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(54) **CONNECTOR ARRANGEMENT WITH AN ACTUATING SLIDE**

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Description

[0001] The invention relates to connectors with an actuating slide having camming slots for receiving a guide pin of a complementary connector for the purpose of mating the connectors, and in particular to assuring the actuating slide is properly positioned at the time of mating.

[0002] Electrical connectors having a multiplicity of electrical contacts are connected to complementary connectors and then form a connector pair. The higher the number of contacts to be connected, the larger is the force that is required to mate the connectors. It is known to use auxiliary mechanical structure to provide mechanical advantage in order to ease interconnecting the two connectors of the connector pair. These auxiliary mechanical structures may be an actuating slides or levers. Actuating slides are normally moved in a direction transverse to the plug-in direction of the mating connectors. The actuating slide is normally integrated into one of the connectors and has either a camming groove or a guide pin, the mating connector then includes the other part. When the two connectors are joined together, the actuation of the actuating slide causes the guide pin to move through the camming groove.

[0003] EP 587 174 A2 discloses an electrical connector arrangement, in particular for door connectors in automobiles. The connector arrangement has an insulating housing and an actuating slide of conventional U-shaped design. The connector housings are brought into the mated position by actuation of the actuating slide. The actuating slide has two camming grooves on each side wall of the U-shape. The guide pins, which are arranged on the connector housing move in these camming grooves. In order to mate the two complementary connectors, the actuating slide must be in a first position, the entry position, so that the guide pins enter the camming grooves. After the initial joining-together or entry operation, the actuating slide is then moved to a second position, the end position, where the two connectors are interconnected. Since the actuating slide could easily move out of the entry position, it is usually necessary that the actuating slide initially be repositioned prior to the connectors being joined together. This requires an additional work step, which has a disadvantageous effect particularly in the case of conveyor-line assembly.

[0004] EP 501 502 A2 discloses a connector arrangement having a first and a second complementary connector, in which a rotatable plate, on which camming grooves are provided, is provided instead of an actuating slide. In addition, the connector housing of the first complementary connector, to which the rotatable plate is fastened in a rotatable manner, also has a guide slot, and the housing of the second complementary connector has a guide pin which is guided correspondingly during rotation of the rotatable plate through the guide slot and into the camming groove, whereby upon actuation of the lever, the two connectors are joined together. As the rotatable plate also moves through a guide slot in the housing, on which it is rotatably mounted, from a starting position to an end position, it is particularly important for the rotatable plate to be in the starting position when the two connectors are intended to be interconnected. Since it cannot easily be discerned from outside whether the guide grooves are in the correct position, it would be helpful to interlock the guide plate and the connector housing in the entry position. This interlocking would be released only when the complementary connector is inserted.

[0005] JP 62 15 827 A discloses a further connector arrangement incorporating an actuating slide. In order to prevent the actuating slide from falling out of the housing or being brought into the end position during transport, a latch is provided for locking the actuating slide in an entry position where the guide pin can be introduced into the guide groove through the guide slot. The latch is designed in the form of latching arms with latching lugs on the actuating slide which are resilient perpendicularly to the plug-in direction. The latching is effected with a corresponding depression in the housing of the connector, which housing accommodates the actuating slide. Means for unlocking the latches are provided on the complementary connector, in such a way that when the connectors are joined together, the latches are unlocked and the actuating slide can be moved. Consequently, the actuating slide can only be moved from the entry position when the locking is released by inserting a complementary connector.

[0006] WO97/07567 likewise discloses a connector arrangement with an actuating slide. In this case, an arm is provided on the housing. The arm is resilient in the plug-in direction and engages in a groove in the actuating slide. In the groove is arranged a wedge which interacts with the means for unlocking the actuating slide in the entry position so that the actuating slide can be moved.

[0007] The object of the invention is to specify an electrical connector arrangement with an actuating slide in which inadvertent pushing of the actuating slide from the entry position into the end latching position is prevented in a simple manner.

[0008] The object is achieved by means of an electrical connector having the features of Patent Claim 1. Advantageous developments are specified in the subclaims.

[0009] The object achieved by locking the actuating slide in an entry position so that the actuating slide is fixed during transport. It can neither be removed nor pushed further towards the end position from the entry position. The insertion of the complementary, second connector releases the actuating slide from the entry position so that the actuating slide can be moved into the end position.

[0010] It is particularly advantageous that the locking members are opened in a single work operation, that is during the insertion of the second complementary con-

nector when the two connectors are being joined together at the same time. The locking members are designed as an arm on the actuating slide with a latching lug. The arm is resilient in the plug-in direction, and prevents the actuating slide from being pushed from the entry position into the end position. The resilient arm is bounded on one side by the guide slot. It abuts a wall of the cutout or opening in the housing through which the guide pin is introduced into the camming groove. This resilient arm can be actuated directly by the guide pin of the second connector, by pressure in the plug-in direction.

[0011] It is particularly advantageous if complementary latching members are provided on the actuating slide and the first connector to hold the actuating slide in the entry and end positions. The first latching position is the entry position, in which the guide pin can be introduced into the camming groove, and the second position is the end position, in which the two connectors are interconnected. The latching members are designed in such a way that the actuating slide can easily be moved between the entry position and the end position, but can be removed from the connector only with difficulty. The effect already achieved as a result of this is that the actuating slide, once pushed into the connector, will not be lost. During transport, however, it is important that the actuating slide not be pushed in either. This is achieved by the latching members.

[0012] It is furthermore particularly advantageous that the housing of the first connector is not constructed with a greater degree of complexity due to the positioning member. One embodiment achieves this by widening an opening that is required in any case in order to introduce the guide pin into the camming groove of the actuating slide. The latching of the actuating slide in the entry position and in the end position is also provided in those actuating slides which do not have any locking in the entry position. A special design of the latching members is not necessary. The positioning members are formed by an arm on the actuating slide, which arm is resilient in the plug-in direction and is bounded on one side by the guide slot. Moreover, the production of the actuating slide is not made more difficult by the special configuration. Overall, the solution involved is one which is very simple in terms of production technology.

[0013] An exemplary embodiment will now be explained with reference to the figures, in which:

Figure 1 shows a cross-section through a housing of a representation of a first connector with an actuating slide and with a phantom indication of a representation of a second connector with pins in the non-connected state;

Figure 2 shows a further cross-section of the housing of the first connector with the two connectors in a first position with the actuating slide still locked; and

Figure 3 shows a further cross-section of the housing of the first connector with the two connectors in a second position with an indication of movement towards an end position with the actuating slide unlocked.

[0014] A first electrical connector 1 according to the present invention is illustrated in Figure 1. The first electrical connector 1 comprises an actuating slide 2, which is commonly of U-shaped design when viewed from above, with a handle 3, which is illustrated in section here, and two side walls 4 extending therefrom. As the connector 1 is shown in sectional form, only one of the side walls 4 can be discerned in Figure 1. The side wall 4 has two camming slots 5 and 6. Furthermore, the side wall 4 of the actuating slide 2 has a latching lug 7 for establishing an entry position (Figures 1 and 2) and a latching lug 8 for an end position. A resilient arm 9 is additionally provided. The resilient arm 9 is bounded on one side by a cutout region 10 of in the side wall 4 of the actuating slide 2 and by edge 22 that defines part of the camming slot 6 on the other side. The side wall 4 that is not shown would normally have the same basic construction.

[0015] The first connector 1 has a housing 11, in which the actuating slide 2 is arranged. This housing 11 has a latching arm 12 with a latching lug 13 that serves to latch the actuating slide 2 in the entry position and in the end position. The latching lug 13 interacts with the complementary latching lugs 7 and 8 on the actuating slide 2. The latching arm 12 is resilient in the plug-in direction. On a plug-in face 21, the housing 11 of the first connector 1 has two openings 14 and 15, which serve to introduce the guide pins 18, 19 of a complementary connector 17 into the camming slots 5, 6 of the actuating slide 2. The opening 15 is wider than the opening 14. A free end 20 of the resilient arm 9 will run up against an edge 16 of the opening 15 in the entry position. As a result, the actuating slide 2 cannot be displaced towards the end position. The resilient arm 9 interlocks the actuating slide 2 by interfering with the edge 16 of the opening 15.

[0016] In Figure 2, the plug-in direction of the complementary connector 17 is indicated by an Arrow S. The complementary connector 17 is introduced with guide pins 18 and 19 passing through the openings 15 and 14 in the housing 11 of the first connector 1 and entering into the camming slots 5 and 6 of the actuating slide 2. The guide pin 19 runs up against edge 22 of the resilient arm 9. The resilient arm 9 deflects into the material cutout region 10, as indicated by the arrow F, which also specifies the spring direction. As a result, the interlocking between the actuating slide 2 and the housing 11 of the first connector 1 is defeated, as illustrated in Figure 3. The resilient arm 9 is deflected as a result of the pin 19 running up against edge 22 of the resilient arm 9, which edge 22 is formed by the camming slot 6. The actuating slide 2 can now be displaced in the actuating direction, which is indicated by an Arrow B in Figure 3, whereby the two connectors 1, 17 can be brought together in the plug-in direction S.

Claims

1. An electrical connector (1) for mating with a complementary connector (17) having at least one guide pin (18, 19), comprising an actuating slide (2) having at least one guide slot (5, 6), the actuating slide (2) being integrated in the connector (1) and interacting with the complementary connector (17) in order to mate the connectors, the guide pin (18, 19) being moved through the guide slot (5, 6) during the actuation of the actuating slide (2) for the purpose of connecting the connectors, and the guide pin (18, 19) being moved in the opposite direction through the guide slot (5, 6) during the actuation of the actuating slide (2) for the purpose of disconnecting the connectors, locking members being provided for locking the actuating slide (2) in the entry position, in which the guide pin (18, 19) can be introduced into the guide slot (5, 6), and the guide pin (19) serving as unlocking member connector (17), in such a way that when the connectors are joined together, the locking members are unlocked to an extent such that the actuating slide (2) can be moved from the entry position into the end position, in which the connectors are in contact, **characterized in that** the locking members for locking the actuating slide (2) are designed as an arm (9) on the actuating slide (2), that is resilient in the plug-in direction, is bounded on one side by the guide slot (6) and interacts with an opening (15) on the connector (1) for the introduction of the guide pin (19) into the guide slot (16).

2. The connector according to Claim 1, **characterized in that** complementary latching members (7, 8, 13) are provided on the actuating slide (2) and the connector (1) to latch the actuating slide (2) in a first latching position, which corresponds to the entry position, and in a second latching position, the end position.

3. The connector according to either of Claims 1 and 2, **characterized in that** the resilient arm (9) is bounded on the other side by a material cutout (10) section of the actuating slide (2).

4. The connector according to one of Claims 1 to 3, **characterized in that** the actuating slide (2) is essentially of U-shaped design, with two side walls (4), in which the guide slots (5, 6) are arranged.

Patentansprüche

1. Elektrischer Verbinder (1) für einen Eingriff mit einem komplementären Verbinder (17), mit mindestens einem Führungsstift (18, 19), der einen Betätigungsschieber (2) mit mindestens einem Führungsschlitz (5, 6) aufweist, wobei der Betätigungsschieber (2) im Verbinder (1) integriert ist und mit dem komplementären Verbinder (17) in Wechselwirkung steht, um die Verbinder in Eingriff zu bringen, wobei der Führungsstift (18, 19) durch den Führungsschlitz (5, 6) während der Betätigung des Betätigungsschieber (2) für den Zweck des Verbindens der Verbinder bewegt wird, und wobei der Führungsstift (18, 19) in der entgegengesetzten Richtung durch den Führungsschlitz (5, 6) während der Betätigung des Betätigungsschiebers (2) für den Zweck des Trennens der Verbinder bewegt wird, wobei Sperrelemente für das Sperren des Betätigungsschiebers (2) in der Eintrittsposition vorhanden sind, in der der Führungsstift (18, 19) in den Führungsschlitz (5, 6) eingeführt werden kann und der Führungsstift (19) als Entriegelungselement des Verbinders (17) in einer derartigen Weise dient, daß, wenn die Verbinder miteinander verbunden werden, die Sperrelemente in einem Ausmaß so entriegelt werden, daß der Betätigungsschieber (2) aus der Eintrittsposition in die Endposition bewegt werden kann, in der die Verbinder in Kontakt sind, **dadurch gekennzeichnet, daß** die Sperrelemente für das Sperren des Betätigungsschiebers (2) als ein Arm (9) am Betätigungsschieber (2) konstruiert sind, der in der Einsteckrichtung elastisch ist, der an einer Seite durch den Führungsschlitz (6) begrenzt wird und mit einer Öffnung (15) am Verbinder (1) für die Einführung des Führungsstiftes (19) in den Führungsschlitz (16) in Wechselwirkung steht.

2. Verbinder nach Anspruch 1, **dadurch gekennzeichnet, daß** komplementäre Einklinkelemente (7, 8, 13) am Betätigungsschieber (2) und dem Verbinder (1) vorhanden sind, um den Betätigungsschieber (2) in einer ersten Einklinkposition, die der Eintrittsposition entspricht, und in einer zweiten Einklinkposition, der Endposition, einzuklinken.

3. Verbinder nach einem der Ansprüche 1 oder 2, **dadurch gekennzeichnet, daß** der elastische Arm (9) an der anderen Seite durch einen Materialaussparungsabschnitt (10) des Betätigungsschiebers (2) begrenzt wird.

4. Verbinder nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, daß** der Betätigungsschieber (2) im wesentlichen eine U-formige Konstruktion mit zwei Seitenwänden (4) aufweist, in denen die Führungsschlitze (5, 6) angeordnet sind.

Revendications

1. Connecteur électrique (1) destiné à être accouplé avec un connecteur complémentaire (17) comportant au moins une broche de guidage (18, 19), com-

prenant un coulisseau d'actionnement (2), comportant au moins une fente de guidage (5, 6), le coulisseau d'actionnement (2) étant intégré dans le connecteur (1) et coopérant avec le connecteur complémentaire (17) pour accoupler les connecteurs, la broche de guidage (18, 19) étant déplacée à travers la fente de guidage (5, 6) au cours de l'actionnement du coulisseau d'actionnement (2) en vue de la connexion des connecteurs, la broche de guidage (18, 19) étant déplacée dans la direction opposée à travers la fente de guidage (5, 6) au cours de l'actionnement du coulisseau d'actionnement (2) en vue de la déconnexion des connecteurs, des éléments de verrouillage servant à verrouiller le coulisseau d'actionnement (2) dans la position d'entrée, dans laquelle la broche de guidage (18, 19) peut être introduite dans la fente de guidage (5, 6), la broche de guidage (19) servant d'élément de déverrouillage du connecteur (17), de sorte que lorsque les connecteurs sont assemblés, les éléments de verrouillage sont déverrouillés, le coulisseau d'actionnement (2) pouvant ainsi être déplacé de la position d'entrée vers la position finale, dans laquelle les connecteurs sont en contact, **caractérisé en ce que** les éléments de verrouillage servant à verrouiller le coulisseau d'actionnement (2) ont la forme d'un bras (9) sur le coulisseau d'actionnement (2), qui est élastique dans la direction d'enfichage et limité sur un côté par la fente de guidage (6) et coopérant avec une ouverture (15) sur le connecteur (1) en vue de l'introduction de la broche de guidage (19) dans la fente de guidage (16).

2. Connecteur selon la revendication 1, **caractérisé en ce que** des éléments de verrouillage complémentaires (7, 8, 13) sont agencés sur le coulisseau d'actionnement (2) et le connecteur (1) pour verrouiller le coulisseau d'actionnement (2) dans une première position de verrouillage, correspondant à la position d'entrée, et dans une deuxième position de verrouillage, correspondant à la position finale.

3. Connecteur selon l'une des revendications 1 ou 2, **caractérisé en ce que** le bras élastique (9) est limité sur l'autre côté par une section d'entaille dans le matériau (10) du coulisseau d'actionnement (2).

4. Connecteur selon l'une des revendications 1 à 3, **caractérisé en ce que** le coulisseau d'actionnement (2) a pour l'essentiel une forme en U, avec deux parois latérales (4), dans lesquelles sont agencées les fentes de guidage (5, 6).

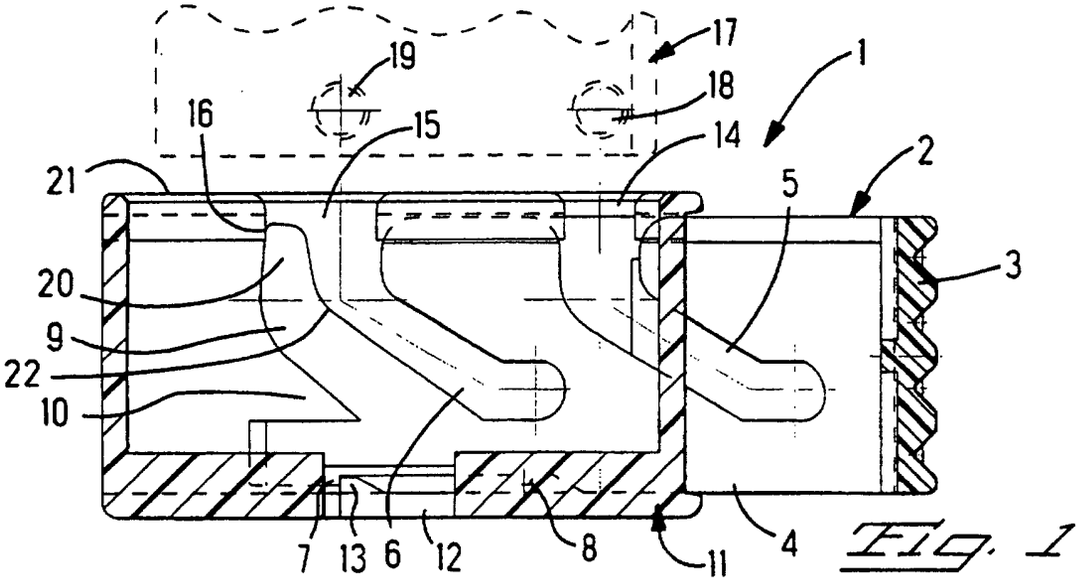

Fig. 1

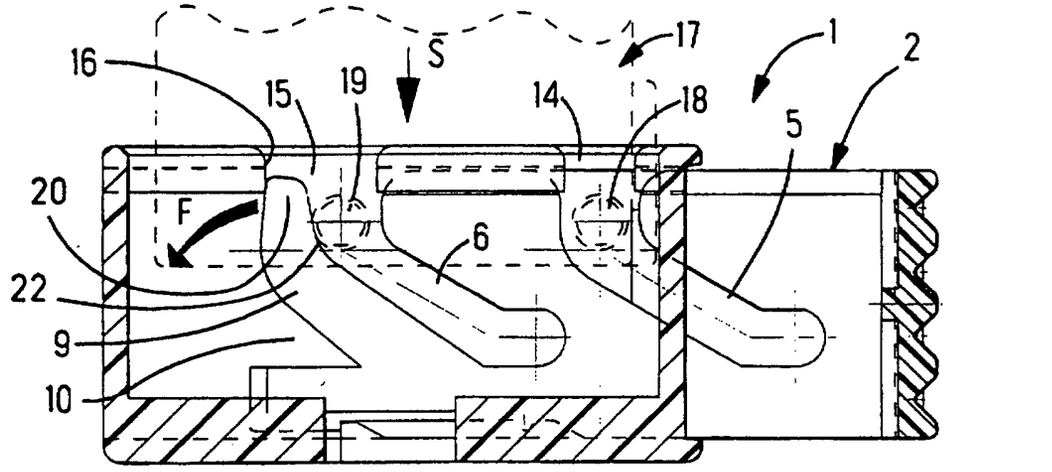

Fig. 2

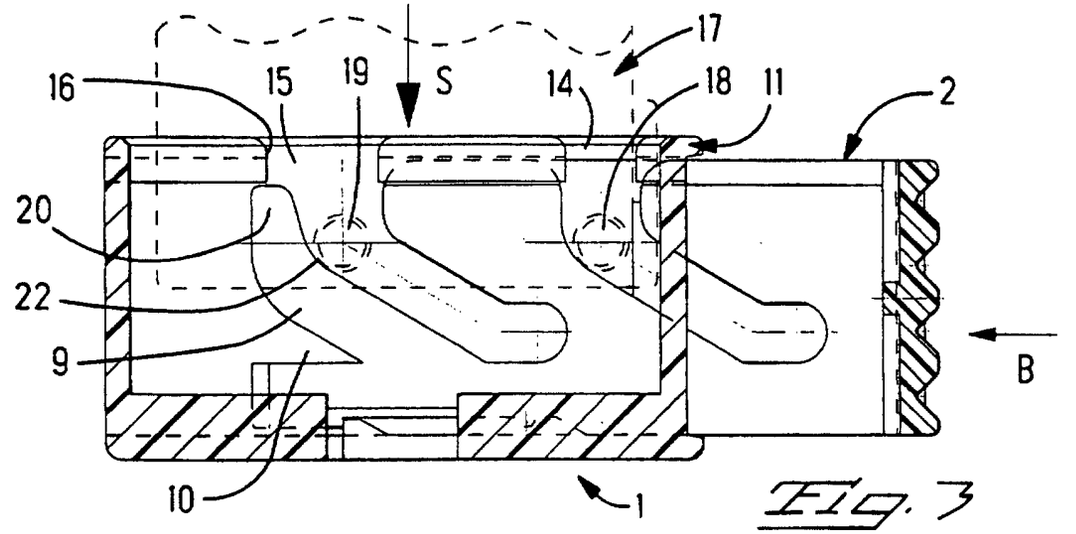

Fig. 3