(54) Title: CONNECTOR FOR A HYDRAULIC PRESSURE HOSE

The invention relates to a connector for a hydraulic pressure hose, said connector comprising a body (7) which includes a first sleeve member (8), to be fitted inside the end of a hydraulic pressure hose, as well as a connecting member (11). The connecting member (11) preferably includes a gripping means (12) for a tool and a fastening means (13), such as a threaded portion, for coupling the connector with a hydraulic system. In addition, the connecting member (11) includes a second sleeve member (9) mounted outside the end of a hose in line with said first sleeve member (8), said sleeve members (8, 9) being adapted, upon mounting the connector on a hydraulic pressure hose, to squeeze towards each other and to clamp the end of hydraulic pressure hose therebetween. At least a part of at least one of the sleeve members (8, 9) is electrically insulated from body (7).

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Connector for a hydraulic pressure hose

The present invention relates to a connector for a hydraulic pressure hose. The connector comprises a body, provided with a first sleeve member to be fitted inside the end of a hydraulic pressure hose, and a connecting member which preferably includes a fixing means for a working tool and a fastening means, such as a threaded portion, for fastening the connector to a hydraulic system, as well as a second sleeve member to be fitted outside the end of a hydraulic pressure hose face to face with the first sleeve member, said first and second sleeve members being adapted, upon mounting the connector on a hydraulic pressure hose, to squeeze towards each other and to clamp the end of a hydraulic pressure hose therebetween.

This type of connectors are prior known and particularly used in hydraulics. The modern hydraulic systems not only include more and more actuators but also a lot of controls. Electrical control, e.g. in terms of valves, pumps and hydraulic motors, is highly complicated and susceptible to trouble in modern systems.

An object of this invention is to introduce such a connector for a hydraulic pressure hose, which is to a substantial degree capable of eliminating the present drawbacks and, thus, of improving the prior art. In order to achieve this object, a connector of the invention is primarily characterized in that at least a part of at least one of the sleeve members of the connector is electrically insulated from the body.

The above solution is capable of providing a simple-design hydraulic pressure hose connector provided at
the same time with one or more possibilities for electric connection providing that the question is about a hydraulic pressure hose which is fitted with one or more conductors with which one or more sleeve sections included in the sleeve member are in electrical contact when the connector is mounted on the end of a hydraulic pressure hose. Thus, the hydraulic pressure hose can be employed, on the one hand, as a hydraulic medium carrier hose and, on the other hand, e.g. for the control of actuators in the transmission of electric messages.

The invention relates also to a hydraulic pressure hose for use in association with the connector, the substantial characterizing features of said hose being set forth in the characterizing section of the independent claim directed to a hydraulic pressure hose.

The invention will now be described in more detail in the following specification with reference made to an exemplary embodiment shown in the accompanying drawings. In the drawings

fig. 1 shows a perspective view of a connector of the invention mounted on a hydraulic pressure hose,

fig. 2 shows a connector in a longitudinal section prior to mounting, and

fig. 3 shows a connector mounted on the end of a hydraulic pressure hose also in a longitudinal section.

Refererring particularly to fig. 1, a connector 1 of the invention is mounted on a hydraulic pressure hose 2.

The outer surface of connector 1 is fitted with an elec-
tric coupling means 3 with an electric wire 4 extending therefrom. The electric coupling means 3 is a shaped piece assembled with a screw 5 to a ring shape. Screw 5 is located between brackets 6 in the electric coupling piece.

Fig. 2, in particular, illustrates the main components of a connector of the invention. Connector 1 has a body 7 which includes as its main components a first sleeve member 8 and a connecting member 11. The first sleeve member 8 is fitted inside a hydraulic pressure hose when installing the connector on a hydraulic pressure hose. The body 7 further includes a fastening means 10 for a second sleeve member 9, said fastening means extending from the end of a hydraulic pressure hose as an integral part of sleeve member 8. The fastening means 10 is followed by connecting member 11 for said body 7, said connecting member including a fixing or gripping means 12 for a tool, e.g. a nut member intended for an adjustable wrench, as well as a fastening means as an extension thereof, such as a threaded portion 13 for coupling the connector to a hydraulic system.

The second sleeve member 9, in turn, includes a first sleeve section 14, a second sleeve section 14, and an insulation member 16 therebetween. The above-mentioned components 14-16 are mounted on the outside of the machined end of a hydraulic pressure hose surrounding said end of hydraulic pressure hose 2.

In the illustrated embodiment, the body 7 and the second sleeve member 9 are coupled together by using on the one hand a fastening means 10, provided with an outwardly-directed jutting annular collar 17 extending
from the end of hydraulic pressure hose 2 mounted on top of sleeve member 8 and extending into said sleeve member as well as with an annular groove 18 positioned between said annular collar 17 and gripping means 12. Accordingly, the first sleeve section 14 includes as counter-fastening means an internal groove 19 in line with annular collar 17 and an inwardly-directed annular collar 20 in line with annular groove 18. The components of said second sleeve member 9 are dimensioned in a manner that, when machined at its end for mounting, the hydraulic pressure hose can be inserted in a cylindrical annular space formed by the outer surface of first sleeve member 8 and the inner surface of second sleeve member 9. The sleeve sections 14, 15 of said second sleeve member 9 carry on their internal surface cross-sectionally preferably triangular, inwardly-directed annular collars 21 at fixed spacings, in this case two in each sleeve section 14, 15. On the other hand, the first sleeve member 8 is provided on its external surface and also at fixed spacings with a plurality (four) of grooves 22 which are linked with each other through the intermediary of equidiameter necks 23. The external surface of necks 23 is parallel to the centre axis 24 of first sleeve member 8.

Between first and second sleeve sections 14, 15 is fitted an insulation member 16. The insulation member 16 is fixed in annular grooves 27 formed on the opposing frontal surfaces 25, 26 of sleeve sections 14, 15 (in the present embodiment one annular groove 27 in each frontal surface 25, 26), said grooves being substantially of equal size and shape. The insulation member 16 is annular in configuration and includes annular collars 28, extending in both directions from
its radial side faces and set in said annular grooves 27 made in first and second sleeve sections 14, 15. As particularly shown in fig. 2, the insulation member 16, which is preferably made of ebonite material and thus has a resilient structure, is designed in a manner that the cross-sectional area of annular collars 28 in a rest condition (prior to the mounting of a connector) is smaller than that of annular grooves 27, whereby the resilient insulation member 16 yields as said second sleeve member 9 is pressed against the external surface of hydraulic pressure hose 2. Thus, the annular collars 28 of insulation member 16 fill the annular grooves, as shown in fig. 3. The annular grooves 2 can preferably be designed as a dovetail shape expanding towards the bottom.

In the embodiment shown in figs. 2 and 3, a hydraulic pressure hose 2 of the invention includes as its innermost component an inner rubber layer 29. Outside that is a first conductor layer 30. Outside the first conductor layer 30 is in turn an intermediate insulation layer 31 with a second conductor layer 32 on its outer surface. The outermost component in a hydraulic pressure hose is an outer layer 33. The materials for layers 29, 31 and 33 can be e.g. rubber or ebonite. As illustrated in figs. 2 and 3, the hydraulic pressure hose has its end machined in a manner that, at said first sleeve section 14, the material is removed up to intermediate insulation layer 31 and, at said second sleeve section 15, there is no material removed at all or material is removed up to second conductor layer 32.

Starting from the situation shown in fig. 2 and effecting a conventional press clamping of the hydraulic pressure hose connector e.g. by means of a device disclosed
in GB Patent 2 003 776, which device, especially its jaw assembly, can be subjected to necessary structural modifications required particularly by the insulation member, the result will be a situation as shown in fig. 3, wherein the first layer 29 of a hydraulic pressure hose is pressed in grooves 22 of the first sleeve member and the annular collars 21 of first sleeve section 14 are partially penetrated into said first layer 29 and said annular collars 21 as well as the entire essential portion of sleeve section 14 between annular collars 21 are in good electrical contact with the first conductor layer 30 of a hydraulic pressure hose.

The inner surfaces in proximity of the first sleeve section 14 and the insulation member 16 of second sleeve section 15, as well as the entire insulation member 16, are in connection with the central intermediate insulation layer 31 of a hydraulic pressure hose. On the other hand, said second sleeve section 15, particularly at annular collars 21, has squeezed into contact with the second conductor layer 32 of hydraulic pressure hose 2. The outer surface of second sleeve member 9 is possibly after the pressing still subjected to insulation coating, e.g. by the application of insulating rubber 34.

An electric coupling means 3, made of an insulating material as for its body 3a, is coupled, on the one hand, with an annular bracket 35 associated with first sleeve section 14 and extending from its outer surface and, on the other hand, with a complementary-shaped annular bracket 36 associated with second sleeve section 15, said brackets being located on either side of insulation member 16. Said annular brackets 35 and 36 are adapted to receive complementary-shaped grooves 37.
and 38 extending in said electric coupling means 3 to its inner surface 40 clamping to the outer surface of one sleeve section 14, said grooves being provided with coupling means 37a and 38a for electrical wires 4a and 4b. The inner surface 40 of electric coupling means 3 is also provided with an outwardly-directed groove 39 for a portion 16a included in insulation member 16 and extending from the outer surface of the sleeve member 9 of insulation member 16.

On the basis of the above it is obvious for a skilled person that a connector of the invention can be considerably varied within the scope of the basic inventive conception. It is obvious that, first of all, between body 7 and first sleeve section 14, e.g. between components 17, 18 and 19, 20, can be fitted an electrical insulation (detail 39 in fig. 2), whereby said body 7, for example, can be used in the grounding of a hydraulic system. On the other hand, it is clear that the described radially-directed spacing of second sleeve member 9 can be replaced with a spacing of zones between different electric circuits in the circumferential direction of a hydraulic pressure hose, whereby the insulation member extends in the longitudinal direction of the sleeve member instead of and/or in addition to the radially-directed insulation member 16 shown in figs. 2 and 3. It is further obvious that the first sleeve member 8 can also be divided into sleeve sections which extend into various layers.
Claims

1. A connector for a hydraulic pressure hose, said connector comprising a body (7), provided with a first sleeve member (8) to be fitted inside the end of a hydraulic pressure hose, and a connecting member (11) which preferably includes a gripping means (12) for a tool and a fastening means (13), such as a threaded portion, for fastening the connector to a hydraulic system, as well as a second sleeve member (9) to be fitted outside the end of a hydraulic pressure hose face to face with first sleeve member (8), said sleeve members (8, 9) being adapted, upon mounting the connector on a hydraulic pressure hose, to squeeze towards each other and to clamp the end of a hydraulic pressure hose (2) therebetween, characterized in that at least a part of at least one of the sleeve members (8, 9) is electrically insulated from body (7).

2. A connector as set forth in claim 1, characterized in that

- at least one of said sleeve members (8, 9) is divided into at least two sleeve sections (14, 15) which are electrically insulated from each other by means of an insulation member (16), and that

- at least some of the sleeve sections are adapted, upon mounting the connector on a hose, to extend radially to various distances from the centre axis (24) of the connector.

3. A connector as set forth in claims 1 and 2, characterized in that said second sleeve member (9) is divided into at least two sleeve sections (14, 15).
4. A connector as set forth in claims 1 and 3, characterized in that said second sleeve member (9) has its first sleeve section (14) fastened (17, 18, 19, 20) to body (7).

5. A connector as set forth in claim 4, characterized in that said joint (17, 18, 19, 20) is effected through the intermediary of an insulation member (38).

6. A connector as set forth in claims 2 and 3, characterized in that the division of sleeve member (8, 9) into at least two sleeve sections (14, 15) is effected in the radial direction of a connector (insulation member 16) and/or in its circumferential direction (longitudinal direction of the sleeve member).

7. A connector as set forth in claims 2-4, characterized in that the division of sleeve member (8, 9) into at least two sleeve sections (14, 15) is effected in a direction perpendicular to the longitudinal direction of a connector, whereby said insulation member (16) is annular in configuration.

8. A connector as set forth in claim 7, characterized in that said insulation member (16) is mounted on the opposing frontal surfaces (25, 26) of sleeve sections (14, 15).

9. A connector as set forth in claims 2, 7 and 8, characterized in that said opposing frontal surfaces (25, 26) of sleeve sections (14, 15) is provided with at least one groove or the like, preferably an annular groove (27), and that said insulation member (16) includes brackets or the like in its both radial side faces, preferably annular brackets (28), the number of which corresponds to that of grooves (27).
10. A connector as set forth in claims 7-9, characterized in that said insulation member (16) is made of a resilient material and that said brackets (28) or the like included therein have a cross-section which in the rest condition of insulation member (16) is smaller than that of groove (27) or the like in the frontal surface (25, 26) of sleeve section (14, 15), said bracket (28) or the like yielding upon mounting a connector, thus filling said groove (27) by virtue of its deformation.

11. A connector as set forth in claims 1 and 2, characterized in that preferably in line with insulation member (16) is adapted to be mounted an electric coupling means (3) provided with at least one coupling member (37a, 38a) included in an insulating body (3a) for electric contact with sleeve section (14, 15).

12. A connector as set forth in claims 7 and 11, characterized in that said sleeve sections (14, 15) are on either side of insulation member (16) provided with brackets or the like, preferably annular brackets (35, 36), for installing said coupling members (37a, 38a) included in electric coupling means (3).

13. A connector as set forth in claim 2, characterized in that the inner surface of at least said second sleeve section (15) is provided with at least one inwardly-directed collars (21) or the like in both sleeve sections (14, 15), said collars (21) or the like being adapted to extend along with a conductor section (30, 32) included in hydraulic pressure hose (2) and to be brought into electric contact with a corresponding sleeve section (14, 15).
14. A connector as set forth in claim 2, characterized in that the outer surface of at least said first sleeve member (8) is provided with a set of grooves (22) or the like.

15. A connector as set forth in claim 1, characterized in that the outer surface of second sleeve member (9) is coated (39) with an electrically insulating material.

16. A hydraulic pressure hose, characterized in that said hose comprises one or more conductor layers (30, 32) fitted between insulating material layers (29, 31, 33), and that said hydraulic pressure hose is adapted to be workable at its end for clamping to the end of hydraulic pressure hose (2) a connector which includes an element (14, 21; 15, 21) coming into electrical contact with conductor layer (30, 32) upon the mounting of said connector.

17. A hydraulic pressure hose, characterized in that there are two conductor layers (30, 32), the first, inner conductor layer (30) being adapted to be placed in electrical contact with a first sleeve section (14), included in the second sleeve member (9) of a connector and positioned adjacent to a connecting member (11) included in a connector body (7), and the second, outer conductor layer (32) being adapted to be placed in electrical contact with a second sleeve section (15), included in the second sleeve member (9) of a connector and connected through the intermediary of an insulation member (16) with said first sleeve section (14) as an extension thereof away from said connecting means (11) of connector body (7).
## International Search Report

**International Application No:** PCT/FL 90/00170

### I. Classification of Subject Matter

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: F 16 L 33/207, 11/127, 25/02

### II. Fields Searched

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Documentation Searched other than Minimum Documentation to the extent that such Documents are included in Fields Searched:

**SE, DK, FI, NO classes as above**

### III. Documents Considered to Be Relevant

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### IV. Certification

- Date of the actual completion of the International Search: 21st September 1990
- Date of Mailing of this International Search Report: 1990-10-03
- International Searching Authority: SWEDISH PATENT OFFICE

**Signature of Authorized Officer:**

Axel Lindhult
ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/FI 90/00170

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