the insulation displacement member 12. The coating solution comprises an organosilane that will be present in the protective coating on the insulation displacement member 12. The coating solution may optionally comprise a solvent with which the organosilane is mixed. For example, in one embodiment, 5 parts by weight of organosilane may be mixed with 100 parts by weight of de-ionized water. However, other solvents may be used and varying ratios of solvent to organosilane may be used.

[0026] The insulation displacement member 12 may be contacted with the organosilane coating solution in any a variety of processes, including, without limitation, submersion, misting, spraying, or any other like process. In an exemplary embodiment, the insulation displacement member 12 is submerged in the coating solution for about 1 to about 5 minutes. Ultrasonic vibration of the insulation displacement member 12 or agitation of the coating solution may be utilized.

[0027] Without being bound by theory, in an aqueous solution embodiment of the organosilane solution, it is believed that after dissolving the organosilane in water, the organosilane reacts with water to form a silanol-rich prepolymer. The silanol-rich prepolymer is able to condense with available hydroxyl groups on the substrate, the coated portion of the insulation displacement member 12. The condensation reaction allows the polymer to be grafted permanently onto the substrate and cover the substrate with a mono layer of organosilane. Furthermore, in some embodiments, the insulation displacement member 12 comprise copper plated with tin. In such an embodiment, without being bound by theory, it is believed that the surface of the insulation displacement member 12 is hydrophilic and has at least some moisture absorbed on its surface. This moisture may allow the organosilane to react with and bond to the insulation displacement member 12.

[0028] In one embodiment, prior to contacting the insulation displacement member 12 with the coating solution, the insulation displacement member 12 is cleaned. Such cleaning may be performed by contact with an acid, such as, but not limited to, isopropyl alcohol. The insulation displacement member 12 may be cleaned by being contacted with an acid in any a variety of processes, including, without limitation, submersion, misting, spraying, or any other like process. The insulation displacement member 12 is dipped and submerged in acid for about 60 seconds to about 30 minutes. In an exemplary embodiment, the insulation displacement member 12 is dipped and submerged in acid for about 10 minutes. Ultrasonic vibration of the insulation displacement member 12 or agitation of the coating solution may be utilized.

[0029] Once the organosilane coating solution has been applied to the insulation displacement member 12, the organosilane coating solution is cured. The organosilane coating solution may be cured at a temperature of at least about 50°C to form a connector assembly 10 comprising an insulation displacement member 12 comprising an organosilane mono-layer protective coating. In other embodiments, the organosilane coating solution may be cured at a temperature of at least about 60°C, at least about 70°C, at least about 80°C, at least about 90°C, at least about 100°C, or even at least about 105°C. The curing may be for a time period of several minutes, such as, for example, about 1 minute, about 3 minutes, about 5 minutes, or about 10 minutes. In one exemplary embodiment, the silane coating solution is cured for about 5 minutes at a temperature of about 105°C. However, appropriate curing times and temperatures may differ based on the coating solution used. Without being bound by theory, it is believed that the curing step drives off volatiles, such as water or other solvents, as well as chemically bonds the coating to the surface of the insulation displacement member 12.

[0030] In one embodiment, the protective coating may be applied to an insulation displacement member 12 in an assembled connector assembly 10. In such an embodiment, the insulation displacement member 12 is mechanically supported by the connector framework 18 while the insulation displacement member 12 is contacted with the coating solution. In such an embodiment, the connector assembly 10 is manufactured by a method comprising assembling the connector assembly 10 by mechanically supporting an insulation displacement member 12 with a connector framework 18, contacting at least the wire engaging portion 14 of the insulation displacement member 12 and at least a portion of the connector assembly 10 with an organosilane coating solution, and curing the organosilane coating solution, as described above, to form a connector assembly 10 comprising an insulation displacement member 12 comprising a hydrophobic organosilane mono-layer protective coating. In such an embodiment, the insulation displacement member 12 may be contacted with the organosilane coating solution by submerging the connector assembly 10 comprising the insulation displacement member 12 and connector framework 18 in the organosilane coating solution. If cleaning is desired prior to coating, the assembled connector assembly 10 may be submerged in acid prior to coating.

[0031] In one embodiment, such as shown in FIGS. 1 and 2, the connector framework 18 forms a housing, wherein the insulation displacement member 12 is at least partially housed inside of the connector framework 18 and the connector framework 18 comprises an opening 16 that allows the coating solution to flow into the interior of the housing. This allows portions of the insulation displacement member 12 that are inside of the housing to be coated while in an assembled state.

[0032] In some embodiments, the respective compositions of the organosilane coating solution and the connector framework 18 are such that the connector framework 10 does not comprise the hydrophobic organosilane mono-layer protective coating upon curing. For example, in exemplary embodiments, the insulation displacement member 12 may be formed primarily of a material that may be hydrophilic relative to a material of the connector framework 18. For example, insulation displacement member 12 may be formed primarily of a metal material and the connector framework 18 may be formed primarily of polycarbonate. This allows the organosilane coating solution to only stick to the hydrophilic insulation displacement member 12, and not to the connector framework 18. In such an embodiment, since the entire connector assembly 10 is assembled prior to coating, only the exposed portion of insulation displacement member 12 may be completely coated and an unexposed portion of the insulation displacement member 12 may not be coated. For example, areas of the insulation displacement member 12 that are covered by the connector framework 18 will not be coated since they are not exposed to the coating solution.

[0033] In another embodiment, the protective coating may be applied to an unassembled insulation displacement member 12. In such an embodiment, following the application of the protective coating to the insulation displacement member 12 (in an unassembled state), the insulation displacement member 12 is assembled with the connector framework 18 by mechanically supporting the insulation displacement member 12 with the connector framework 18. In such an embodiment, the connector assembly 10 is manufactured by a method comprising contacting at least the wire engaging portion 14 of an insulation displacement member 12 with an organosilane coating solution, curing the organosilane coating solution, as described herein, to form an insulation displacement member 12 comprising a hydrophobic organosilane mono-layer protective coating, and assembling the connector assembly 10 by mechanically supporting the insulation displacement member 12 comprising the hydrophobic organosilane mono-layer protective coating with a connector framework 18. In such an embodiment, the insulation displacement member 12 may be contacted with the organosilane coating solution by submerging the insulation displacement member 12 in the organosilane coating solution. In such an embodiment, since the insulation displacement member 12 is coated prior to its assembly with the connector framework 18, the insulation displacement member 12 may be coated on all surfaces. If cleaning is desired prior to coating, the insulation displacement member 12, in an unassembled state, may be submerged in acid prior to coating.

[0034] It should now be understood that the connector assemblies 10 disclosed herein have insulation displacement members 12 that are at least partially environmentally sealed from moisture and other material that may damage the insulation displacement member. Furthermore, the connector assemblies 10 described herein, in various embodiments, may have the features of enhanced scratch protection of the coated portions of the insulation displacement members 12, good environmental aging characteristics, especially as compared with some gel sealants, and a lack of an oily, adherent residue on the surfaces of the connector assemblies 10, especially as compared with some gel sealants. Furthermore, in various embodiments described herein, these connector assemblies 10 may be suitable for indoor and outdoor use.

[0035] For the purposes of describing and defining the present disclosure it is noted that the term “about” is utilized herein to represent the inherent degree of uncertainty that may be attributed to any quantitative comparison, value, measurement, or other representation. The term “about” is also utilized herein to represent the degree by which a quantitative representation may vary from a stated reference without resulting in a change in the basic function of the subject matter at issue.

[0036] It is noted that one or more of the following claims utilize the term "wherein" as a transitional phrase. For the purposes of defining the present technology, it is noted that this term is introduced in the claims as an open-ended transitional phrase that is used to introduce a recitation of a series of characteristics of the structure and should be interpreted in like manner as the more commonly used open-ended preamble term "comprising."

[0037] It should be understood that any two quantitative values assigned to a property may constitute a range of that property, and all combinations of ranges formed from all stated quantitative values of a given property are contemplated herein.

[0038] Having described the subject matter of the present disclosure in detail and by reference to specific embodiments thereof, it is noted that the various details disclosed herein should not be taken to imply that these details relate to elements that are essential components of the various embodiments described herein, even in cases where a particular element is illustrated in each of the drawings that accompany the present description. Rather, the claims appended hereto should be taken as the sole representation of the breadth of the present disclosure and the corresponding scope of the various embodiments described herein. Further, it will be apparent that modifications and variations are possible without departing from the scope of the appended claims.

CLAIMS

What is claimed is:

1. A method for manufacturing a connector assembly, the method comprising:

assembling the connector assembly by mechanically supporting an insulation displacement member with a connector framework such that the connector framework comprises an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire, the insulation displacement member comprising a conductive wire engaging portion permitting forcible engagement of the wire engaging portion with the insulated electrically conductive wire when mechanically supported by the connector framework, the insulation displacement member formed primarily of a material that is hydrophilic relative to a material of the connector framework and defining an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly;

contacting at least the wire engaging portion of the insulation displacement member and at least a portion of the connector assembly with an organosilane coating solution; and

curing the organosilane coating solution at a temperature of at least about 50°C to form the connector assembly comprising an insulation displacement member comprising a hydrophobic organosilane mono-layer protective coating.

2. The method of claim 1, wherein the protective coating comprises an alkylsilane, an alkoxysilane, or both.

3. The method of either of claims 1 and 2, wherein prior to contacting the insulation displacement member with the organosilane coating solution the insulation displacement member is cleaned by contacting with an acid.

4. The method of any of claims 1-3, wherein the insulation displacement member is contacted with the organosilane coating solution by submerging the connector assembly comprising the insulation displacement member and the connector framework in the organosilane coating solution.

5. The method of claim 1, wherein the respective compositions of the organosilane coating solution and the connector framework are such that the connector framework does not comprise the hydrophobic organosilane mono-layer protective coating upon curing.

6. The method of any of claims 1-5, wherein the insulation displacement member is formed primarily of a metal material and the connector framework is formed primarily of polycarbonate.

7. A method for manufacturing a connector assembly, the method comprising:

contacting at least a wire engaging portion of an insulation displacement member with an organosilane coating solution;

curing the organosilane coating solution at a temperature of at least about 50°C to form an insulation displacement member comprising a hydrophobic organosilane mono-layer protective coating; and assembling the connector assembly by mechanically supporting the insulation displacement member comprising the hydrophobic organosilane mono-layer protective coating with a connector framework such that the connector framework comprises an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire, the insulation displacement member comprises a conductive wire engaging portion permitting forcible engagement of the wire engaging portion with the insulated electrically conductive wire when mechanically supported by the connector framework, and the insulation displacement member defines an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly.

8. The method of claim 7, wherein the protective coating comprises an alkylsilane, alkoxysilane, or both.

9. The method of either of claims 7 and 8, wherein prior to contacting the insulation displacement member with the organosilane coating solution the insulation displacement member is cleaned by contacting with an acid.

10. The method of any of claim 7-9, wherein the insulation displacement member is contacted with the organosilane coating solution by submerging the insulation displacement member in the organosilane coating solution.

11. A connector assembly comprising a connector framework and at least one insulation displacement member, wherein:

the connector framework comprises an insulated-wire passage that is sized and oriented to receive an insulated electrically conductive wire;

the insulation displacement member comprises a conductive wire engaging portion and is mechanically supported by the connector framework to permit forcible engagement of the wire engaging portion with the insulated electrically conductive wire, the insulation displacement member defining an electrically conductive path extending from the wire engaging portion to an electrical coupling node of the connector assembly;

at least the wire engaging portion of the insulation displacement member is coated with a cured hydrophobic organosilane mono-layer protective coating such that it seals the insulation displacement member from environmental moisture or otherwise protects the insulation displacement member from damage.

12. The connector assembly of claim 11, wherein the protective coating comprises an alkylsilane.

13. The connector assembly of claim 12, wherein an alkyl functionality of the alkylsilane comprises a carbon chain having a length of greater than or equal to 8 carbons and less than or equal to 36 carbons.

14. The connector assembly of claim 11, wherein the protective coating comprises an alkoxysilane

15. The connector assembly of any of claims 11-14, wherein the insulation displacement member is mechanically supported in a static or motive state.

16. The connector assembly of any of claims 11-15, wherein the connector framework is not electrically conductive.

17. The connector assembly of any of claims 11-16, wherein the connector framework comprises polycarbonate.

18. The connector assembly of any of claims 11-17, wherein the connector framework is configured as a housing and the insulation displacement member is partially or entirely disposed within the housing.

19. The connector assembly of any of claims 11-18, wherein only an exposed portion of insulation displacement member is completely coated and an unexposed portion of the insulation displacement member is not coated.

20. The connector assembly of any of claims 11-18, wherein the insulation displacement member is coated on all surfaces.

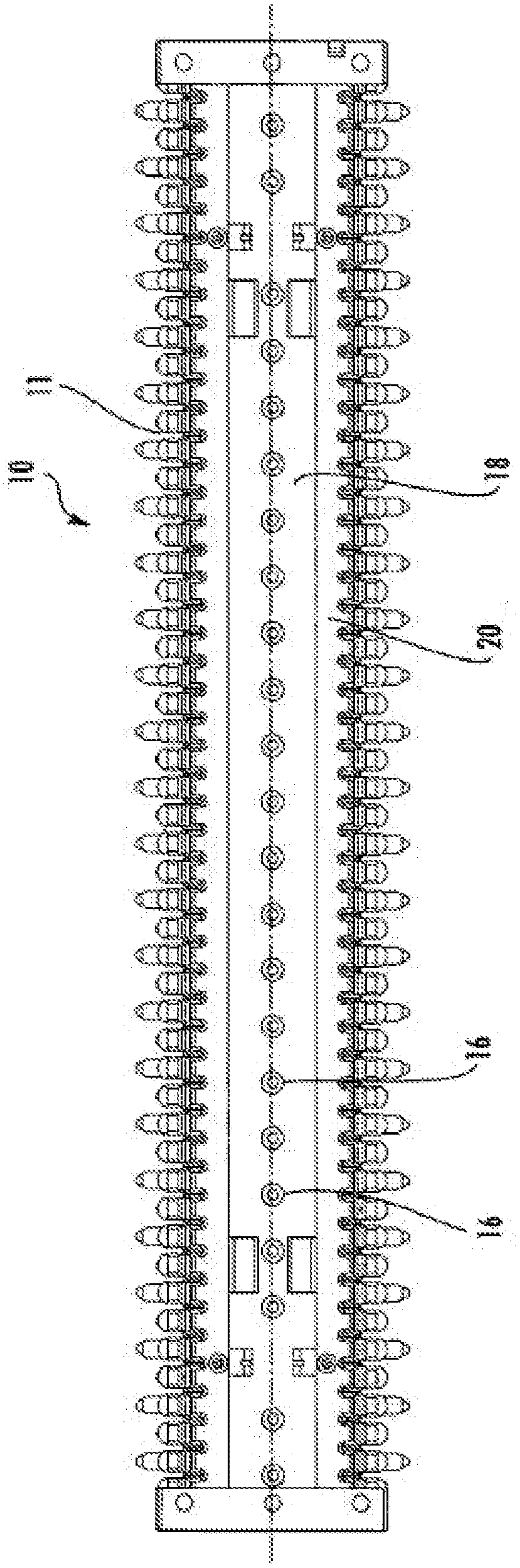

FIG. 1

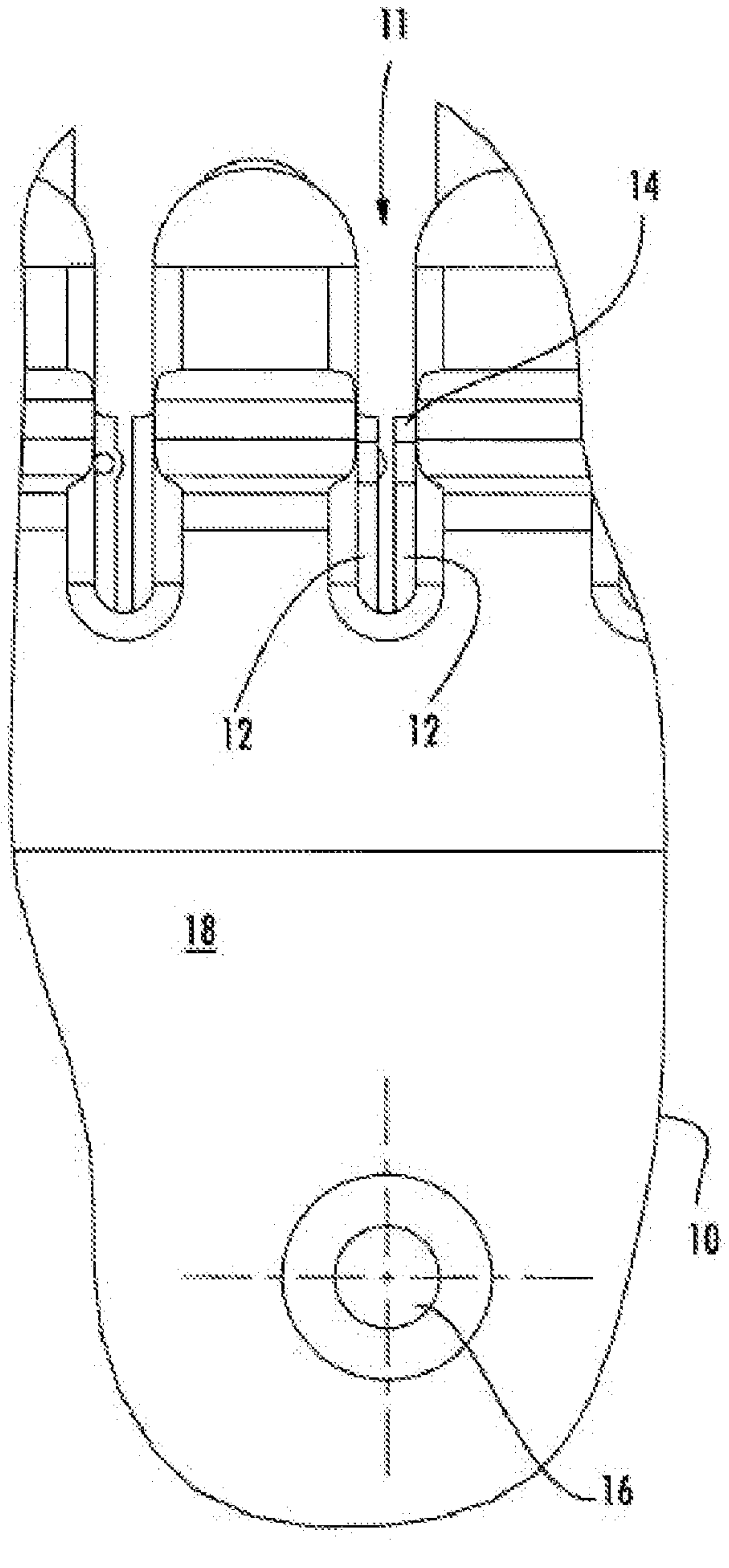

FIG. 2

FIG. 1