

Description

The subject invention relates to a connection device for releasable termination of a flat cable.

Such a device is known from US-A-4,406,511. In the cable flat cable openings are provided through which cams can engage protruding from the connection device. In its inserted position the flat cable is received in the connector part and the connection device which is locked laterally from the connector part prevents pulling loose of the flat cable. If the connection device is disconnected from the connector part it will separate, after removal of the flat cable from the connector part, from this flat cable.

This device is designed as strain relief. However, it cannot be prevented that after removal of the flat cable short circuit or damage to components of the apparatus might occur because exposed ends of the cable can contact a live part of the apparatus. Furthermore one has to be always cautious not to lose the connection device during such circumstances because this is a separate part.

The invention aims to provide a connection device for a flat cable which can protect the bare conductor extremities of said cable, said connection device being used together with a connector.

This object is realized with the characterizing features of claim 1. The expression "connector part" is used to encompass all kinds of devices to which a cable can be fixed.

The legs do protect the unisolated extremities of the cable against short circuiting, such that it is possible to introduce and remove the cable in and from the connector part respectively whilst under voltage and also no further detrimental effects result from working loose of the cable from the connector part during operation or shipment from e.g. vibrations.

In the prior art it is known to introduce flat cables in conductors. Before introduction the insulation is stripped from the extremity of the cable such that the conductors are exposed. Such connector parts can e.g. comprise wire trap connector traps as described in NL-A-8901467. A feature of this wire trap is that it is also possible to disengage a cable from the trap. Although it is possible in most cases to effect introducing and releasing of the cable from the connector part in a condition wherein the related device is switched off, there are situations wherein during (partially) functioning of the related device the cable has to be introduced or removed. Furthermore under severe conditions working loose of the cables has been observed (such as by vibrations). In all these conditions the danger of short circuiting because of the bare conductors or otherwise undesired contacting arises.

According to a preferred embodiment of the invention the means to engage the connector part are arranged to allow only one position of introduction of

the connection device into the connector. Once fitted to the cable in this way positioning of the cable relative to the connector part will be obtained. This is in particular of interest if more than one conductor lead is provided in the cable.

According to a further preferred embodiment the position of the flat cable relative to the connection device is fixed in that the lug means are arranged to allow only one position of introduction into the at least one opening of the cable.

In combination with connector parts, such as wire traps, it is necessary to be able to move the cable relative to the connector part to make or disconnect the connection between the exposed extremity of the conductor and the contact within the connector part. To allow such displacement according to the invention the lug means have a size in the direction of introduction of said cable being substantially smaller than said opening in the cable in the direction of introduction of the cable.

According to a preferred embodiment of the connection device described above it comprises a body with bridging portions from which the means to engage the cable extend in one direction and from which the means to engage the connector part extend in the opposite direction. Preferably the lug means are connected to said bridging portions through leg means. According to a further preferred embodiment gripping means are provided for controlling the movement of the lug means being parallel and spaced from the means to engage the connector part.

As indicated above the connection device according to the subject application can be used with a wire trap connector part such e.g. described in NL-A-8901467. Such a wire trap can comprise an upper part being removably arranged relative to a lower part in which the contact is arranged.

As indicated above the flat cable to be used with a cover assembly must have an opening with a size in the direction of introduction being at least several times the length of the means which project in said opening of the connection device to allow movement in the direction of introduction (or removal) of the cable relative to the cover.

The invention will be explained below with reference to a number of examples of embodiments shown in the drawings, in which:

Fig. 1 shows in side view a cable and a cover device according to the invention, not fitted;

Fig. 2a-2e shows the cover device with a cable according to Fig. 1 in side view, and partially in cross-section, fitted in different positions relative to a connector part;

Figs. 3a - 3b show top view of the connector part and cover device according to Figs. 1 and 2 and Figs 4a - 4c show a further embodiment in different positions of the cover device according to the invention, combined with a connector part;

Fig. 5 shows another embodiment of the cover device according to the invention; and Figs. 6a-6b show a modified embodiment in different positions of the cover device according to the invention.

In Fig. 1 the cover device according to the invention is shown in its entirety by 1. It comprises a body part 2 and arms 3 and 4. Arm 3 is provided with a first end 5 and a second end 6, and arm 4 is provided with a first end 7 and a second end 8. Locking lips 9 and 10, provided with locking lobes 11, are fitted on the body 2. Second ends 6 and 8 are provided with bevels 12 and 13.

Fig. 1 also shows a cable, shown in its entirety by 15. It comprises conductors 16 with insulation 17 between them. It can be seen that locking apertures 18 and apertures 19 determining the polarity are fitted in said insulation.

Fig. 2a shows a combination of the cover device according to Fig. 1 and a connector part 20 which is known in the state of the art (see NL-A-8901467). The connector part comprises two portions 22, 23 which can be moved relative to each other. The portion 22 is provided with a resilient tongue 21 having an aperture 24, and the movable portion 23 is provided with a bevel 25, which can engage on the top end of tongue 21. Movable portion 22 is provided with a support 26.

Fig. 2b shows the position on placing of cover device 1 on connector part 20. Lobes 14 engage behind a recess in the movable portion 23. Through pressing down cover device 1 from the situation shown in Fig. 2a, the second ends 6 and 8 will move apart, and the lobes 14 will move along the movable portion 23 and snap behind it. Releasing can be achieved by moving the first ends 5, 7 of the arms 3, 4 towards each other.

Fig. 2c shows the situation during insertion of cable 15. Cable 15 is moved along locking lobes 11. This is possible without special operation of the cover device 1 through the fact that said locking lobes 11 are bevelled. Cable 15 cannot be taken down further than the top boundary of the aperture 19 engaging the body part 2. Through the presence of these apertures, the cable can be taken far down enough in only one position, so that the conductor 16 in the connector can come into contact with tongue 21. Through the downward movement of the conductor 16, tongue 21 will bend away, but conductor 16 cannot move back because tongue 21 together with supporting face 26 provides an efficient lock.

Fig. 2d shows the situation during withdrawal. It can be seen that the boundary of aperture 18 comes to rest against locking lobe 11 and thus the cover device effectively prevents the cable from moving back. On further movement of the cover device 1 and portion 22 of the connector towards each other, surface 27 of portion 23, which is normally held behind lobe-shaped projection 28 of portion 22, will move outwards. Part 25 will also press tongue 21 downwards,

so that the cable is no longer pressed against supporting point 26. This makes it possible to remove cable 15 together with cover device relief 1 and portion 23 from portion 22.

Opening 18 in cable 15 is elongated to allow movement of cable 15 relative to locking lobes 11. This movement of cable 15 relative to cover device 1 is of importance during introduction, removal respectively of conductor 16 from tongue 21. If cover device is connected to cable 15 and cover device 1 is not connected to the connector, it is prevented that conductors 16 can short circuit, contact any part of the related device or the person effecting contact or withdrawal by virtue of the protecting first end 7 and second end 8. By engaging these ends 6 and 8 of the cover device 1 in the condition not introduced in the connector part, but provided with cable 15, locking lobes 11 come apart such that it is possible to remove cable 15 from the locking device 1 according to the invention.

Fig. 3a shows a top view of connector part 20 according to Fig. 2. It can be seen that it is provided with different guide slots 30, 31. Guide slot 31 is dovetailed in this case. A corresponding top view of the cover device 1 is shown in Fig. 3b. It can be seen that it is provided with projections 32 of corresponding dovetailed shape. In this way it is ensured that the cover device 1 can be placed on the connector part 20 only in one position. The precise location of the cable 15 through the apertures 19 relative to the cover device 1 and the precise location of cover device 1 relative to connector part 20 ensures precise location of the cable 15 relative to the connector part 20.

Figs. 4a-4c show a further embodiment of the invention. In this case the cover device is indicated in its entirety by 40. Apart from the parts described above, the cover device functions as a second portion of the connector part 41. For this purpose, it is provided with a bevel 42 which can engage with tongue 21 of part 41 of the cover device. This is shown in Fig. 4a, in which the cable is shown in the position for fitting in the cover device or connector. Fig. 4b shows the situation during fitting. Through moving the cover device 40 and the connector part 41 towards each other, the second ends 44, 45 of the arms of the cover device will be moved outwards and tongue 21 will be pressed away by bevelled portion 42. After this, cable 15 can be moved upwards to such an extent that the boundary of aperture 18 touches locking lobe 11. Subsequently, when the first ends 46 and 46 are pressed in, cover device 40 can be detached from connector part 41 together with the cable 15. Locking lobe 11 can be moved out of aperture 18 by pressing the two ends 44 into the position detached from each other.

Fig. 5 shows a further embodiment of the invention. In this case cover device 50 is engaged, by means not shown in any further detail, with connector

part 51, comprising portions 52 and 53. When cover device 50 is pressed onto portion 53, the bevelled portion 54 thereof is pressed against tongue 21, and the passage for the cable is released.

Figs. 6a, 6b show a further modified embodiment of the invention. In this case the cover device is indicated by 60 and the locking lobe comprises a part 61 projecting from the body. The body is provided with a bevel 62 to operate tongue 21.

Claims

1. Connection device (1,40,50,60;20) for releasable termination of a flat cable (15), comprising a cable receiving part (1) and a connector part (20), the cable receiving part being provided at one end with opening engaging means (11,61) to engage an opening (19) in said cable (15) and being mechanically connected at the other end with the connector part, said cable receiving part (1) being provided near its free end with connector engaging means (14,44) to releasibly engage the connector part (20), characterized in that the cable receiving part has a body (2) defining a passage for said cable between two portions bridging the cable over its width and two sides, in that the ends of the cable receiving part (1) and connector part (20) are substantially in line with each other so as to position the cable, connection device substantially according to a longitudinal axis, in that the cable receiving part is provided with legs (6,8,50) extending from bridging portions of the cable receiving part to the free end of the connector part and defining there between an opening for accommodating the free end of said cable and to receive the connector part (20) for mechanical connection of the connector part (20) and cable receiving part (1), and in that the opening engaging means comprise lug means (11,61) displaceable perpendicularly to said longitudinal axis to provide passage and locking of the cable.
2. Connection device according to claim 1, wherein said connector engaging means (14,44) are arranged to allow only one position of introduction of the connector part into the connector.
3. Connection device according to one of the preceding claims, wherein the lug means (11,61) are arranged to allow only one position of introduction of the at least one opening of the cable in the cable part.
4. Connection device according to one of the preceding claims, wherein the lug means (11,61) have a size in the direction of introduction of said cable being substantially smaller than said open-

ing in said cable in the direction of introduction of said cable.

5. Connection device according to one of the preceding claims wherein the cable engaging means (11) extend in one direction from the bridge portion and the connector engaging means (14,44) extend in the opposite direction from the bridge member.
6. Connection device according to claim 5, wherein the lug means (11,61) are connected to said bridge portion through leg means.
7. Connection device according to claim 5 or 6, wherein gripping means (3,4;45,46) extending from said bridging portions are provided for controlling the movement of the lug means being parallel and spaced from the connector engaging means (14, 44).
8. Connection device according to one of the preceding claims, wherein said connector part (20,41,51) comprises a wire trap connector.
9. Connection device according to claim 8, wherein the wire trap connector comprises a removable top part (23).
10. Connection cable assembly comprising a connection device according to one of the preceding claims with a flat cable wherein the insulation between two conductors of the flat cable has at least one opening having in the direction of introduction a length of at least several times the length of the means (11,61) to project into said opening.
11. Connection cable assembly according to claim 10 in combination with one of the claims 6-9, having a recess to receive the bridge portion.

Patentansprüche

1. Verbindungseinrichtung (1,40,50,60;20) zum lös-
baren Abschliessen eines Flachkabels (15) mit
einem kabelaufnehmenden Teil (1) und einem Ver-
bindungsteil (20), wobei das kabelaufnehmende
Teil an einem Ende mit Öffnungs-Eingriffs-
einrichtungen (11, 61) versehen ist, um mit einer
Öffnung (19) im Kabel (15) in Eingriff zu kommen,
und mechanisch an dem anderen Ende mit dem
Verbindungsteil verbunden ist, wobei das kabelauf-
nehmende Teil (1) in der Nähe seines freien Endes
mit Verbindungs-Eingriffseinrichtungen (14, 44)
versehen ist, um lösbar mit dem Verbindungsteil
(20) in Eingriff zu kommen, dadurch gekenn-



part 51, comprising portions 52 and 53. When cover device 50 is pressed onto portion 53, the bevelled portion 54 thereof is pressed against tongue 21, and the passage for the cable is released.

Figs. 6a, 6b show a further modified embodiment of the invention. In this case the cover device is indicated by 60 and the locking lobe comprises a part 61 projecting from the body. The body is provided with a bevel 62 to operate tongue 21.

Claims

1. Connection device (1,40,50,60;20) for releasable termination of a flat cable (15), comprising a cable receiving part (1) and a connector part (20), the cable receiving part being provided at one end with opening engaging means (11,61) to engage an opening (19) in said cable (15) and being mechanically connected at the other end with the connector part, said cable receiving part (1) being provided near its free end with connector engaging means (14,44) to releasably engage the connector part (20), characterized in that the cable receiving part has a body (2) defining a passage for said cable between two portions bridging the cable over its width and two sides, in that the ends of the cable receiving part (1) and connector part (20) are substantially in line with each other so as to position the cable, connection device substantially according to a longitudinal axis, in that the cable receiving part is provided with legs (6,8,50) extending from bridging portions of the cable receiving part to the free end of the connector part and defining there between an opening for accommodating the free end of said cable and to receive the connector part (20) for mechanical connection of the connector part (20) and cable receiving part (1), and in that the opening engaging means comprise lug means (11,61) displaceable perpendicularly to said longitudinal axis to provide passage and locking of the cable.
2. Connection device according to claim 1, wherein said connector engaging means (14,44) are arranged to allow only one position of introduction of the connector part into the connector.
3. Connection device according to one of the preceding claims, wherein the lug means (11,61) are arranged to allow only one position of introduction of the at least one opening of the cable in the cable part.
4. Connection device according to one of the preceding claims, wherein the lug means (11,61) have a size in the direction of introduction of said cable being substantially smaller than said open-

ing in said cable in the direction of introduction of said cable.

5. Connection device according to one of the preceding claims wherein the cable engaging means (11) extend in one direction from the bridge portion and the connector engaging means (14,44) extend in the opposite direction from the bridge member.
6. Connection device according to claim 5, wherein the lug means (11,61) are connected to said bridge portion through leg means.
7. Connection device according to claim 5 or 6, wherein gripping means (3,4;45,46) extending from said bridging portions are provided for controlling the movement of the lug means being parallel and spaced from the connector engaging means (14, 44).
8. Connection device according to one of the preceding claims, wherein said connector part (20,41,51) comprises a wire trap connector.
9. Connection device according to claim 8, wherein the wire trap connector comprises a removable top part (23).
10. Connection cable assembly comprising a connection device according to one of the preceding claims with a flat cable wherein the insulation between two conductors of the flat cable has at least one opening having in the direction of introduction a length of at least several times the length of the means (11,61) to project into said opening.
11. Connection cable assembly according to claim 10 in combination with one of the claims 6-9, having a recess to receive the bridge portion.

Patentansprüche

1. Verbindungseinrichtung (1,40,50,60;20) zum lösbaren Abschliessen eines Flachkabels (15) mit einem kabelaufnehmenden Teil (1) und einem Verbindungsteil (20), wobei das kabelaufnehmende Teil an einem Ende mit Öffnungs-Eingriffseinrichtungen (11, 61) versehen ist, um mit einer Öffnung (19) im Kabel (15) in Eingriff zu kommen, und mechanisch an dem anderen Ende mit dem Verbindungsteil verbunden ist, wobei das kabelaufnehmende Teil (1) in der Nähe seines freien Endes mit Verbindungs-Eingriffseinrichtungen (14, 44) versehen ist, um lösbar mit dem Verbindungsteil (20) in Eingriff zu kommen, dadurch gekenn-



zeichnet, daß das kabelaufnehmende Teil einen Körper (2) hat, der einen Durchgang für das Kabel zwischen zwei Bereichen definiert, die das Kabel über seine Breite und zwei Seiten überbrücken, daß die Enden des kabelaufnehmenden Teils (1) und des Verbindungsteils (20) im wesentlichen miteinander auf einer Linie liegen, um so das Kabel und die Verbindungseinrichtung im wesentlichen gemäß einer Längsachse zu positionieren, daß das kabelaufnehmende Teil mit Schenkeln (6, 8, 50) versehen ist, die sich von überbrückenden Bereichen des kabelaufnehmenden Teils zum freien Ende des Verbindungsteils erstrecken und dazwischen eine Öffnung zur Aufnahme des freien Endes des Kabels definieren und zum Aufnehmen des Verbindungsteils (20) zur mechanischen Verbindung des Verbindungsteils (20) und des kabelaufnehmenden Teils (1), und daß die Öffnungs-Eingriffseinrichtungen rechtwinklig zur Längsachse verschiebbare Ansatzvorrichtungen (11, 61) aufweisen, um die Durchführung und das Festhalten bzw. Arretieren des Kabels zu ermöglichen.

2. Verbindungseinrichtung nach Anspruch 1, wobei die Verbindungs-Eingriffseinrichtungen (14, 44) so angeordnet sind, daß nur eine Einführposition des Verbindungsteils in den Verbinder möglich ist.
3. Verbindungseinrichtung nach einem der vorhergehenden Ansprüche, wobei die Ansatzvorrichtungen (11, 61) angeordnet sind, um nur eine Einführposition der zumindest einen Öffnung des Kabels in den Kabelteil zu erlauben.
4. Verbindungseinrichtung nach einem der vorhergehenden Ansprüche, wobei die Ansatzvorrichtungen (11, 61) eine Größe in Richtung der Einführung des Kabels haben, die wesentlich kleiner ist als die Öffnung im Kabel in der Richtung der Einführung des Kabels.
5. Verbindungseinrichtung nach einem der vorhergehenden Ansprüche, wobei die Kabel-Eingriffseinrichtungen (11) sich einer Richtung von dem Brückenbereich erstrecken und die Verbindungseingriffseinrichtungen (14, 44) sich in der entgegengesetzten Richtung von dem Brückenbauteil erstrecken.
6. Verbindungseinrichtung nach Anspruch 5, wobei die Ansatzvorrichtungen durch Schenkeleinrichtungen mit dem Brückenbereich verbunden sind.
7. Verbindungseinrichtung nach Anspruch 5 oder 6, wobei Greifvorrichtungen (3, 4; 45, 46), die sich von den überbrückenden Bereichen erstrecken,

zur Steuerung der Bewegung der Ansatzvorrichtungen parallel und von den Verbindungseingriffseinrichtungen (14, 44) beabstandet vorgesehen sind.

8. Verbindungseinrichtung nach einem der vorhergehenden Ansprüche, wobei das Verbindungsteil (20, 41, 51) ein Drahtfang-Verbindungsglied (wire trap connector) aufweist.
9. Verbindungseinrichtung nach Anspruch 8, wobei das Drahtfang-Verbindungsglied ein abnehmbares Oberteil (23) aufweist.
10. Verbindungskabelbaugruppe mit einer Verbindungseinrichtung nach einem der vorhergehenden Ansprüche mit einem Flachkabel, wobei die Isolation zwischen zwei Leitern des Flachkabels mindestens eine Öffnung mit einer Länge von mindestens einigen Vielfachen der Länge der Vorrichtung (11, 61) in der Richtung der Einführung hat, um in die Öffnung vorzustehen.
11. Verbindungskabelbaugruppe nach Anspruch 10 in Kombination mit einem der Ansprüche 6 bis 10 mit einer Vertiefung zur Aufnahme des Brückenbereichs.

Revendications

1. Dispositif de connexion (1, 40, 50, 60; 20) pour une terminaison amovible d'un câble plat (15), comportant une partie (1) de réception du câble et une partie formant connecteur (20), la partie de réception du câble comportant, à une extrémité, des moyens (11, 61) d'engagement dans une ouverture, destinés à s'engager dans une ouverture (19) située dans ledit câble (15) et étant connectée mécaniquement par son autre extrémité, à la partie formant connecteur, ladite partie (1) de réception du câble comportant, à proximité de son extrémité libre, des moyens (14, 44) d'engagement avec le connecteur, destinés à s'engager de façon amovible avec la partie formant connecteur (20), caractérisé en ce que la partie de réception du câble possède un corps (2) définissant un passage pour ledit câble entre deux parties d'enveloppement enserrant le câble sur sa largeur et sur deux côtés, en ce que les extrémités de la partie (1) de réception du câble et de la partie formant connecteur (20) sont sensiblement réciproquement alignées de manière à positionner le câble, le dispositif de connexion sensiblement suivant un axe longitudinal, en ce que la partie de réception du câble comporte des bras (6, 8, 50) qui s'étendent à partir de parties d'enveloppement, que comporte la partie de récep-



tion du câble, jusqu'à l'extrémité libre de la partie formant connecteur et définissant, entre ces éléments, une ouverture servant à recevoir l'extrémité libre dudit câble et à recevoir la partie formant connecteur (20) pour établir une connexion mécanique entre la partie formant connecteur (20) et la partie (1) de réception du câble, et en ce que les moyens d'engagement dans l'ouverture comprennent des moyens en forme de pattes (11, 61) déplaçables perpendiculairement audit axe longitudinal de manière à établir un passage et bloquer le câble.

2. Dispositif de connexion selon la revendication 1, dans lequel lesdits moyens (14, 44) destinés à s'engager avec le connecteur sont agencés de manière à permettre une seule position d'introduction de la partie formant connecteur dans le dispositif de connexion. 15
3. Dispositif de connexion selon l'une des revendications précédentes, dans lequel les moyens en forme de pattes (11, 61) sont agencés de manière à permettre une seule position d'introduction d'au moins une ouverture du câble dans la partie de réception du câble. 20 25
4. Dispositif de connexion selon l'une des revendications précédentes, dans lequel les moyens en forme de pattes (11, 61) possèdent une dimension dans la direction d'introduction dudit câble, qui est sensiblement inférieure à ladite ouverture ménagée dans ledit câble dans la direction d'introduction dudit câble. 30 35
5. Dispositif de connexion selon l'une des revendications précédentes, dans lequel les moyens (11) d'engagement du câble s'étendent dans une direction à partir de la partie d'enveloppement, et les moyens (14, 44) d'engagement avec le connecteur s'étendant dans la direction opposée à partir de l'élément d'enveloppement. 40
6. Dispositif de connexion selon la revendication 5, dans lequel les moyens en forme de pattes (11, 61) sont raccordés à ladite partie d'enveloppement par des moyens formant bras. 45
7. Dispositif de connexion selon la revendication 5 ou 6, dans lequel des moyens de saisie (3, 4; 45, 46), qui s'étendent à partir desdites parties d'enveloppement sont prévus pour la commande du déplacement des moyens en forme de pattes parallèlement aux et en étant espacés des moyens (14, 44) d'engagement avec le connecteur. 50 55
8. Dispositif de connexion selon l'une des revendications précédentes, dans lequel ladite partie for-

mant connecteur (20, 41, 51) comprend un connecteur à retenue du fil.

9. Dispositif de connexion selon la revendication 8, dans lequel le connecteur à retenue du fil comprend une partie supérieure amovible (23). 5
10. Ensemble de câble à connexion comprenant un dispositif de connexion selon l'une des revendications précédentes, équipé d'un câble plat et dans lequel l'isolant entre deux conducteurs du câble plat comporte au moins une ouverture possédant, dans la direction d'introduction, une longueur égale au moins à un multiple de la longueur des moyens (11, 61), destinés à faire saillie dans ladite ouverture. 10
11. Ensemble à câble de connexion selon la revendication 10, en combinaison avec l'une des revendications 6 - 10, comportant un renforcement servant à recevoir la partie d'enveloppement. 15 20 25 30 35 40 45 50 55