(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 534 465 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
12.05.2021 Bulletin 2021/19

(51) Int Cl.:
H01R 9/05 *(2006.01)*

(21) Application number: **18159749.3**

(22) Date of filing: **02.03.2018**

(54) **SHIELDING ARRANGEMENT**

ABSCHIRMANORDNUNG

AGENCEMENT DE BLINDAGE

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
04.09.2019 Bulletin 2019/36

(73) Proprietor: **Stäubli Electrical Connectors AG**
4123 Allschwil (CH)

(72) Inventors:
- **NURDIN Yannick**
  68130 Walheim (FR)
- **SCHULL Frédéric**
  68210 Hagenbach (FR)

(74) Representative: **Frischknecht, Harry Ralph**
Isler & Pedrazzini AG
Giesshübelstrasse 45
Postfach 1772
8027 Zürich (CH)

(56) References cited:
WO-A1-99/08343
WO-A1-2015/189289
DE-U- 7 125 761
US-A1- 2010 297 875

EP 3 534 465 B1

Description

TECHNICAL FIELD

[0001] The present invention relates to an electromagnetic shielding arrangement according to claim 1, a shielding structure according to claim 12 and a method according to claim 13.

PRIOR ART

[0002] From prior art shielded cables are well known. Usually such a cable comprises at least one electrical conductive conductor which is encompassed by means of an insulation, whereby on the outer side of the insulation a metallic shielding braid is arranged in order to provide an electromagnetic shielding.

[0003] At the interface between a cable and a plug or any other electrical part the shielding braid is to be connected to respective shielding elements on the side of the plug or the other electrical element. Providing this connection is usually cumbersome as it requires a rather exact positioning between the end of the shielding braid and the plug.

[0004] Document WO9908343 A1 shows a conventional electromagnetic arrangement.

SUMMARY OF THE INVENTION

[0005] It is an object of the present invention to provide a shielding arrangement which overcomes the drawbacks as mentioned in prior art. In particular it is a preferred object to provide a shielding arrangement which can be mounted very easily under the provision of a determined electrical contact. In particular it is a further preferred object to provide a shielding arrangement allowing more tolerance for the connection of a shielding braid of a cable.

[0006] This object is solved by the electromagnetic shielding arrangement of claim 1. The electromagnetic shielding arrangement comprises

an inner ring extending around a middle axis and having an inner surface and an outer surface,

an outer ring extending around said middle axis and having an inner surface and an outer surface, which inner ring is located at least partly within said outer ring, wherein a spacing is provided between the inner ring and the outer ring, and

an electrically conductive body having a bore with an inner surface, wherein said inner ring and/or said outer ring are at least partly located in said bore. A shielding braid of the cable can be mechanically clamped in said spacing between the inner ring and the outer ring such that an electrical contact is provided between said outer ring and said shielding braid. The arrangement further comprises an electrical contact element that is arranged between the outer ring and the electrically conductive body in order to provide an electrical contact between the outer ring and the electrically conductive body.

[0007] With such a shielding arrangement the electrical contact between the shielding braid and the body can be enhanced whereby the structure is very facile to mount.

[0008] Furthermore the electrical contact between the shielding braid of a cable and body which is part of a plug structure can be enhanced. In particular the electrical contact element serves to provide a determined electrical contact between the outer ring and the body.

[0009] The term "body" refers to structure which is part of a the shielding structure of a plug housing or which can be connected to the shielding structure of a plug housing or which is part of a shielding structure of another element or which can be connected to the shielding structure of another element.

[0010] The term "clamped " is to be understood in that a firm mechanical connection between the two rings and the shielding braid can be achieved.

[0011] Preferably the inner ring is located fully within the outer ring. Preferably the inner ring and the outer ring is arranged fully in said bore.

[0012] Preferably the outer ring and the body are at least partly or fully made out of an electrically conductive material. The same applies preferably also to the inner ring, however, in a further embodiment the inner ring can also be made of a non-conductive material, such as a plastic or fibre-reinforced plastics.

[0013] According to the invention, the electrical contact element comprises a plurality of resilient contact pieces and extends substantially fully around said middle axis. The resilient contact pieces are resiliently clamped by means of their own spring force in the gap between the outer ring and the bore.

[0014] The electrical contact element can also be designated as contact lamella.

[0015] Preferably the outer ring comprises a determined contact surface with which said electrical contact element is in electrical contact and/or the bore comprises a contact surface with which said electrical contact element is in electrical contact.

[0016] Preferably at least one of said contact surface extends around said middle axis with a constant cylindrical diameter, wherein said contact surface has a length as seen along the middle axis which is longer than the width of the

contact element as seen along the middle axis. This allows positioning the contact element with a larger degree on flexibility based on the position of the cable braid as seen along the middle axis. This is a particular advantage as an accurate positioning of the elements of the shielding arrangement relatively to the end of the shielding braid is no longer necessary.

[0017] Preferably the position of the contact element on said contact surface can variable based on the end of the shielding braid and the location of the inner ring as well as of the outer ring.

[0018] Particularly preferably either the contact surface of the outer ring or the contact surface of the bore is part of a groove extending around the middle axis, wherein the contact element is arranged in said groove. The groove can have different cross-sections. In a first preferred variant the groove has a rectangular cross-section. In a second preferred variant the groove has a dovetail cross-section. Preferably the other contact surface without the groove is cylindrical with a constant diameter.

[0019] In a particularly preferred embodiment the groove is arranged on the outer ring and the cylindrical contact surface with the above mentioned length in relation to the width of the contact element is arranged on the body.

[0020] Preferably the diameter of the inner surface and of the outer surface of the inner ring ist constant over the whole length of the inner ring.

[0021] Preferably the outer ring and/or the inner ring comprises a crimping section which will be mechanically deformed in order to minimize the width of the spacing such that the shielding braid is mechanically clamped or crimped in said spacing. In particular the crimping section of the outer ring will be deformed such that it will be forced towards the inner ring.

[0022] Preferably the inner ring has a length in direction of the middle axis which is shorter or equal or longer to the length of the crimping section of the outer ring in direction of the middle axis.

[0023] Preferably the material thickness of the crimping section is larger than the material thickness of the inner ring. This allows a determined deformation during the crimping process.

[0024] Preferably the crimping section of the inner ring extends over its full length.

[0025] Preferably the crimping is a circular or a hexagonal crimping.

[0026] Preferably the contact surface of the outer ring is arranged at a distance to the crimping section as seen along the middle axis. This has the advantage that the contact surface of the outer ring will not be affected by the deformation of the crimping section and remains in its original shape after the crimping process.

[0027] Preferably the diameter of the contact surface of the outer ring is larger than the diameter of the crimping section.

[0028] Preferably the material thickness of the crimping section of the outer ring remains constant over the whole length as seen along the middle axis.

[0029] Preferably the front end of the inner ring is tapered towards the outer surface and/or towards the inner surface. This enhances mounting to the inner ring underneath the shielding braid, as the tapered front and allows a radial spreading of the shielding braid.

[0030] Preferably the body comprises on an end section an outer thread via which a threaded sleeve is connectable, which threaded sleeve preferably acts on a sealing element.

[0031] Preferably the body comprises on an end section a connection interface via which the body connectable to an external plug housing or via which a plug housing is integrally formed on the body.

[0032] Preferably the opening of the outer ring comprises a conical section. The conical section allows a facile position of the outer ring. Preferably the conical section is arrange underneath the contact surface with the groove.

[0033] A shielding structure comprises an electromagnetic shielding arrangement according to the description above and a cable having at least one electrically conductive core and an inner insulation which is encompassed by a shielding braid, wherein the inner ring is located between the inner insulation and the shielding braid, wherein the shielding braid extends into said spacing between the inner ring and the outer ring and is clamped in said spacing.

[0034] The invention further relates to a method according to claim 13.

[0035] Further embodiments of the invention are laid down in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Preferred embodiments of the invention are described in the following with reference to the drawings, which are for the purpose of illustrating the present preferred embodiments of the invention and not for the purpose of limiting the same. In the drawings,

Fig. 1 shows an explosive view of an electromagnetic shielding arrangement according to one embodiment;

Fig. 2 shows an explosive cross-sectional view of the electromagnetic shielding arrangement according figure 1; and

Fig. 3 shows cross-sectional view of the electromagnetic shielding arrangement according figures 1 and 2 in a mounted state.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0037] In the figures an electromagnetic shielding arrangement 1 is shown. The shielding arrangement 1 comprises an inner ring 3 extending around a middle axis M and having an inner surface 3a and outer surface 3b, an outer ring 4 extending a round said middle axis M and having an inner surface 4a and an outer surface 4b, as well as an electrically conductive body 6 having a bore 7 with an inner surface 7a. The inner ring 3 and the outer ring 4 are located concentrically with each other. Additionally the inner ring 3 and the outer ring 4 are located concentrically in said bore 7.

[0038] The inner ring 3 is located at least partly within the outer ring 4. In the present case, the inner ring 3 is located fully in the outer ring 4. Between the inner ring 3 and the outer ring 4, there is a spacing 5 provided. The spacing 5 is provided as the diameter of the inner surface 4a of the outer ring 4 is larger than the diameter of the outer surface 3b of the inner ring 3. Furthermore, with regard to the electrically conductive body 6 the inner ring 3 and the outer ring 4 are located fully in the bore 7.

[0039] A shielding braid 8 of a cable 2 can be mechanically clamped in said spacing 5 between the inner ring 3 and the outer ring 4. This can be seen for example in the cross sectional view of figure 3, in which the shielding braid 8 of the cable 2 extends from the left of the drawing into the spacing 5.

[0040] The cable 2 comprises in the present embodiment a conductive core 22 which is surrounded by an inner insulation 23. The shielding braid 8 encompasses the inner insulation 23 and serves as an electromagnetic shielding element for the cable 2. On the outer side of the shielding braid 8 there is arranged an outer insulation 26 which covers the shielding braid 8. The structure of the cable is shown as an example and it can have a different structure.

[0041] Between the outer ring 4 and the electrically conductive body 6 an electrical contact element 9 is arranged. With the electrical contact element 9 an electrical contact between the outer ring 4 and the electrically conductive body 6 is provided. With regard to figure 3 this means that an electrical contact is provided from the shielding braid 8 via the outer ring 4 and the contact element 9 to the electrically conductive body 6. The electrically conductive body 6 can be part of a shielding structure of a plug housing or it can be part of the plug housing. With this shielding arrangement it is possible to provide a facile structure in terms of its mechanical structure and in terms of proving an efficient shielding structure. Furthermore the electrical contact between the shielding braid 8 and the electrically conductive body 6 can be enhanced.

[0042] The electrical contact element 9 comprises a plurality of resilient contact pieces 10. With the resilient contact pieces 10 it is possible to provide the electrical contact between the outer ring 4 and the electrically conductive body 6. Thereby the resilient contact pieces 10 are clamped or braced within a gap between the bore 7 and the outer ring 4. The gap is designated with the reference number 25. The resilient contact pieces 10 are provided such that they contact the outer surface 4b of the outer ring 4 as well as the inner surface 7a of the bore 7. Furthermore they are resiliently located in this gap 25 such that they are always in contact with the respective surfaces 7a and 4b. The electrical contact element 9 extends substantially fully around said middle axis M, such that a circular contact between the electrically conductive body 9 and the outer ring 4 can be achieved.

[0043] In the present case, the outer ring 4 comprises a contact surface 11, which is part of the outer surface 4b. Thereby the electrical contact element 9 is in an electrical contact with this contact surface 11. Furthermore the bore 7 comprises also a contact surface 12, which is part of the inner surface 7a of the bore 7. Again the electrical contact element 9 is in an electrical contact with the contact surface 12. In the present case, the contact surface 12 arranged in the bore 6 has a cylindrical shape. Thereby it has a constant cylindrical diameter D. Furthermore, the contact surface 12 has a length L which extends along the middle axis M. The length L is preferably longer the width W of the contact element 9 as seen along the middle axis M. This means that the contact element 9 can be positioned on the contact surface 12 at any position and it can be moved along the contact surface 12, which has the advantage that tolerances of the end of the shielding braid 8 can be compensated very efficiently.

[0044] The contact surface of the outer ring 4 comprises a groove 13 which extends around the middle axis M and in which the electrical contact element 9 is placed. The groove has in the present embodiment the cross action of a dovetail. Thereby the electrical contact element is arranged firmly in this structure. However, the groove can also have any other shape.

[0045] Additionally, the outer ring 4 comprises in the present embodiment a crimping section 14. The crimping section 14 is arranged at a distance with regard to the contact surface 11. The crimping section 14 will be mechanically deformed. Thereby its diameter will be decreased such that the width of the spacing 5 is minimized in order to crimp the shielding braid 8 in said spacing 5. Alternatively it may also be possible to crimp the inner ring 3 against the outer ring 4.

[0046] The crimping can be a circular or a hexagonal crimping.

[0047] As it can be seen from figure 3, the inner ring 3 has a length L13 in direction of the middle axis M. This length L13 is in the present case a bit longer then the length L14 of the crimping section 14 of the outer ring 4. The length L13 could also be equal or shorter than the crimping section 14.

[0048] The contact surface 11 of the outer ring 4 is arranged at a distance in direction of the middle axis M to the crimping section 14. In the embodiment as shown in the figures the contact surface 11 is provided by the groove 13. In

the present case, the contact surface 12 is oriented towards the cable 2 and the crimping section 14 is oriented towards a plug or the end of the cable. The arrangement of the crimping section 14 with a distance to the contact surface 11 has the advantage that the contact surface 11 is not affected by the crimping procedure which will mechanically deform the crimping section 14. Therefore the contact surface 11 will 1not be mechanically influenced, once the crimping section 14 is deformed. Hence, the two functions "crimping" and "electrical contact" are separated from each other.

[0049] In the embodiment as shown in the figures, the diameter of the crimping section 14 is larger than the diameter of the contact surface 11.

[0050] As it can be seen in figure 3, the front end 15 of the inner ring 3 is tapered towards the outer surface 3a and towards the inner surface 3b. This has the advantage that the inner ring 3 can be easily moved on the inner insulation 23 of the cable 2 as well as within the shielding braid 8.

[0051] Additionally the body 6 comprises on an end section 16 an outer thread 17 via which a threaded sleeve 18 is connectable. The threaded sleeve 18 is preferably arranged such that it acts on a sealing element 19, which can be in an elastic manner pushed towards to the outer insulation 26 of the cable 2 as well as against the body 6 in order to seal the gap between the outer insulation 26 and the bore 7 of the body so that it is not possible that moisture enters into this gap.

[0052] Furthermore, on the other side of the outer thread 17 the body 6 comprises on the end section 27 a connection interface 20, via which the body is connectable to an external plug housing in an electrical conductive manner.

[0053] Alternatively it may also be possible that the plug housing is integrally formed on the body 6 in the region of the connection interface 20.

[0054] The opening of the outer ring 4 comprises also a conical section 21 which allows an easy mounting of the outer ring 4 over the inner ring 3 and the shielding braid 8.

[0055] A preferred embodiment of shielding structure comprises an electromagnetic shielding arrangement according to the description above and a cable 2 having at least one electrically conductive core 22 and an inner insulation 23 which is encompassed by a shielding braid 8, wherein the inner ring 3 is located between the inner insulation 23 and the shielding braid 8, wherein the shielding braid 8 extends into said spacing between the inner ring 3 and the outer ring 4 and is clamped in said spacing 5.

LIST OF REFERENCE SIGNS

1	shielding arrangement	17	outer thread
2	cable	18	threaded sleeve
3	inner ring	19	sealing element
3a	inner surface	20	connection interface
3b	outer surface	21	conical section
4	outer ring	22	conductive core
4a	inner surface	23	inner insulation
4b	outer surface	25	gap
5	spacing	26	outer insulation
6	body	27	end section
7	bore		
7a	inner surface	M	middle axis
8	shielding braid	L	length
9	electrical contact element	W	width
10	resilient contact pieces	D	Diameter
11	contact surface		
12	contact surface		
13	groove		
14	crimping section		
15	front end		
16	end section		

Claims

1. Electromagnetic shielding arrangement (1), comprising
an inner ring (3) extending around a middle axis (M) and having an inner surface (3a) and an outer surface (3b),
an outer ring (4) extending around said middle axis (M) and having an inner surface (4a) and an outer surface (4b),

which inner ring (3) is located at least partly within said outer ring (4) wherein a spacing (5) is provided between the inner ring (3) and the outer ring (4), and
an electrically conductive body (6) having a bore (7) with an inner surface (7a), wherein said inner ring (3) and/or said outer ring (4) are at least partly located in said bore (7);
wherein a shielding braid (8) of the cable (2) can be mechanically clamped in said spacing (5) between the inner ring (3) and the outer ring (4) such that an electrical contact is provided between said outer ring (4) and said shielding braid (8), and
wherein an electrical contact element (9) is arranged between the outer ring (4) and the electrically conductive body (6) in order to provide an electrical contact between the outer ring (4) and the electrically conductive body (6), the electrical contact element (9) extends substantially fully around said middle axis (M), **characterized in that** the electrical contact element (9) comprises a plurality of resilient contact pieces (10).

2. Electromagnetic shielding arrangement (1) according to one of the preceding claims, **characterized in that** the outer ring (4) comprises a contact surface (11) with which said electrical contact element (9) is in electrical contact and/or **in that** the bore (7) comprises a contact surface (12) with which said electrical contact element (9) is in electrical contact.

3. Electromagnetic shielding arrangement (1) according to claim 2, **characterized in that** at least one of said contact surface (11, 12) extends around said middle axis (M) with a constant cylindrical diameter (D), wherein said contact surface (11, 12) has a length (L) as seen along the middle axis (M) which is longer than the width (W) of the contact element (9) as seen along the middle axis (M); and/or wherein the position of the contact element (9) on said contact surface can be variable.

4. Electromagnetic shielding arrangement (1) according to claim 2 or 3, **characterized in that** either the contact surface (11) of the outer ring (4) or the contact surface (12) of the bore (7) is part of a groove (13) extending around the middle axis (M), wherein the contact element (9) is arranged in said groove (13), which groove (13) has preferably a rectangular cross-section or a dovetail cross-section and **in that** the other contact surface (11, 12) without the groove (13) is cylindrical with a constant diameter.

5. Electromagnetic shielding arrangement (1) according to one of the preceding claims, **characterized in that** the outer ring (4) and/or the inner ring (3) comprises a crimping section (14) which can be mechanically deformed in order to minimize the width of the spacing (5) such that the shielding braid (8) is crimped in said spacing (5).

6. Electromagnetic shielding arrangement (1) according to claim 5, **characterized in that** the inner ring (3) has a length (L3) in direction of the middle axis (M) which is shorter or equal or longer to the length (L14) of the crimping section (14) of the outer ring (4) in direction of the middle axis (M).

7. Electromagnetic shielding arrangement (1) according to one of the preceding claims 5 or 6, **characterized in that** the crimping (14) is a circular or a hexagonal crimping.

8. Electromagnetic shielding arrangement (1) according to one of the preceding claims 2 to 7, **characterized in that** the contact surface (11) of the outer ring (4) is arranged at a distance to the crimping section (14) as seen along the middle axis (M) and/or **in that** the diameter of the contact surface (11) of the outer ring (4) is larger than the diameter of the crimping section (14).

9. Electromagnetic shielding arrangement (1) according to one of the preceding claims, **characterized in that** the front end (15) of the inner ring (3) is tapered towards the outer surface (3b) and/or towards the inner surface (3a).

10. Electromagnetic shielding arrangement (1) according to one of the preceding claims, **characterized in that** the body (6) comprises on an end section (16) an outer thread (17) via which a threaded sleeve (18) is connectable, which threaded sleeve (18) preferably acts on a sealing element (19); and/or **in that** the body (6) comprises on an end section (27) a connection interface (20) via which the body (6) is connectable to an external plug housing or via which a plug housing is integrally formed on the body (6).

11. Electromagnetic shielding arrangement (1) according to one of the preceding claims, **characterized in that** the opening of the outer ring (4) comprises a conical section (21).

12. Shielding structure comprising an electromagnetic shielding arrangement (1) according to one of the preceding

claims and a cable (2) having at least one electrically conductive core (22) and an inner insulation (23) which is encompassed by a shielding braid (8), wherein the inner ring (3) is located between the inner insulation (23) and the shielding braid (8), wherein the shielding braid (8) extends into said spacing between the inner ring (3) and the outer ring (4) and is clamped in said spacing (5).

13. Method to mount an electromagnetic shielding arrangement (1) according to one of the preceding claims 1 to 11, **characterized in that**
the inner ring (3) is mounted under the shielding braid (8);
the outer ring (4) is mounted over the shielding braid (8) such that the shielding braid (8) is positioned in said spacing (5) between the inner ring (3) and the outer ring (4),
the outer ring (4) and/or the inner ring (3) is mechanically deformed such that the shielding braid (8) is clamped in said spacing (5), and
the body (6) is positioned over the outer ring (4) such that an electrical connection between said outer ring (4) and said body (6) is provided by means of the contact element (9).

Patentansprüche

1. Elektromagnetische Abschirmanordnung (1), umfassend
einen Innenring (3), der sich um eine Mittelachse (M) erstreckt und eine Innenfläche (3a) und eine Aussenfläche (3b) aufweist,
einen Aussenring (4), der sich um besagte Mittelachse (M) erstreckt und eine Innenfläche (4a) und eine Aussenfläche (4b) aufweist, wobei der Innenring (3) sich zumindest teilweise innerhalb des besagten Aussenringes (4) befindet, wobei sich ein Zwischenraum (5) zwischen dem Innenring (3) und dem Aussenring (4) befindet, und
einen elektrisch leitenden Körper (6), der eine Bohrung (7) mit einer Innenfläche (7a) aufweist, wobei besagter Innenring (3) und/oder besagter Aussenring (4) sich zumindest teilweise in besagter Bohrung (7) befinden;
wobei ein Schirmgeflecht (8) des Kabels (2) in besagtem Zwischenraum (5) zwischen dem Innenring (3) und dem Aussenring (4) mechanisch festgeklemmt werden kann, so dass ein elektrischer Kontakt zwischen dem Aussenring (4) und dem Schirmgeflecht (8) bereitgestellt wird, und
wobei sich ein elektrisches Kontaktelement (9) zwischen dem Aussenring (4) und dem elektrisch leitenden Körper (6) befindet, um einen elektrischen Kontakt zwischen dem Aussenring (4) und dem elektrisch leitenden Körper (6) bereitzustellen, das elektrische Kontaktelement (9) erstreckt sich im Wesentlichen vollständig um besagte Mittelachse (M),
dadurch gekennzeichnet, dass das elektrische Kontaktelement (9) mehrere elastische Kontaktstücke (10) umfasst.

2. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Aussenring (4) eine Kontaktfläche (11) aufweist, mit der sich das besagte elektrische Kontaktelement (9) in elektrischem Kontakt befindet und/oder dass die Bohrung (7) eine Kontaktfläche (12) aufweist, mit der sich das elektrische Kontaktelement (9) in elektrischem Kontakt befindet.

3. Elektromagnetische Abschirmanordnung (1) nach Anspruch 2, **dadurch gekennzeichnet, dass** sich mindestens eine der besagten Kontaktflächen (11,12) um besagte Mittelachse (M) mit einem konstanten zylindrischen Durchmesser (D) erstreckt, wobei die besagte Kontaktfläche (11, 12) der Mittelachse (M) entlang gesehen eine Länge (L) aufweist, die länger ist als die der Mittelachse (M) entlang gesehene Breite (W) des Kontaktelementes (9); und/oder wobei die Position des Kontaktelementes (9) auf der besagten Kontaktfläche variabel sein kann.

4. Elektromagnetische Abschirmanordnung (1) nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** entweder die Kontaktfläche (11) des Aussenringes (4) oder die Kontaktfläche (12) der Bohrung (7) Teil einer Nut (13) sind, die sich um die Mittelachse (M) erstreckt, wobei sich das Kontaktelement (9) in der Nut (13) befindet, welche Nut (13) vorzugsweise einen rechteckigen Querschnitt oder einen Schwalbenschwanzquerschnitt aufweist und dass die andere Kontaktfläche (11,12) ohne Nut (13) zylindrisch mit konstantem Durchmesser ist.

5. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Aussenring (4) und/oder der Innenring (3) einen Crimpabschnitt (14) aufweisen, der mechanisch verformt werden kann, um die Ausdehnung des Zwischenraumes so zu minimieren, dass das Schirmgeflecht (8) in besagtem Zwischenraum (5) gecrimpt wird.

6. Elektromagnetische Abschirmanordnung (1) nach Anspruch 5, **dadurch gekennzeichnet, dass** der Innenring (3)

eine Länge (L3) in Richtung der Mittelachse (M) aufweist, die kürzer oder gleich lang oder länger ist als die Länge (L14) des Crimpabschnittes (14) des Aussenringes (4) in Richtung der Mittelachse (M).

7. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche 5 oder 6, **dadurch gekennzeichnet, dass** die Crimpung (14) eine kreisförmige oder eine sechseckige Crimpung ist.

8. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche 2 bis 7, **dadurch gekennzeichnet, dass** sich die Kontaktfläche (11) des Aussenringes (4) in einem Abstand zum Crimpabschnitt (14) entlang der Mittelachse (M) gesehen befindet und/oder dass der Durchmesser der Kontaktfläche (11) des Aussenringes (4) grösser ist als der Durchmesser des Crimpabschnitts (14).

9. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das vordere Ende (15) des Innenringes (3) zur Aussenfläche (3b) und/oder zur Innenfläche (3a) hin verjüngt ist.

10. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Körper (6) an einem Endabschnitt (16) ein Aussengewinde (17) aufweist, über das eine Gewindehülse (18) verbindbar ist, welche Gewindehülse (18) vorzugsweise auf ein Dichtungselement (19) wirkt; und/oder dass der Körper (6) an einem Endabschnitt (27) eine Verbindungsschnittstelle (20) aufweist, über die der Körper (6) mit einem externen Steckergehäuse verbunden werden kann oder über die ein Steckergehäuse vollständig am Körper (6) ausgebildet wird.

11. Elektromagnetische Abschirmanordnung (1) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Öffnung des Aussenringes (4) einen konischen Abschnitt (21) aufweist.

12. Abschirmstruktur, die eine elektromagnetische Abschirmanordnung (1) gemäss einem der vorhergehenden Ansprüche umfasst, und ein Kabel (2) mit mindestens einem elektrisch leitenden Kern (22) und einer inneren Isolierung (23), die von einem Schirmgeflecht (8) umgeben ist, wobei sich der Innenring (3) zwischen der inneren Isolierung (23) und dem Schirmgeflecht (8) befindet, wobei sich das Schirmgeflecht (8) in den Zwischenraum zwischen dem Innenring (3) und dem Aussenring (4) erstreckt und in besagtem Zwischenraum (5) festgeklemmt wird.

13. Verfahren zum Montieren einer elektromagnetischen Abschirmanordnung (1) gemäss einem der vorhergehenden Ansprüche 1 bis 11, **dadurch gekennzeichnet, dass**
der Innenring (3) unter das Schirmgeflecht (8) montiert wird;
der Aussenring (4) so über das Schirmgeflecht (8) montiert wird, dass das Schirmgeflecht (8) in dem besagten Zwischenraum (5) zwischen dem Innenring (3) und dem Aussenring (4) positioniert ist,
der Aussenring (4)und/oder der Innenring (3) mechanisch so verformt werden, dass das Schirmgeflecht (8) in besagtem Zwischenraum (5) festgeklemmt wird, und
der Körper (6) so über den Aussenring (4) positioniert wird, dass mittels des Kontaktelementes (9) eine elektrische Verbindung zwischen dem Aussenring (4) und dem Körper (6) hergestellt wird.

Revendications

1. Agencement de blindage électromagnétique (1), comprenant
une bague intérieure (3) s'étendant autour d'un axe médian (M) et ayant une surface intérieure (3a) et une surface extérieure (3b),
une bague extérieure (4) s'étendant autour dudit axe médian (M)) et ayant une surface intérieure (4a) et une surface extérieure (4b), laquelle bague intérieure (3) est située au moins en partie à l'intérieur de ladite bague extérieure (4) dans laquelle un espacement (5) est prévu entre la bague intérieure (3) et la bague extérieure (4), et
un corps électriquement conducteur (6) ayant un alésage (7) avec une surface intérieure (7a), dans lequel ladite bague intérieure (3) et / ou ladite bague extérieure (4) sont au moins en partie situées dans ledit alésage (7);
dans lequel une tresse de blindage (8) du câble (2) peut être serrée mécaniquement dans ledit espacement (5) entre la bague intérieure (3) et la bague extérieure (4) de telle sorte qu'un contact électrique est fourni entre ladite bague extérieure (4) et ladite tresse de blindage (8), et
dans lequel un élément de contact électrique (9) est agencé entre la bague extérieure (4) et le corps électriquement conducteur (6) afin de fournir un contact électrique entre la bague extérieure (4) et le corps électriquement conducteur (6), l'élément de contact électrique (9) s'étend sensiblement entièrement autour dudit axe médian (M),

caractérisé en ce que l'élément de contact électrique (9) comprend une pluralité de pièces de contact élastiques (10).

2. Agencement de blindage électromagnétique (1) selon l'une des revendications précédentes, **caractérisé en ce que** la bague extérieure (4) comprend une surface de contact (11) avec laquelle ledit élément de contact électrique (9) est en contact électrique et / ou **en ce que** l'alésage (7) comprend une surface de contact (12) avec laquelle ledit élément de contact électrique (9) est en contact électrique.

3. Agencement de blindage électromagnétique (1) selon la revendication 2, **caractérisé en ce qu'**au moins une de ladite surface de contact (11, 12) s'étend autour dudit axe médian (M) avec un diamètre cylindrique constant (D), dans lequel ladite surface de contact (11, 12) a une longueur (L) vue le long de l'axe médian (M) qui est plus longue que la largeur (W) de l'élément de contact (9) vue le long de l'axe médian (M); et / ou dans lequel la position de l'élément de contact (9) sur ladite surface de contact peut varier.

4. Agencement de blindage électromagnétique (1) selon la revendication 2 ou 3, **caractérisé en ce que** soit la surface de contact (11) de la bague extérieure (4) soit la surface de contact (12) de l'alésage (7) fait partie d'une rainure (13)) s'étendant autour de l'axe médian (M), dans lequel l'élément de contact (9) est disposé dans ladite rainure (13), laquelle rainure (13) a de préférence une section transversale rectangulaire ou une section transversale en queue d'aronde et **en ce que** l'autre surface de contact (11, 12) sans la rainure (13) est cylindrique à diamètre constant.

5. Agencement de blindage électromagnétique (1) selon l'une des revendications précédentes, **caractérisé en ce que** la bague extérieure (4) et / ou la bague intérieure (3) comprend une section de sertissage (14) déformable mécaniquement pour minimiser la largeur de l'espacement (5) de telle sorte que la tresse de blindage (8) est sertie dans ledit espacement (5).

6. Agencement de blindage électromagnétique (1) selon la revendication 5, **caractérisé en ce que** la bague intérieure (3) a une longueur (L3) en direction de l'axe médian (M) qui est plus courte ou égale ou plus longue à la longueur (L14) de la section de sertissage (14) de la bague extérieure (4) en direction de l'axe médian (M).

7. Agencement de blindage électromagnétique (1) selon l'une des revendications 5 ou 6 précédentes, **caractérisé en ce que** le sertissage (14) est un sertissage circulaire ou hexagonal.

8. Agencement de blindage électromagnétique (1) selon l'une des revendications 2 à 7 précédentes, **caractérisé en ce que** la surface de contact (11) de la bague extérieure (4) est disposée à distance de la section de sertissage (14) vue le long de l'axe médian (M) et / ou **en ce que** le diamètre de la surface de contact (11) de la bague extérieure (4) est supérieur au diamètre de la section de sertissage (14).

9. Agencement de blindage électromagnétique (1) selon l'une des revendications précédentes, **caractérisé en ce que** l'extrémité avant (15) de la bague intérieure (3) est effilée vers la surface extérieure (3b) et / ou vers la surface intérieure (3a).

10. Agencement de blindage électromagnétique (1) selon l'une des revendications précédentes, **caractérisé en ce que** le corps (6) comprend sur une section d'extrémité (16) un filetage extérieur (17) par lequel un manchon fileté (18) peut être connecté, lequel manchon fileté (18) agit de préférence sur un élément d'étanchéité (19); et / ou **en ce que** le corps (6) comprend sur une section d'extrémité (27) une interface de connexion (20) via laquelle le corps (6) peut être connecté à un boîtier de fiche externe ou via laquelle un boîtier de fiche est formé intégralement sur le corps (6).

11. Agencement de blindage électromagnétique (1) selon l'une des revendications précédentes, **caractérisé en ce que** l'ouverture de la bague extérieure (4) comprend une section conique (21).

12. Structure de blindage comprenant un agencement de blindage électromagnétique (1) selon une des revendications précédentes et un câble (2) ayant au moins un noyau électriquement conducteur (22) et une isolation interne (23) qui est entourée par une tresse de blindage (8), dans laquelle la bague intérieure (3) est située entre l'isolation intérieure (23) et la tresse de blindage (8), dans lequel la tresse de blindage (8) s'étend dans ledit espacement entre la bague intérieure (3) et la bague extérieure (4) et est serré dans ledit espacement (5).

13. Procédé de montage d'un agencement de blindage électromagnétique (1) selon l'une des revendications 1 à 11

précédentes, **caractérisé en ce que**
la bague intérieure (3) est montée sous la tresse de blindage (8);
la bague extérieure (4) est montée sur la tresse de blindage (8) de telle sorte que la tresse de blindage (8) est positionnée dans ledit espacement (5) entre la bague intérieure (3) et la bague extérieure (4),
la bague extérieure (4) et / ou la bague intérieure (3) est mécaniquement déformée de telle sorte que la tresse de blindage (8) est serrée dans ledit espacement (5), et
le corps (6) est positionné sur la bague extérieure (4) de telle sorte qu'une connexion électrique entre ladite bague extérieure (4) et ledit corps (6) est fournie au moyen de l'élément de contact (9).

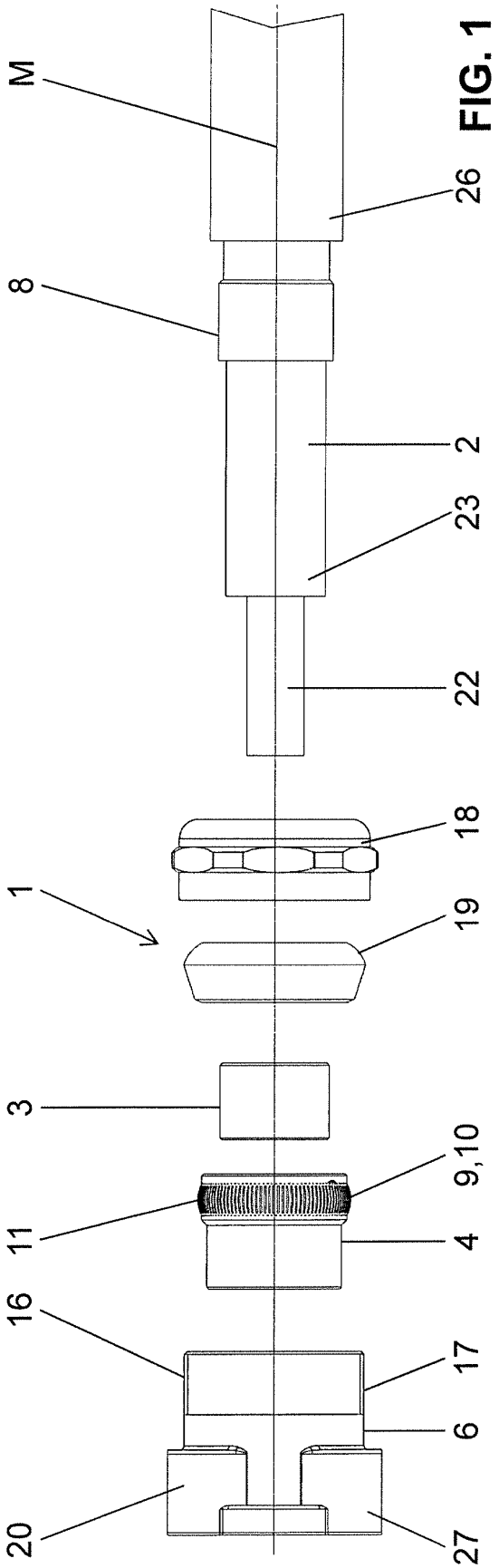
M
26
8
2
23
22
18
1
19
3
9,10
11
4
16
17
6
20
27

FIG. 1

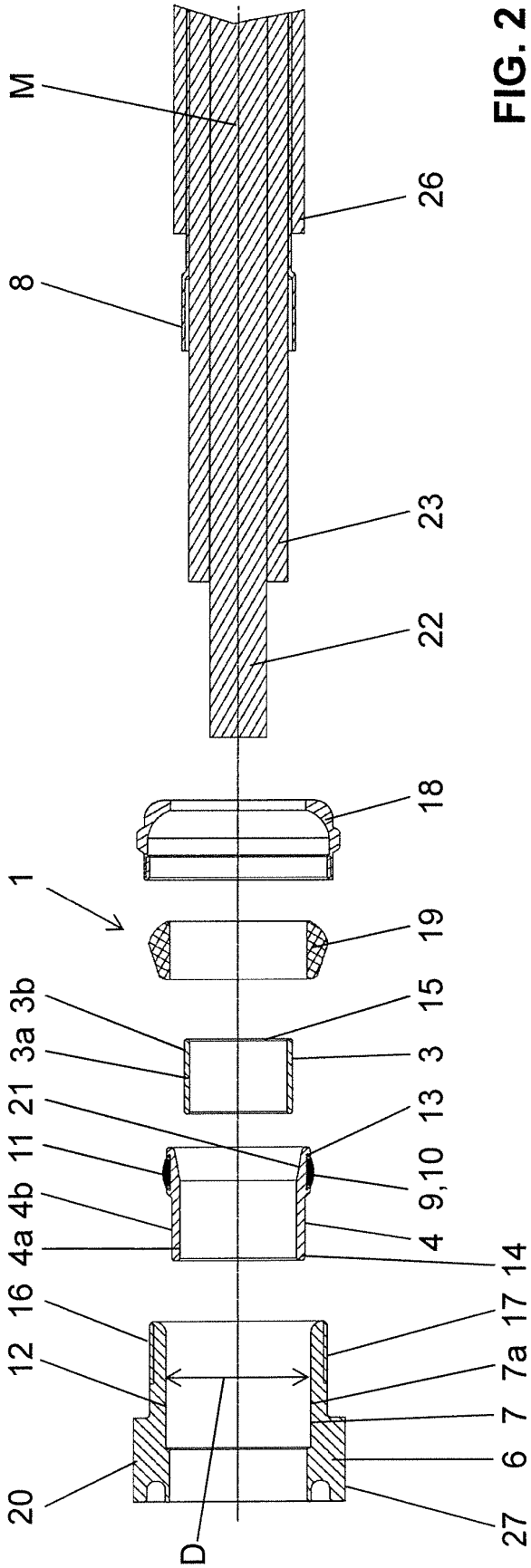
M
26
8
23
22
18
1
19
3b
15
3a
3
21
13
11
9,10
4b
4
4a
14
16
17
12
7a
7
6
20
D
27

FIG. 2

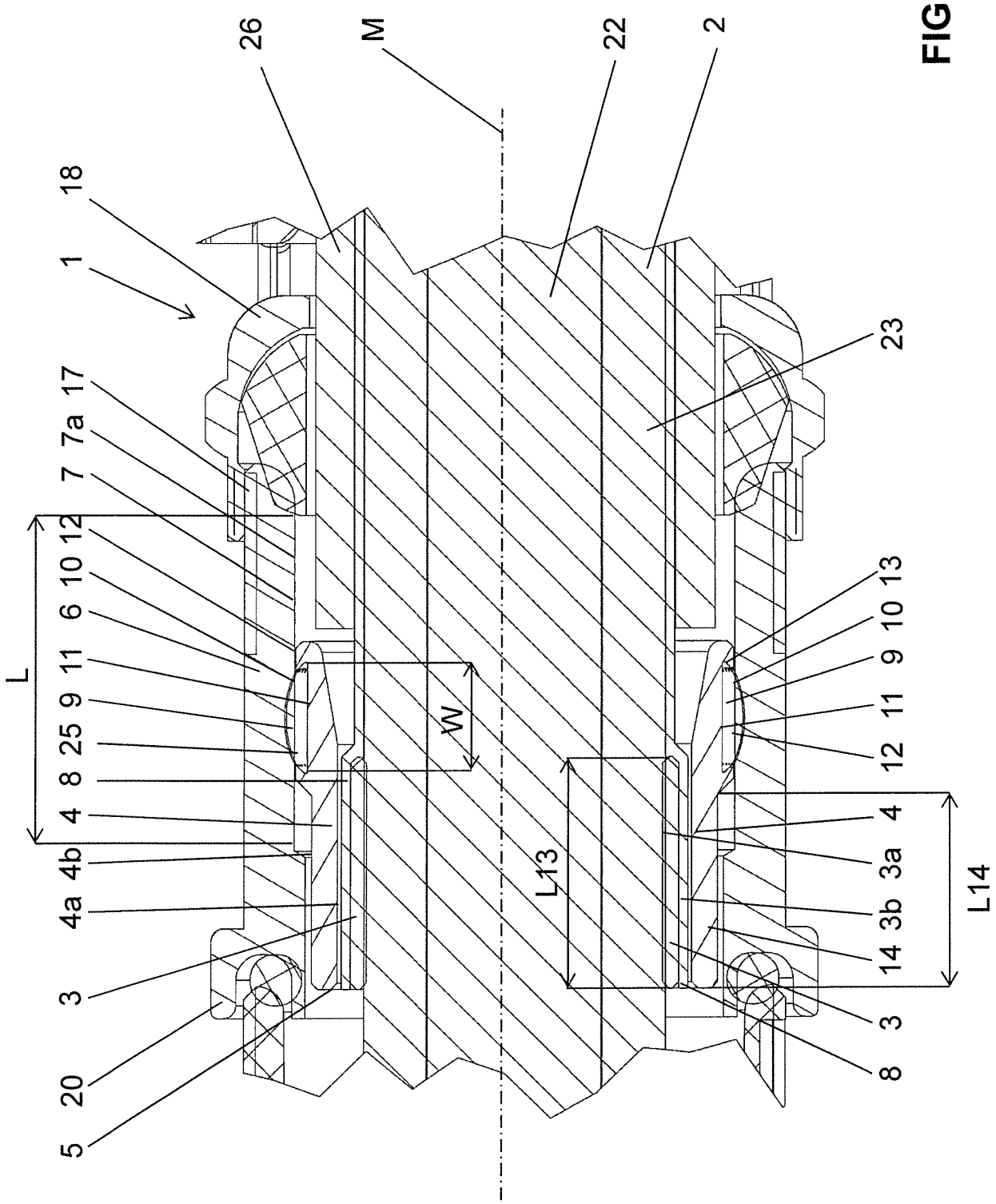
26
M
22
2
18
1
23
17
7a
7
12
10
6
11
9
25
8
4
4b
4a
3
20
5
13
10
9
11
12
4
3a
3b
14
3
8
L
W
L13
L14

FIG. 3

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 9908343 A1 **[0004]**