

Description

The invention relates generally to electrical connection between electrical connectors and shielded cables and more particularly to an assembly of an electrical connector and a shielded cable.

To protect electronic apparatus against electromagnetic interference, a shielding cover is commonly used which comprises a pair of shells produced by a press. The shells are joined with a connector held between their joined front ends and a shield layer of the shielded cable held between their joined rear ends, which are shaped in the form of mouths.

A shielded cable may be constantly subjected to external forces, and because of them the joint between the shielding cover and the shielded cable may become slackened or even disconnected.

In EP-A-0125760 there is disclosed an assembly of an electrical connector and a shielded cable. The assembly includes a shielding cover comprising a pair of shells of electrically conducting material. Each shell has front connector receiving part and a rear cable receiving part. When the shells are joined together, they maintain a shielding uncovered from the shielded cable with a projecting portion of the shielding turned back. A ferrule engages around the cable receiving sections and is compressed to secure the cable receiving sections and effect electrical connection between the connector and the shielded cable.

According to the invention there is provided an assembly of an electrical connector and a shielded cable, the assembly comprising a shielding cover comprising a pair of shells of electrically conducting material, each shell having a connector receiving section at its front end and a cable receiving section at its rear end, the cable receiving sections of the shells when joined maintaining a shield meshwork uncovered from the shielded cable, a first ferrule fastening the shield meshwork with a projecting portion of the shield meshwork turned back so as to wrap the first ferrule, a conducting foil placed over the turned back shield meshwork, and a second ferrule engaged around the cable receiving sections and compressed thereby to secure the cable receiving sections and effect electrical connection between the connector and the shielded cable, wherein the outer ferrule is compressed in such a way that the cable receiving sections of the shells, the copper foil and the turned back portion of the shield meshwork are forced inwards along a rear end of the inner ferrule.

The invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a front view showing an assembly of an electrical connector and a shielded cable

according to the invention;

Figure 2 is a front view showing a shell of a shielding cover of the connector shown in Figure 1;

Figure 3 is a cross-section taken on line 3-3 in Figure 2;

Figure 4 is a front view showing another shell to mate with that shown in Figure 2;

Figure 5 is a cross-section taken on line 5-5 in Figure 4;

Figure 6 is a vertical cross-sectional view showing the joined shells;

Figure 7 shows the front view of a joint between the connector and the joined shells;

Figure 8 is a cross-sectional view showing a joint between the shielded cable and the joined shells; and

Figure 9 is a cross-section taken on line 9-9 in Figure 8.

Referring firstly to Figures 8 and 9, shielded cable 1 includes a plurality of insulation-clad wires 2, a shield meshwork 3 surrounding the wires 2 and an insulating covering 4. Each of the wires 2 is connected to a respective contact (not shown) individually arranged in a housing 6 of a connector 5, Figure 1. The connector 5 has a shield conductor 7 which surrounds the housing 6, and the shield conductor 7 has a flange 8 for engagement with a shield covering 11.

The shield covering 11 comprises a pair of shells 12, 13 formed by pressing from an electrically conductive metal such as mild steel panel. The shells 12 and 13 are plated with nickel.

The shell 12, as shown in Figures 2 and 3, includes side walls 15 erected at the edges of its bottom plate 14. The side walls 15 include high portions 15a, 15b which include detents 16 projecting outwardly. The bottom plate 14, as shown in Figure 2, progressively becomes narrower toward its rear end to form a mouth 17 at its terminating end which is engaged with a shield layer 30 exposed from the shield cable 1. The bottom plate 14 also has a tongue 18 at its front end which has an engaging section 19 including a hook 19a. The hook 19a, as shown in Figure 3, is slightly bent upward so as to facilitate the engagement with the flange 8 of the shield conductor 7.

The bottom plate 14 is provided with an upright metal post 20 at its middle. The post 20 has its reduced diameter lower end 20a inserted into an aperture 21 in the bottom plate 14, and a protruding portion 20b is turned over to secure the anchorage of the post 20. Alternatively it is possible to weld the post 20 to the bottom plate 14.

Reference numeral 22 denotes a reinforcing bulged portion.

The shell 13, as shown in Figures 4 and 5, is similar in shape to the shell 12. Specifically, the

shell 13 has a bottom plate 24 and side walls 25 erected at the edges of the bottom plate 24. The plate 25 includes receiving detents 26 to mate with the projecting detents 16 of the side plates 15. The bottom plate 24 progressively becomes narrow toward its rear end to form a mouth 27 at its terminating end which is engaged with the shield layer 30 of the shield cable 1. The bottom plate 24 also has a tongue 28 at its front end, the tongue 28 including an engaging section with a hook 29a bent upward.

Figures 8 and 9 show the shield layer 30.

The shield meshwork 3 is exposed from the shielded cable 1 and fastened by an inner ferrule 31 extending around it. The projecting portion of the shield meshwork 3 is turned back to overlie the ferrule 31. The turned back portion of the shield meshwork 3 will be referred to as an ear portion 3a. The ear portion 3a is covered with an electric conductor layer such as a copper foil 32. The inner ferrule 31 is preferably an annular sleeve formed by cutting off a length of a metal pipe, plated with copper or tin. Alternatively the inner ferrule 31 can be C-shaped in cross-section.

An outer ferrule 33 is preferably also obtained by cutting off a length of metal pipe and is preferably as long as the mouths 17 and 27 of the shells 12 and 13. The outer ferrule 33 has an inside diameter sufficient to enable it to cover the joined mouths 17 and 27 with no gap therebetween.

The shield covering 11 is formed as follows:

The shells 12 and 13 are joined as shown in Figure 6 such that the side walls 15 are located inside the side plates 25 with the projecting detents 16 of the shell 12 being engaged with the receiving detents 26. When the two shells 12 and 13 are joined, the free end of the post 20 of the shell 12 abuts the inside wall of the shell 13.

At the front end of the shield covering 11 the two engaging sections 19 and 29 are opposite to each other and form a cavity which receives the connector 5 with the respective hooks 19a and 29a engaging the flange 8 of the connector 5 to effect a joint between the connector 5 and the shield casing 11. In this way the connector 5 is secured to the front ends of the shells 12 and 13. The mouths 17 and 27 of the shells 12 and 13 jointly receive the shield layer 30 of the cable 1 as shown in Figure 8. The outer ferrule 33 is compressed to cause the mouths 17 and 27 to hold the shield layer 30 firmly therebetween. In this way electrical and mechanical connection is established between the shells 12, 13 and the shield layer 30. When the outer ferrule 33 is compressed, the mouths 17 and 27, the copper foil 32 and the turned back ear portion 3a of the shield meshwork 3 are forced inward along a rear end 31a of the inner ferrule 31. The turned back ear portion 3a of the shield meshwork 3 is held

between the inner ferrule 31 and the mouths 17, 27, thereby securing the shield meshwork 3 to the joined shells 12 and 13. As a result, the joint between the shells 12 and 13 can withstand external force exerting on the shield cable 1. In this way a firm electrical connection between the shield layer 30 of the cable 1 and the shield conductor 7 of the connector 5, through the shells 12 and 13, is established against electromagnetic interference.

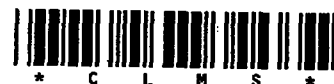
Finally the assembly of the shield cable 1 and the joined shells 12, 13 and the shield covering 11 are covered with an insulating cover 40 indicated by broken lines in Figure 1. The insulating cover 40 can be moulded of an insulating plastic material such as polyvinyl chloride by injection.

When the cover 40 is moulded, a large pressure is exerted on the shells 12 and 13 but the post 20 of the shell 12 prevents the joined shells 12 and 13 from deforming inwardly and fracturing.

As shown in Figure 7, if an external force (A) is exerted on the joined shells 12 and 13 during the injection, the engaging sections 19 and 29 will undergo a pull (B). However, the hooks 19a and 29a are inwardly turned to be engaged with the flange 8, so that the engaging sections 19 and 29 will elastically deform to avert the detrimental pull (B) as indicated by dotted lines in Figure 7. Thus the engaging sections 19 and 29 are firmly secured to the flange 8. The electrical connection is thus established.

Claims

1. An assembly of an electrical connector (5) and a shielded cable (1), the assembly comprising a shielding cover (11) comprising a pair of shells (12,13) of electrically conducting material, each shell (12,13) having a connector receiving section (19,29) at its front end and a cable receiving section (17,27) at its rear end, the cable receiving sections (17,27) of the shells (12,13) when joined maintaining a shield meshwork (3) uncovered from the shielded cable (1), a first ferrule (31) fastening the shield meshwork (3) with a projecting portion of the shield meshwork (3) turned back (3a) so as to wrap the first ferrule (31), a conducting foil (32) placed over the turned back shield meshwork (3a), and a second ferrule (33) engaged around the cable receiving sections (17,27) and compressed thereby to secure the cable receiving sections (17,27) and effect electrical connection between the connector (5) and the shielded cable (1), wherein the outer ferrule (33) is compressed in such a way that the cable receiving sections (17, 27) of the shells (28, 30), the copper foil (32) and the turned back portion (39) of the shield meshwork (3) are forced



shell 13 has a bottom plate 24 and side walls 25 erected at the edges of the bottom plate 24. The plate 25 includes receiving detents 26 to mate with the projecting detents 16 of the side plates 15. The bottom plate 24 progressively becomes narrow toward its rear end to form a mouth 27 at its terminating end which is engaged with the shield layer 30 of the shield cable 1. The bottom plate 24 also has a tongue 28 at its front end, the tongue 28 including an engaging section with a hook 29a bent upward.

Figures 8 and 9 show the shield layer 30.

The shield meshwork 3 is exposed from the shielded cable 1 and fastened by an inner ferrule 31 extending around it. The projecting portion of the shield meshwork 3 is turned back to overlie the ferrule 31. The turned back portion of the shield meshwork 3 will be referred to as an ear portion 3a. The ear portion 3a is covered with an electric conductor layer such as a copper foil 32. The inner ferrule 31 is preferably an annular sleeve formed by cutting off a length of a metal pipe, plated with copper or tin. Alternatively the inner ferrule 31 can be C-shaped in cross-section.

An outer ferrule 33 is preferably also obtained by cutting off a length of metal pipe and is preferably as long as the mouths 17 and 27 of the shells 12 and 13. The outer ferrule 33 has an inside diameter sufficient to enable it to cover the joined mouths 17 and 27 with no gap therebetween.

The shield covering 11 is formed as follows:

The shells 12 and 13 are joined as shown in Figure 6 such that the side walls 15 are located inside the side plates 25 with the projecting detents 16 of the shell 12 being engaged with the receiving detents 26. When the two shells 12 and 13 are joined, the free-end of the post 20 of the shell 12 abuts the inside wall of the shell 13.

At the front end of the shield covering 11 the two engaging sections 19 and 29 are opposite to each other and form a cavity which receives the connector 5 with the respective hooks 19a and 29a engaging the flange 8 of the connector 5 to effect a joint between the connector 5 and the shield casing 11. In this way the connector 5 is secured to the front ends of the shells 12 and 13. The mouths 17 and 27 of the shells 12 and 13 jointly receive the shield layer 30 of the cable 1 as shown in Figure 8. The outer ferrule 33 is compressed to cause the mouths 17 and 27 to hold the shield layer 30 firmly therebetween. In this way electrical and mechanical connection is established between the shells 12, 13 and the shield layer 30. When the outer ferrule 33 is compressed, the mouths 17 and 27, the copper foil 32 and the turned back ear portion 3a of the shield meshwork 3 are forced inward along a rear end 31a of the inner ferrule 31. The turned back ear portion 3a of the shield meshwork 3 is held

between the inner ferrule 31 and the mouths 17, 27, thereby securing the shield meshwork 3 to the joined shells 12 and 13. As a result, the joint between the shells 12 and 13 can withstand external force exerting on the shield cable 1. In this way a firm electrical connection between the shield layer 30 of the cable 1 and the shield conductor 7 of the connector 5, through the shells 12 and 13, is established against electromagnetic interference.

Finally the assembly of the shield cable 1 and the joined shells 12, 13 and the shield covering 11 are covered with an insulating cover 40 indicated by broken lines in Figure 1. The insulating cover 40 can be moulded of an insulating plastic material such as polyvinyl chloride by injection.

When the cover 40 is moulded, a large pressure is exerted on the shells 12 and 13 but the post 20 of the shell 12 prevents the joined shells 12 and 13 from deforming inwardly and fracturing.

As shown in Figure 7, if an external force (A) is exerted on the joined shells 12 and 13 during the injection, the engaging sections 19 and 29 will undergo a pull (B). However, the hooks 19a and 29a are inwardly turned to be engaged with the flange 8, so that the engaging sections 19 and 29 will elastically deform to avert the detrimental pull (B) as indicated by dotted lines in Figure 7. Thus the engaging sections 19 and 29 are firmly secured to the flange 8. The electrical connection is thus established.

Claims

1. An assembly of an electrical connector (5) and a shielded cable (1), the assembly comprising a shielding cover (11) comprising a pair of shells (12,13) of electrically conducting material, each shell (12,13) having a connector receiving section (19,29) at its front end and a cable receiving section (17,27) at its rear end, the cable receiving sections (17,27) of the shells (12,13) when joined maintaining a shield meshwork (3) uncovered from the shielded cable (1), a first ferrule (31) fastening the shield meshwork (3) with a projecting portion of the shield meshwork (3) turned back (3a) so as to wrap the first ferrule (31), a conducting foil (32) placed over the turned back shield meshwork (3a), and a second ferrule (33) engaged around the cable receiving sections (17,27) and compressed thereby to secure the cable receiving sections (17,27) and effect electrical connection between the connector (5) and the shielded cable (1), wherein the outer ferrule (33) is compressed in such a way that the cable receiving sections (17, 27) of the shells (28, 30), the copper foil (32) and the turned back portion (39) of the shield meshwork (3) are forced



inwards along a rear end (31a) of the inner ferrule (31).

2. An assembly according to claim 1, wherein the connector receiving section (19,29) of each shell (12,13) is engaged with a flange (8) of a shield conductor (7) of the connector (5), and the connector receiving section (19,29) includes an inwardly bent end (19a, 29a) so as to secure the engagement with the flange (8).

Patentansprüche

1. Zusammenbau eines elektrischen Steckverbinders (5) mit einem abgeschirmten Kabel (1), wobei der Zusammenbau eine Abschirmabdeckung (11) mit einem Gehäusepaar (12,13) eines elektrischleitenden Materials umfaßt, wobei jedes Gehäuse (12, 13) einen Steckverbinderaufnahmeabschnitt (19,29) an seinem vorderen Ende und einen Steckeraufnahmeabschnitt (17,27) für ein Kabel an seinem hinteren Ende hat, die Kabelaufnahmeabschnitte (17,27) der Gehäuse (12,13) - wenn verbunden - einen nicht von dem abgeschirmten Kabel (1) bedeckten Abschirmmaschendraht (3) beibehalten, ein erster Eisenring (31) den Abschirmmaschendraht (3) mit einem hervorstechenden Abschnitt des Abschirmmaschendrahts (3) verbindet, der zurückgedreht (3a) ist, um den ersten Eisenring (31) zu umhüllen, eine leitende Folie (32) über dem zurückgedrehten Abschirmmaschendraht (3a) liegt, und ein zweiter Eisenring (33) um die Kabelaufnahmeabschnitte (17,27) herum anliegt und dadurch komprimiert ist, um die Kabelaufnahmeabschnitte (17,27) zu sichern und elektrische Verbindung zwischen dem Steckverbinder (5) und dem abgeschirmten Kabel (1) herzustellen, wobei der äußere Eisenring (33) in derartiger Weise komprimiert wird, daß die Kabelaufnahmeabschnitte (17,27) der Gehäuse (28,30), die Kupferfolie (32) und der zurückgedrehte Abschnitt (3a) des Abschirmmaschendrahts (3) vorwärts in das Innere eines rückwärtigen Endes (31a) des inneren Eisenrings (31) gedrückt sind.
2. Ein Zusammenbau nach Anspruch 1, bei welchem der Steckverbinderaufnahmeabschnitt (19,29) jedes Gehäuses (12,13) mit einem Flansch (8) eines Abschirmleiters (7) des Steckverbinders (5) in Eingriff steht, und der Steckverbinderaufnahmeabschnitt (19,29) ein nach innen gebogenes Ende (19a,29a) einschließt, um so den Eingriff mit dem Flansch (8) zu sichern.

Revendications

1. Assemblage d'un connecteur électrique (5) et d'un câble blindé (1), l'assemblage comprenant un boîtier de blindage (11) constitué d'une paire d'enveloppes (12, 13), faites d'une matière conductrice de l'électricité, chaque enveloppe (12, 13) comportant une partie recevant le connecteur (19, 29) à son extrémité avant et une partie recevant le câble (17, 27) à son extrémité arrière, les parties recevant le câble (17, 27) des enveloppes (12, 13), lorsqu'elles sont jointes, maintenant une tresse de blindage (3) dénudée provenant du câble blindé (1), une première frette (31) fixant la tresse de blindage (3), une partie en saillie de la tresse de blindage (3) étant retournée en arrière (3a) de manière à envelopper la première frette (31), une feuille conductrice (32) placée sur la tresse de blindage retournée en arrière (3a), et une seconde frette (33) entourant les parties recevant le câble (17, 27) et comprimée par ce moyen pour fixer les parties recevant le câble (17, 27) et réaliser la connexion électrique entre le connecteur (5) et le câble blindé (1), dans lequel la frette extérieure (33) est comprimée de telle manière que les parties recevant le câble (17, 27) des enveloppes (28, 30), la feuille de cuivre (32) et la partie retournée en arrière (39) de la tresse de blindage (3), soient forcées vers l'intérieur le long de l'extrémité arrière (31a) de la frette intérieure (31).
2. Assemblage selon la revendication 1, dans lequel la partie recevant le connecteur (19, 29) de chaque enveloppe (12, 13) est enclenchée avec une collerette (8) d'un conducteur de blindage (7) du connecteur (5), et dans lequel la partie recevant le connecteur (19, 29) comprend une extrémité recourbée vers l'intérieur (19a, 29a) de manière à assurer l'enclenchement avec la collerette (8).