

Description

The present invention relates to a latching mechanism for electrical connectors and in particular to a mechanism which can be operated by one hand acting from only one end of the connector.

There are many well known latching mechanisms for electrical connectors. Some of these require two hand operation while others, such as the one described in U.S. Patent No. 4,178,051, can be operated by one hand only by squeezing the arms 38 of the latching member 28 together. This causes the eject arm to force the connector from the header. The device described in this patent can be operated by one hand, however, it requires grasping the connector at opposite ends to effect both the latching and release. Other connectors have a similar requirement for grasping opposite sides, such as the connector shown in U.S. Patent No. 4,067,633 in which the side handles 34, 36 of the connector are squeezed together to effect a camming of housing 14 within housing 12 thereby opening the terminals 16. While these mechanisms are completely satisfactory in operation, they are not suitable for use in high density arrays of plugs where it is only possible to gain access to one end or side portion of the connector.

There are other known latching mechanisms which are one hand operated, such as that shown in U.S. Patent No. 4,172,627. This mechanism has frame slidably mounted with respect to one mating connector member and a fixed mounting plate secured to the other connector member. The frame is manually moved to a release position and returns to a latched position under the influence of a spring. Should anything interfere, such as incomplete mating, latching will not be effected.

In the present invention, therefore, a latching mechanism for positively locking together mated connector members is operable with one hand from one end of the connector and is formed by an actuating member connected to one end of a latching member. Both are mounted on one of a pair of mating connector members with the actuating member being pivotally mounted and the latching member slidable across the mating face. Each of the mating connector members has at least two profiled abutment studs secured thereto in fixed spaced relationship and the studs come into an abutting relationship when the connector members are mated. The latching member is profiled to selectively engage all four studs thereby securing the connectors together. The actuating member causes the relative driven sliding movement of the latching member in either the latching or unlatching direction.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is an exploded perspective view of the subject latching system together with a pair of matable connector members;

FIGURE 2 is a perspective view of the subject invention fully assembled on the unmated connector members of Figure 1;

FIGURE 3 is a side elevation, partly in section, of the subject latching system in an unmated and unlatched condition; and

FIGURE 4 is a side elevation, partly in section, of the subject latching system in a mated and latched condition.

The subject latching mechanism has been shown in Figures 1 and 2 with a connector of known type as shown for example in U.S. Patent Nos. 3,101,229 or 3,879,099 or 4,062,616, each of which has an elongated D-shaped profile of insulative material having terminated contacts therein and a peripheral metal flange. The connector comprises a receptacle member 10 and a mating plug member 12. The plug member 12 has attached thereto a cable strain relief 14 which is generally rectangular, defines a cable enclosing cavity with a cable entry and means to grippingly engage the plug member. It can be either a unitary member or an assembly of mating parts.

The subject latching system includes an actuating assembly 16, a latching member 18, a pair of first abutment studs 20, 22, and a pair of second abutment studs 24, 26. The first abutment studs 20, 22 are secured in apertures 28, 30 in opposite ends of a peripheral flange 32 on the plug member 12 while the second studs 24, 26 are mounted in a similar fashion in flange 34 on the receptacle member 10. It should be noted that the receptacle member would most likely be panel mounted so that the second studs could also be used to mount the receptacle member 10 in a panel (not shown). The actuating assembly 16 is secured at one end of the flange 32 on plug member 12 by first stud 20. The actuating assembly 16 includes a pivot member 36 having an actuating lever 38 attached thereto by means of pivot pin 40. The lever 38 has a pair of inwardly directed arms 42, 44 at one end thereof. The latching member 18 is an elongated rigid member having a generally channel shaped section formed by base 46 and integral spaced side walls 48, 50 and provided in its base with a profiled opening 52 including slots 54, 56 at opposite ends thereof. Due to the large size of opening 52, it is clear that sidewalls 48, 50 provide the necessary rigidity and strength for member 18. The opening 52 has a profile generally similar to the hood 58 surrounding the pin terminals 60 of the plug member 12 but longer in length to allow relative transverse motion. The slots 54, 56 are of sufficient length to engage and slide in the annular grooves 62, 64 of the mounting studs 20, 22 respectively. At each end of the member 18 there is an overturned extension 66, 68 each with a respective slot 70, 72 with the slots 70, 72 overlying slots 54, 56, respectively in a parallel spaced relationship. The slots 70, 72 are spaced so as to engage in the annular grooves 74, 76 in the second abutment studs 24, 26, respectively. It should be noted that the slot 70 is a substantially straight slot while the slot 72 has a generally

keyhole configuration of a narrow open neck extending into an enlarged generally circular opening.

It should be noted that the first and second abutment studs have been shown with two different configurations. They, of course, could be identical and could have a variety of configurations. The only requirement for these members is to have mounting means, abutment faces, and annular slots spaced from the abutment faces.

The subject latching system is assembled as shown in Figure 2 with the hood 58 exposed in the opening 52, first abutment studs 20, 22 passing through the respective slots 54, 56 and spacer washers 78, 80 into the apertures 28, 30 of the plug. The pivot plate 36 is secured to the stud 20 and the arms 42, 44 of the lever 38 engage under opposite sides of the extension 66 of latching member 18.

The operation of the subject latching system will be readily understood from Figures 3 and 4 which show that when the lever 16 is rotated in a clockwise direction, as shown by the arrow indicating pressure on the tail of the lever, the sliding latching member 18 will be drawn to its uppermost position (Figure 3). In this position the abutment studs 20, 22 engage the edges of respective slots 54, 56 by grooves 62, 64 to hold the latching member 18 in assembly with the plug member 12. It will also be noted that in this position the extension 66 is moved so that slot 70 is clear of the second abutment stud 24 while the enlarged portion of slot 72 is aligned with the second abutment stud 26 to receive the stud therethrough. Mating of the connector members 10 and 12 brings the first and second stud members into an abutting relationship, as shown in Figure 4. Rotation of the lever in a counterclockwise direction, as shown by the arrow in Figure 4, drives the latching member 18 downwardly so that the slots 70, 72 engage in the respective annular grooves 74, 76 of the second abutment stud members thereby securing the connector members together.

It will be appreciated from the foregoing that the simple rocking motion of the lever 38 is all that is necessary to effect the locking and unlocking engagement of the connector. It will also be appreciated that it is not necessary to use two hands for this operation or even to grasp both ends of the connector with one hand.

From the foregoing, it will be seen that the subject invention can be operated by one hand acting on only one end of a connector. Thus, the invention is highly useful in high density arrays, especially where it is desirable to latch both opposite sides of the connector. Further, it will be appreciated that the subject latching system can be applied to almost any known electrical connector regardless of the shape, although elongated connectors clearly would be most likely to be used in a high density array. It will also be appreciated that the simplicity of the subject invention makes it particularly easy and economic to manufacture.

Claims

1. A latching mechanism for positively securing a pair of mating electrical connector members (10, 12) together in a mated condition and releasing them for unmating and operable by one hand acting on only one end of the connector members, said connector members each being formed of insulative material defining terminal passages opening on mating faces and with a plurality of contacts each terminating a respective conductor and received in a respective passage, at least two first abutment members (20, 22) mounted in spaced relationship on one of said pair of connector members (12); at least two second abutment members (24, 26) each mounted on the other connector member (10) and aligned to abut a respective first abutment member (20, 22); said latching mechanism characterized by a latching member (18) defining a profiled opening (52) similar to but larger in one dimension than mating portions (58) of said connector members (10, 12), oppositely directed first slots (54, 56) at each end of said profiled opening (52), an extension (66, 68) at each end of said profiled opening (52) overlying each said first slot (54, 56), a second slot (70, 72) formed in each said overlying portion (66, 68) parallel to and spaced from the first slot (54, 56), said latching member (18) being mounted on one of said connector members (12) with said first abutment members (20, 22) engaging in said first slots (54, 56) and said mating portions (58) of said connector member (12) being exposed in said opening (52); actuating means (16) mounted on one end of said one connector member (12) and connected to positively drive said latching member (18) transversely with respect to the mating portion (58) of said connector member (12); whereby upon mating of said connector members (10, 12) and actuating of said latching member (18) in a latching direction said second abutment members (24, 26) are engaged by said second slots (70, 72) to secure said connector members (12, 12) together in a mated condition.

2. A latching mechanism according to claim 1 characterized by said first and said second abutment members (20, 22, 23, 26) being elongated members having mounting means on one end, an abutting surface on the opposite end, and an annular groove (62, 64, 76, 76) therein spaced from said abutting surface.

3. A latching mechanism according to claim 1 wherein said actuating means (16) is characterized by a pivot member (36) secured to said one end of said one connector member (12); and a lever (38) pivotally mounted on said pivot member (36) with one end connected to said latching member (18).

4. A latching mechanism according to claim 1 further characterized by at least one of said second slots (70, 72) has a keyhole shaped profile whereby said second abutment member (24, 26) is received through the enlarged portion and engaged by the narrow neck.

5. A latching mechanism according to claim 1

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From the foregoing, it will be seen that the subject invention can be operated by one hand acting on only one end of a connector. Thus, the invention is highly useful in high density arrays, especially where it is desirable to latch both opposite sides of the connector. Further, it will be appreciated that the subject latching system can be applied to almost any known electrical connector regardless of the shape, although elongated connectors clearly would be most likely to be used in a high density array. It will also be appreciated that the simplicity of the subject invention makes it particularly easy and economic to manufacture.

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4. A latching mechanism according to claim 1 further characterized by at least one of said second slots (70, 72) has a keyhole shaped profile whereby said second abutment member (24, 26) is received through the enlarged portion and engaged by the narrow neck.

5. A latching mechanism according to claim 1



further characterized by said first slots (54, 56) are so dimensioned as to allow limited relative movement of said latching member (18) without disengagement from said abutment members (20, 22) of said one connector member (12).

Patentansprüche

1. Verriegelungsmechanismus zum positiven Aneinanderbefestigen von zwei zusammenpassenden elektrischen Verbinderelementen (10, 12) in miteinander verbundenem Zustand sowie zum Entriegeln derselben zur Lösung der Verbindung, der mit einer Hand betätigbar ist, die auf nur ein Ende der Verbinderelemente einwirkt, wobei die Verbinderelemente jeweils aus isolierenden Material gebildet sind und an Verbindungsseiten mündende Anschlußdurchlässe mit einer Mehrzahl von Kontaktelementen definieren, die jeweils einen entsprechenden Leiter abschließen und in einem entsprechenden Durchlaß aufgenommen sind, wobei wenigstens zwei erste Anlageelemente (20, 22) voneinander beabstandet an einem der beiden Verbinderelemente (12) angebracht sind und wobei wenigstens zwei zweite Anlageelemente (24, 26) jeweils an dem anderen Verbinderelement (10) angebracht sind und jeweils für die Anlage an einem entsprechenden ersten Anlageelement (20, 22) ausgerichtet sind, gekennzeichnet durch:

ein Verriegelungselement (18), das eine Profilloffnung (52) definiert, die Verbindungsbereichen (58) der Verbinderelemente (10, 12) ähnlich ist, jedoch in einer Dimension größer als dieselben ist,

in entgegengesetzte Richtungen weisende erste Schlitze (54, 56) an jedem Ende der Profilloffnung (52),

einen Fortsatz (66, 68) an jedem Ende der Profilloffnung (52), der jedem ersten Schlitz (54, 56) überlagert ist,

einen zweiten Schlitz (70, 72), der in jedem überlagerten Bereich (66, 68) parallel zu dem ersten Schlitz (54, 56) sowie beabstandet von diesem ausgebildet ist,

wobei das Verriegelungselement (18) an einem der Verbinderelemente (12) derart befestigt ist, daß die ersten Anlageelemente (20, 22) in die ersten Schlitze (54, 56) eingreifen und die Verbindungsbereiche (58) des Verbinderelements (12) in der Öffnung (52) freiliegen, und durch

eine Betätigungseinrichtung (16), die an einem Ende des einen Verbinderelements (12) befestigt und derart mit diesem verbunden ist, daß sie das Verriegelungselement (18) positiv in Querrichtung in bezug auf den Verbindungsbereich (58) des Verbinderelements (12) drücken kann, wodurch nach Verbinden der Verbinderelemente (10, 12) und nach Betätigung des Verriegelungselements (18) in Verriegelungsrichtung die zweiten Schlitze (70, 72) an den zweiten Anlageelementen (24, 26) angreifen, um die Verbinderelemente (10, 12) in miteinander verbundenem Zustand aneinander zu befestigen.

2. Verriegelungsmechanismus nach Anspruch

1, dadurch gekennzeichnet, daß es sich bei den ersten und den zweiten Anlageelementen (20, 22, 24, 26) um längliche Elemente handelt, die eine Befestigungseinrichtung an einem Ende und eine Anlagefläche an dem entgegengesetzten Ende aufweisen und in denen eine Ringnut (62, 64, 76, 76) ausgebildet ist, die von der Anlagefläche beabstandet ist.

3. Verriegelungsmechanismus nach Anspruch 1, wobei die Betätigungseinrichtung (16) gekennzeichnet ist durch ein Schwenkelement (36), das an dem genannten einen Ende des einen Verbinderelements (12) befestigt ist, und durch einen Hebel (38), der an dem Schwenkelement (36) schwenkbar befestigt ist, wobei ein Ende desselben mit dem Verriegelungselement (18) verbunden ist.

4. Verriegelungsmechanismus nach Anspruch 1, dadurch gekennzeichnet, daß wenigstens einer der zweiten Schlitze (70, 72) ein schlüssellochförmiges Profil aufweist, wodurch das zweite Anlageelement (24, 26) durch den vergrößerten Bereich hindurch aufgenommen wird und der enge Hals an diesem angreift.

5. Verriegelungsmechanismus nach Anspruch 1, dadurch gekennzeichnet, daß die ersten Schlitze (54, 56) so dimensioniert sind, daß sie eine begrenzte Relativbewegung des Verriegelungselements (18) gestatten, ohne daß sich dieses dabei von den Anlageelementen (20, 22) des einen Verbinderelements (12) löst.

Revendications

1. Mécanisme de verrouillage pour fixer fermement deux éléments accouplables (10, 12) de connecteur électrique, l'un à l'autre, dans un état accouplé, et pour les libérer afin de les désaccoupler, ce mécanisme pouvant être manoeuvré d'une main agissant sur une seule extrémité des éléments du connecteur, lesdits éléments du connecteur étant réalisés chacun en une matière isolante définissant des canaux à bornes s'ouvrant sur des faces d'accouplement, et plusieurs contacts terminant chacun un conducteur associé et logés chacun dans un canal respectif, au moins deux premiers éléments de butée (20, 22) montés à distance l'un de l'autre sur un premier (12) des deux éléments du connecteur, au moins deux seconds éléments de butée (24, 26) montés chacun sur le second (10) éléments du connecteur et alignés chacun pour buter contre un premier élément correspondant (20, 22) de butée; ledit mécanisme de verrouillage caractérisé par un élément de verrouillage (18) définissant une ouverture profilée (52) similaire aux parties (58) d'accouplement desdits éléments (10, 12) du connecteur, mais plus grande, dans une dimension, que ces parties, des premières encoches (54, 56), orientées en opposition à chaque extrémité de ladite ouverture profilée (52), une saillie (66, 68) à chaque extrémité de ladite ouverture profilée (52), s'étendant au-dessus de chaque première encoche (54, 56), une seconde encoche (70, 72) formée dans chacune desdites parties (66, 68),



parallèlement à la distance de la première encoche (54, 56), ledit élément de verrouillage (18) étant monté sur l'un (12) desdits éléments du connecteur de façon que lesdits premiers éléments de butée (20, 22) s'enclenchent dans lesdites premières encoches (54, 56) et que lesdites parties d'accouplement (58) desdits éléments (12) du connecteur soient exposées dans ladite ouverture (52); des moyens d'actionnement (16) montés sur une extrémité dudit élément (12) du connecteur et reliées pour entraîner fermement ledit élément (18) de verrouillage transversalement par rapport à la partie (58) d'accouplement dudit élément (12) du connecteur de manière que, à la suite de l'accouplement desdits éléments (10, 12) du connecteur et de l'actionnement dudit élément (18) de verrouillage dans une direction de verrouillage, lesdites secondes encoches (70, 72) s'enclenchent avec lesdits seconds éléments (24, 26) de butée pour fixer lesdits éléments (10, 12) du connecteur l'un à l'autre dans un état accouplé.

2. Mécanisme de verrouillage selon la revendication 1, caractérisé en ce que lesdits premiers et seconds éléments de butée (20, 22, 24, 26) sont des éléments allongés présentant des moyens de

montage à une extrémité, une surface de butée à l'extrémité opposée et une gorge annulaire (62, 64, 74, 76) espacée de ladite surface de butée.

3. Mécanisme de verrouillage selon la revendication 1 dans lequel lesdits moyens (16) d'actionnement sont caractérisés par un élément pivotant (36) fixé à ladite première extrémité dudit premier élément (12) du connecteur; et un levier (38) monté de façon à pouvoir pivoter sur ledit élément pivotant (36), une extrémité étant reliée audit élément (18) de verrouillage.

4. Mécanisme de verrouillage selon la revendication 1, caractérisé en outre en ce qu'au moins l'une desdites secondes encoches (70, 72) présente un profil en forme de trou de serrure de manière que ledit second élément (24, 26) de butée soit reçu dans la partie élargie et enclenché avec le col étroit.

5. Mécanisme de verrouillage selon la revendication 1, caractérisé en outre en ce que les premières encoches (54, 56) sont dimensionnées de façon à permettre un mouvement relatif limité dudit élément (18) de verrouillage sans que lesdits éléments (20, 22) de butée se dégagent dudit premier élément (12) du connecteur.

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