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(54) **ELECTRICAL CONNECTOR HAVING A SECONDARY LOCKING MEMBER**

ELEKTRISCHER VERBINDER MIT SEKUNDÄR VERRIEGELUNGSMITTEL

CONNECTEUR ELECTRIQUE DOTE D'UN ELEMENT DE BLOCAGE SECONDAIRE

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Description

[0001] The invention relates generally to electrical connectors incorporating secondary locking members for ensuring contacts are retained in the connector.

[0002] In numerous applications where electrical connectors are subject to high-vibrations and possibly rough handling, such as in automotive applications, it has become common place to incorporate a secondary locking mechanism into the connector to further assure that the contacts are retained in their proper position. Typically, the secondary locking mechanisms are formed as a movable component of the connector and they incorporate a shoulder that in a first position is clear of a terminal receiving passageway so that the terminals may be inserted into the connector housing and then displaced to a second position where the shoulder now blocks part of the passageway so that it is impossible to withdraw the terminal therefrom. It is highly desirable that it is difficult to move the secondary locking mechanism from the second position back to the first position so that the secondary locking function is not unintentionally defeated. The secondary locking member and latch structure that establishes both the first and second positions thereof is well known in the art and can take on various configurations.

[0003] An electrical connector with all features of the pre-characterising portion of claim 1 is known from EP-A-0691709. The releasable retention member should be released before insertion of the electrical terminal.

[0004] In some applications, the terminals that are received within one of the mating connectors originate from different components and therefore it is not possible to insert all terminals at the same time during the creation of a wire harness. In these cases, the connector may be incorporated into a harness associated with one of the components and a primary retention function, such as a locking lance, is used to retain whatever terminals have been inserted. As the products, such as an automobile, moves along the assembly-line and the additional components are assembled therewith, their terminals can be loaded into the connector. Once all of the associated terminals are properly positioned, the secondary locking member is displaced into the second, or locked, position.

[0005] A problem exists in that during production of the product, before all of the terminals have been inserted, it is possible to move the secondary locking member from the first position, where the contacts can be inserted, to the second position where the contacts would be retained. As the secondary locking member blocks a portion of the terminal receiving passageway it is also impossible to insert additional terminals until the secondary locking member is moved back to its first position. As stated above, the latch structure used to establish these positions is intended to prevent easy movement of the secondary locking member from the second

position back to the first position. This may even require special tools that are not generally present on the production line. Obviously, this disruption is both time consuming and inconvenient for the manufacturer.

[0006] Therefore, it would be very helpful to provide an electrical connector that incorporates secondary locking where it is not possible to displace the secondary locking member from the first position to the locked second position until the connector is properly loaded with the electrical terminals.

[0007] This and other objects are accomplished by providing an electrical connector according to claim 1.

[0008] It is an advantage of this invention that only upon insertion of the electrical terminal is possible to displace the secondary locking member into its locked second position. It is another advantage of this invention that the terminal co-operates with the releasable retention member.

[0009] The invention will now be described by way of reference to the drawings wherein:

Figure 1 is a front side perspective view of an electrical connector according to the present invention; Figure 2 is a partial cut away side view of the electrical connector of Figure 1 showing a terminal being inserted therein;

Figure 3 is a side sectional view of the connector of Figure 1 taken 90 degrees to the view of Figure 2; Figure 4 is a front side prospective view of the connector of Figure 1 having a terminal inserted therein;

Figure 5 is a side partial section view of the connector of Figure 4 corresponding to the view of Figure 2; Figure 6 is a side sectional view of the connector of Figure 5 taken 90 degrees thereto and corresponding to Figure 3; and,

Figure 7 is a side partial sectional view corresponding to Figure 5 with the secondary lock in the second position;

Figure 8 is an upper side prospective view of the electrical connector according to Figure 1 shown mating with a complementary component.

[0010] With reference now to Figure 1, an electrical connector according to the present invention as shown in generally at 2. The electrical connector 2 includes a connector body 4 and a secondary locking member 6. The electrical connector 2 has a terminal receiving end 8 and a mating face 10 located on the secondary locking member 6. The connector body 4 includes terminal receiving passageways 12 that extend through a body portion 14 of the connector body 4. A shroud 16 generally surrounds the body portion 14 to define an annular receiving region 18 therebetween. The shroud 16 further includes a latch 20 for maintaining engagement with a mating component 3 (Figure 8) as will be described below. The connector body 4 further includes cantilevered resilient primarily retention lances 22 extending along

either side of the passageways 12. Each retention lance 22 includes a retention shoulder 24 designed to fall behind a shoulder 26 of a terminal 28 once the terminal is fully inserted into the passageway 12 (Figures 3 and 6). It is apparent that the resilient retention lances could be incorporated into the contact as locking lances and the primarily retention shoulders could be fixed forms in the housing, in essence the reverse construction illustrated here.

[0011] The secondary locking member 6 includes the mating face 10 of the connector 2 and has openings 30 where complementary contacts from the mating connector 3 (Figure 8) would be received for mating with the terminals 28 received in the terminal receiving passageways 12. In Figures 1-3, the secondary locking member 6 is shown in a first position where the terminals 28 may be inserted. In addition to the openings 30, the mating face 10 further includes a keying slot 32 to ensure proper mating. The mating face 10 also includes a releasable retention member 34 for maintaining the secondary locking member 6 in the first position until the terminals 28 are fully inserted, as will be described below. The secondary locking member 6 further includes a plurality of ribs 36 which define openings 38 where in the first position of the secondary locking member 6, as shown, the resilient retention lances 22 are free to deflect outward during insertion of the terminal 28, as shown in Figure 3. The ribs 36 interconnect the front mating face 10 with a rear band 40 from which a secondary locking shoulder 42 is suspended that would extend into the terminal receiving passageway 12 and the secondary locking member 6 is displaced into the unlocked position.

[0012] With reference now to Figure 2, the releasable retention member 34 is shown. The releasable retention member 34 is cantilevered about a resilient hinge 44. The resiliency of the hinge 44 may be adjusted by way of an opening 46 formed therebelow. The releasable retention member 34 has a free end 48 and an underside 50 where a notch 52 is defined that embraces a wall 54 that defines the terminal receiving passageway 12. The notch 52 is defined by a pair of lugs 56 that extend on either side of the wall 54 of the connector body 4 to prevent relative motion between the secondary locking member 6 and the connector body 4. Near the free end 48, the releasable retention member 34 includes a camping head 58 that co-operates with the electrical terminal 28 in order to displace the releasable retention member 34 such that the notch 52 and associated lugs 56 disengage the wall 54 upon full insertion of the terminal 28, enabling the secondary locking member 6 to be displaceable into the second position, as will be described below.

[0013] With reference to Figure 3, it can be observed that the camping lug 58 is aligned with a forward edge 60 of the terminal 28 as the terminal is inserted into the terminal receiving passageway 12. During insertion, the resilient retention lances 22 deflect outwardly over the

terminal 28. The terminal 28 is illustrated only as a representative housing which may or may not have individual contact arms therein. It would be obvious to utilise other known receptacle terminals or even pin terminals as desired. Additionally, it may be desirable to locate the camping head 58 in a different location. As can be further observed, a seal 62 has been included such that a sealed connection with a mating component 3 may be formed.

[0014] With reference now to Figure 4, the connector 2 is shown from the outside with the terminal 28 fully inserted. The terminal 28 has now co-operated with the camping head 58 to deflect the releasable retention member 34 at the hinge 44. With the releasable retention member 34 deflected, it is now possible to move the secondary locking member 6 relative to the connector body 4 in the direction of arrow A, thereby achieving the second locked position.

[0015] As it shown in Figure 5, the releasable retention member 34 is displaced as a result of co-operation of the camping head 58 and the front edge 60 of the terminal 28. With the releasable retention member 34 deflected outward, the lugs 56 are moved such that the notch 52 disengages the wall 54. This ensures that the displacement for the secondary locking member 6 can now occur in the direction of arrow A. Once the secondary locking member 6 has been displaced in the direction of arrow A into the second locked position, the camping head 58 will be located in the relieved portion 64 so that the retention member 34 may return to its natural position as a result of the resilience of hinge 44 (Figure 7).

[0016] As can be seen in Figure 6, where there has been a slight displacement of the secondary locking member 6 relative to the connector body 4, a retention shoulder 42 is now being brought behind a shoulder of the contact to prevent withdraw thereof. In addition, positive locking is being assured by bringing ribs 36 over the resilient arms 22 such that when the second position is achieved, it would not be possible to displace the resilient arms 22 outward, thereby providing further assurance that the terminal is retained therein. It is further possible to see the co-operation between the camping head 58 and the front edge 60 of the terminal 28. While in the present embodiment only a single releasable retention member 34 has been incorporated to correspond to one of the terminal receiving passageways 12 (possibly the last passageway to be loaded), it may be desirable to incorporate a feature such as this for some or each passageway 12. In addition, while the releasable retention member 34 has been shown incorporated into the mounting face 10 of the secondary locking member 6, it may be also possible to incorporate the deflectable portion of this retention structure into the connector body 4, whereby the connector body then engages the secondary locking member, as opposed to the structure described above. Finally, it is known to configure secondary locking members such that the second position

must be achieved before mating with the complementary component can occur. The embodiment shown incorporates this feature.

[0017] With respect now to Figure 7, the connector according of the present invention 2 as shown with a secondary locking member 6 in the second position wherein the ribs 36 overlay the retention arms 22. In addition, the shoulder 42 would be disposed behind a shoulder of the contact. It may be also desirable to utilize only one of these features to provide the secondary or positive contact retention. The mating component 3 includes a shroud 64 having a latch 66 thereupon. The shroud 64 is configured to fit within the angular opening 18 and cooperate with the seal 62. As can be imagined and is known, by properly sizing the angular opening 18 and the shroud 64, it can be assured that the connectors 2, 3 will not mated until the secondary locking member 6 is in the second position. The latch 66 is engaged by the latch 20 to assure that the connector components 2, 3 remain engaged.

[0018] Advantageously then, the invention assures that the secondary locking member is not disadvantageously displaced to its second or locked position without insertion of the terminal. By having the releasable retention member correspond to the last terminal inserted, it can be assured that the secondary locking member 6 is not displace until the connector is fully loaded. If desired, it may be possible to incorporate releasable retention member for each of the cavities.

Claims

1. An electrical connector (2) for receiving an electrical terminal (28) therein, the electrical connector comprising: a connector body (4) having a terminal receiving passageway (12) therethrough; a secondary locking member (6) co-operating with the body (4) and having a first position where the terminal (28) is fully insertable into the terminal receiving passageway (12) and a second position where the fully inserted terminal (28) is positively retained in the passageway (12); the connector (2) having a releasable retention member (34) that retains the secondary locking member (6) in the first position, **characterised in that** the releasable retention member (34) is released upon insertion of the electrical terminal (28) as a result of co-operation therewith.
2. The electrical connector 2 of claim 1 wherein the releasable retention member (34) includes a camming head (58) extending into the passageway (12) to abut the front end (60) of the terminal (28) being inserted therein.
3. The electrical connector (2) of claim 1 or claim 2 wherein the releasable retention member (34) in-

cludes a notch (52) defined by legs (56) which embraces a wall (54) along the passageway (12) prior to insertion of the terminal (28).

Patentansprüche

1. Elektrischer Verbinder (2) für das Aufnehmen einer elektrischen Anschlußklemme (28) darin, wobei der elektrische Verbinder aufweist: ein Verbindergehäuse (4) mit einem Klemmenaufnahmedurchgang (12) dort hindurch; ein sekundäres Sperrelement (6), das mit dem Gehäuse (4) zusammenwirkt und eine erste Position, wo die Anschlußklemme (28) vollständig in den Klemmenaufnahmedurchgang (12) eingesetzt werden kann, und eine zweite Position aufweist, wo die vollständig eingesetzte Anschlußklemme (28) zwangsläufig im Durchgang (12) gehalten wird; wobei der Verbinder (2) ein lösbares Arretierelement (34) aufweist, das das sekundäre Sperrelement (6) in der ersten Position hält, **dadurch gekennzeichnet, daß** das lösbare Arretierelement (34) beim Einsetzen der elektrischen Anschlußklemme (28) als Ergebnis des Zusammenwirkens mit dieser freigegeben wird.
2. Elektrischer Verbinder (2) nach Anspruch 1, bei dem das lösbare Arretierelement (34) einen Nockensteuerekopf (58) umfaßt, der sich in den Durchgang (12) hinein erstreckt, um an das vordere Ende (60) der Anschlußklemme (28) anzustoßen, die darin eingesetzt wird.
3. Elektrischer Verbinder (2) nach Anspruch 1 oder Anspruch 2, bei dem das lösbare Arretierelement (34) eine Kerbe (52) umfaßt, die durch Schenkel (56) definiert wird, die eine Wand (54) längs des Durchganges (12) vor dem Einsetzen der Anschlußklemme (28) umfaßt.

Revendications

1. Connecteur électrique (2) destiné à recevoir une borne électrique (28), le connecteur électrique comprenant: un corps de connecteur (4) comportant un passage de réception de bornes (12) le traversant; un élément de verrouillage secondaire (6) coopérant avec le corps (4) et comportant une première position dans laquelle la borne (28) peut être insérée complètement dans le passage de réception des bornes (12), et une deuxième position, dans laquelle la borne complètement insérée (28) est retenue positivement dans le passage (12); le connecteur (2) comportant un élément de retenue libérable (34) retenant l'élément de verrouillage secondaire (6) dans la première position, **caractérisé en ce que** l'élément de retenue libérable (34) est dégagé

lors de l'insertion de la borne électrique (28) par suite de la coopération avec celle-ci.

2. Connecteur électrique (2) selon la revendication 1, dans lequel l'élément de retenue libérable (34) englobe une tête à came (58) s'étendant dans le passage (12) pour buter contre l'extrémité avant (60) de la borne (28) qui y est insérée. 5
3. Connecteur électrique (2) selon les revendications 1 ou 2, dans lequel l'élément de retenue libérable (34) englobe une encoche (52) définie par des branches (56), entourant une paroi (54) le long du passage (12) avant l'insertion de la borne (28). 10

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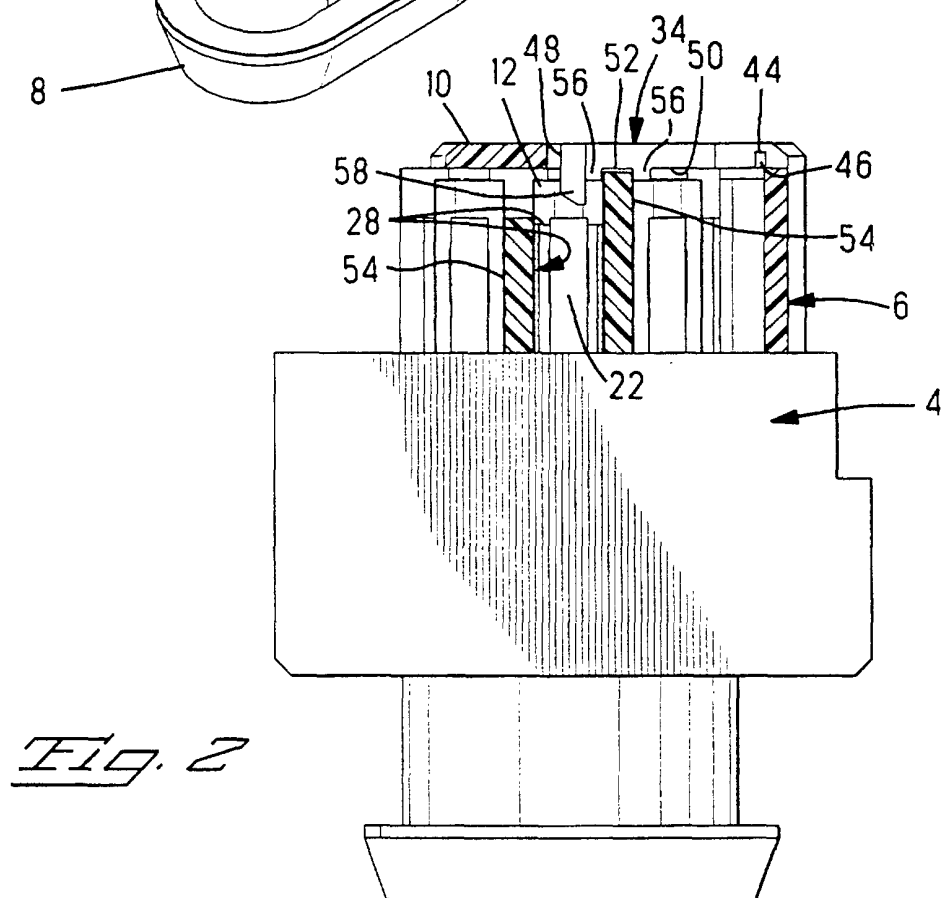
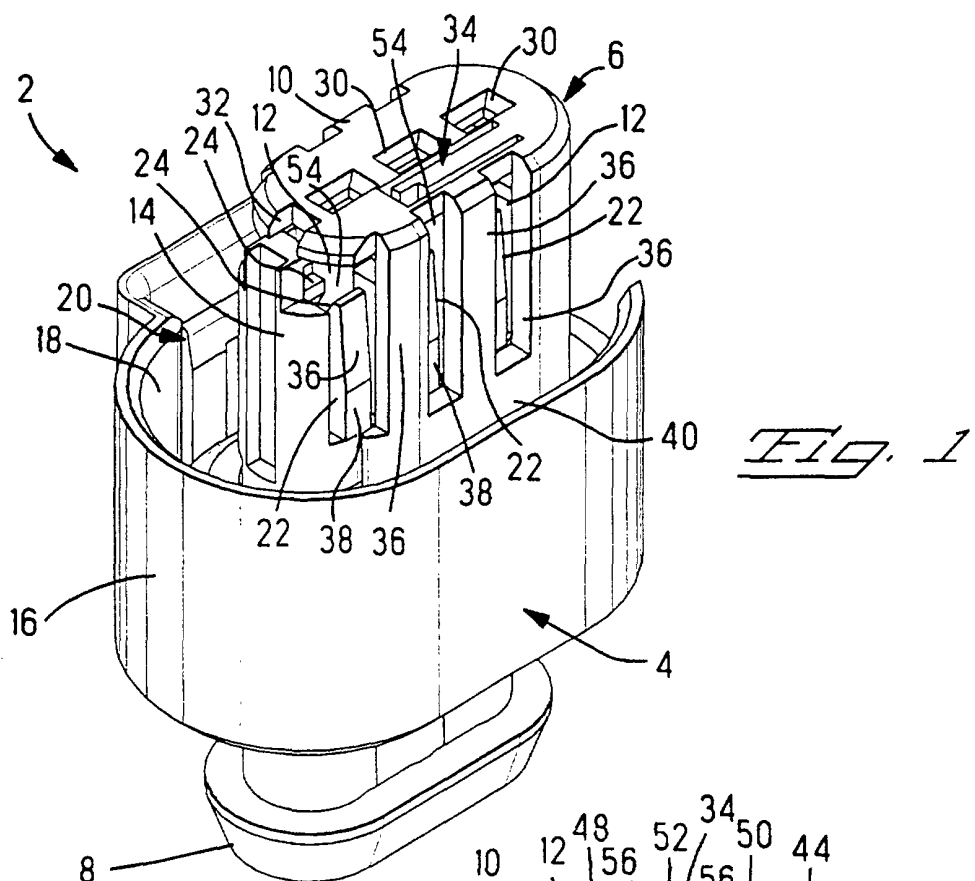
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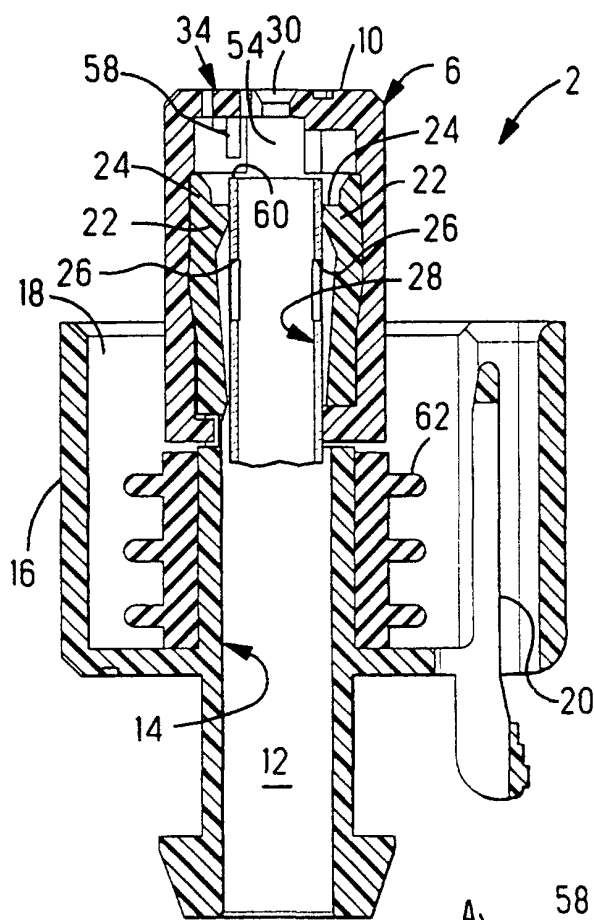


Fig. 3

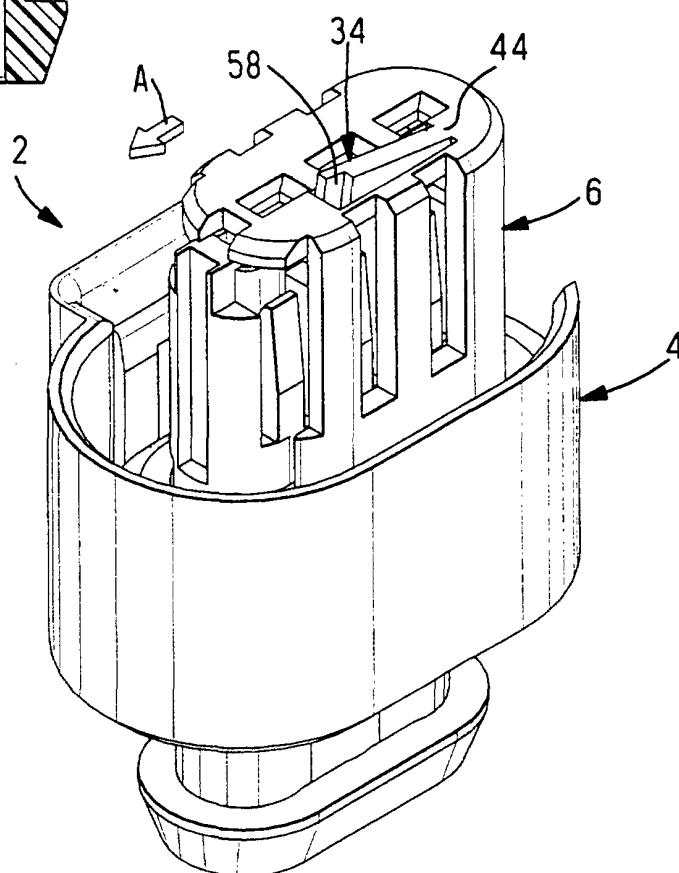


Fig. 4

