

Description

Background of the invention

The invention relates to a connector for one or more conductors, comprising:

swivel means disposed within a casing of insulating material for electrically contacting and mechanically retaining each conductor, said swivel means being adapted to be rotated about one point and having a projecting part cooperating with a stationary counterelement to retain said conductor, whereby rotating the swivel means in one direction will move the projecting part away from a position adjoining the counterelement.

Such connectors, as known for instance from French Patent 1,324,140, are frequently used for making rapid and efficient simultaneous contact to and retaining, in particular, several parallel conductors in for example, a flat cable or in a flexible foil. It must be possible for the connection to the conductors of the latter to take place both on the underside and the upperside, for which reason two parallel contacts are used, for example, in the form of a fork, the contact surfaces of which are biased against each other under spring force.

Summary of the invention

The connector according to the present invention is characterized in that said contact means including a connector part and two parallel extending contacts with contact surfaces spring biased against each other, and said swivel means further having an abutment surface adapted to engage an end of one of the parallel extending contacts and upon rotating will cause the abutment surface to engage the end of said one contact so as to lift the contact to create a gap between said contact surfaces through which the conductor may be inserted and whereby subsequently rotating the swivel means in the other direction will lower said one contact until its end is free of the abutment surface and the projecting part is positioned adjacent the counterelement, said conductor thereby being electrically contacted by said spring biased contact surfaces and also being retained by the clamping action between the projecting part and the counterelement.

The end of the conductor to be retained is first pushed through and between the contacts when the projecting part is swivelled away from its position opposite the counterelement. By swivelling the projecting part to its position opposite the counterelement, the conductor is retained between the projecting part and the counterelement.

By using the connector according to the invention, a force-closed contact system is obtained in which the conductor is held in its position without forces being exerted on the contact element. At the same time, before the securing, the surface of the bare conductor is slid along the contact surfaces by the swivelling of the projecting part of

the retaining element, as a result of which any contaminants are removed.

The projecting part can be provided with an arc-shaped, grooved friction surface provided, for example with teeth, which surface can act together with a friction surface of the counterelement, between which friction surfaces the electrical conductor can be retained.

The projecting part can also be provided with a protrusion which in the retaining position extends transversely across the insertion position between the contacts and which protrusion, after it has been swivelled to this position, engages in a cavity in the counterelement, as a result of which the electrical conductor is retained by being bent around this protrusion. In this case, the foil can be secured by fixed protrusions which engage in openings in the foil.

A further protrusion which is at the same time displaced in an arc along with the projecting part and whose active surface faces a free end of one of the contacts, can lift this contact off the other contact as the projecting part swivels in the direction of the contacts past the counterelement, so that the electrical conductor can be pushed unhampered between the retaining elements and the opened contacts.

The spindle for the displacement of the projecting part of the retaining element is preferably coupled to a lever by means of which this spindle can be rotated for swiveling the projecting part in the direction of the contacts and consequently outside the position in which the projecting part is situated opposite the counterelement. When the counterelement is returned and a conductor is secured, the lever is finally arrested by a part of the casing so that the counterelement cannot swivel further and the conductor cannot be pulled out of its position between the contacts.

Connectors of the above type are preferably used in connector assemblies in which several connectors are accommodated next to each other in a common casing. The swivellable retaining elements are in this case coupled to a common spindle.

Brief description of the drawings

The invention will now be explained in more detail on the basis of the drawings in which two exemplary embodiments are shown.

Figures 1 and 2 show a first embodiment of a connector according to the invention;

Figures 3 and 4 show a second embodiment of a connector according to the invention;

Figures 5 and 6 show in perspective a connector assembly constructed from several connectors according to Figures 1—4.

Description of the preferred embodiments

The connectors according to the invention shown in the figures are provided with a casing 1 of insulating material. Within the casing are contact elements 2 provided with two parallel contacts 3 and 4 having contact surfaces 5 and 6.

In the embodiment of Figures 1 and 2, the

contacts 3 and 4 form part of contact element 2 which is obtained by punching and consists also of a flat part 7 with a connecting pin 8. The contacts 3 and 4 consist of parts of the flat part 7 bent through a right angle. The contact 3 has the form of a spring strip. The contact 4 remains permanently connected over the greatest part of its length to the flat part 7, with the exception of the contact surface 6 (see also Figure 5). It should also be noted that the end of the contact 3 is provided with a projecting end 9, by means of which the contact 3 can be lifted from the contact 4 in order to be able to guide a conductor 10 between the contacts.

The connector further includes a spindle 11 around which a cylindrical part 12 is clamped or is integral with the spindle 11. In Figure 1, the cylindrical part is provided on its lower side with a projecting part 13 having an arc-shaped, grooved friction surface provided, for example, with teeth 14. The projecting part 13 with its teeth 14 is opposite a friction surface 15 of a counterelement 16. As is evident from Figure 1, the conductor 10 is clamped between the surfaces of the projecting part 13 and the counterelement 16. These surfaces must obviously approach each other sufficiently closely.

A lever 17 is also coupled to the spindle 11 and cylindrical part 12. By means of this lever 17, the spindle 11 can be rotated from the position in Figure 1 to the position in Figure 2 and vice versa. In the position in Figure 2, the projecting part 13 is swivelled in the clockwise direction.

In addition to the projecting part 13, the cylindrical part 12 has a recess 18 having a protrusion surface or abutment 19. As is evident from Figure 2, this protrusion surface 19 presses against the projecting free end 9 of contact 3 in the position shown in Figure 2. As the lever 17 swivels from the position in Figure 1 to the position which is shown in Figure 2, the surface 19 contacts the projecting end 9 and lifts the contact 3 off the contact 4. As a result, a gap 23 is created between the contact surfaces 5 and 6 through which a conductor 10 can easily be pushed between these contact surfaces 5 and 6 along the surface 15 of the counterelement 16.

The conductor 10 is inserted between the contacts 3 and 4, and is pushed up to the stop 26. The lever 17 can then be swivelled back down to the position shown in Figure 1. As this is done, the toothed surface 14 at a given instant comes into contact with the conductor 10, which is then pushed to the right as the lever swivels further. In the meantime, the contact 3 is lowered back toward contact 4. When the protrusion surface 19 of the cylindrical part 12 no longer engages the projecting end 9 of the contact 3, the contact surface 5 will come to rest on the conductor 10, which is retained by the contact surface 6 situated on opposite side of the conductor. As the lever 17 is displaced still further downwards, the conductor 10 is carried along to the right by the toothed surface 14 and the bare parts of the conductor are pushed on either side along the contact surfaces 5

and 6, as a result of which any contaminants are removed. Finally, the lever 17 is arrested by the surface 20 of the casing 1. The projecting part 13 and its toothed surface 14 cannot therefore swivel further to the right, as a result of which the conductor 10 is firmly retained or clamped between the surfaces 14 and 15. With the aid of a clamping element 24 for the lever 17, the latter can be locked against being rotated back.

In the embodiment of Figures 3 and 4, the toothed surface 14 is replaced by a protrusion 21. In the position shown in Figure 3, this protrusion 21 is located in a recess 22 in the counterelement 16.

The remaining components of this embodiment are indicated by the same reference figures as the embodiment of Figures 1 and 2.

Figure 4 shows the position for the insertion of the conductor 10 between the contacts 3 and 4. The projection end 9 of the contact 3 is raised up by the protrusion surface 19 so that there is a gap between the contact surfaces 5 and 6 for inserting the conductor 10. When the conductor 10 has to be secured, the lever 17 is again moved downwards. The protrusion 21 will then mate with the inserted part of the conductor 10 and bends the latter downwards into the recess 22. The lever 17 is finally arrested by the surface 20 of the casing 1 when the protrusion 21 is located in the recess 22, the conductor 10 being held in place by the severe bending. If a flat cable or flexible foil is used with conductors present in it, holes or openings can also be provided in this flexible foil or flat cable with which protrusions 25 mounted on the casing 1 of the connector can engage so that no displacement of the foil, which is situated outside the connector, can take place as a result of the bending by means of protrusion 21.

In place of the single connector shown in Figures 1-4, several such connectors can be combined into a connector assembly in a common casing using a common spindle and lever for all the individual connectors. Such a connector assembly is shown in Figures 5 and 6. The same reference figures as in Figures 1-4 indicate the same components, some reference figures having been omitted for the sake of clarity.

Obviously the common spindle or the part to which all the projecting parts 13 are fixed must possess adequate rigidity, especially if a wide flat cable or flexible foil is used, for the projecting parts of all the connectors to be adequately pressed against the counterelement over the whole length of the spindle of the connector assembly. In the open position according to Figures 2, 4 and 6, the spindle must also not bend towards the counterelement to such an extent that the insertion of the flat cable or foil is prevented.

In Figures 5 and 6 the common lever 17 also forms a cover for the various contact elements 2. This cover is provided with spindle pins 11 at the sides which project through openings in the side walls of the casing 1.

The connector assembly according to Figures 5

and 6 may be mounted on a board 27 having a printed wiring, while the connecting pins 8 are accommodated in suitable openings in this board 27 and can be soldered into them.

Claims

1. Connector for one or more conductors, comprising:

swivel means disposed within a casing (1) of insulating material for electrically contacting and mechanically retaining each conductor, said swivel means being adapted to be rotated about one point (11) and having a projecting part (13) cooperating with a stationary counterelement (16) to retain said conductor, whereby rotating the swivel means, in one direction will move the projecting part (13) away from a position adjoining the counterelement (16),

characterized in that said contact means including a connector part (8) and two parallel extending contacts (3, 4) with contact surfaces (5, 6) spring biased against each other, and said swivel means further having an abutment surface (19) adapted to engage an end (9) of one of the parallel extending contacts and upon rotating will cause the abutment surface (19) to engage the end (9) of said one contact (3) so as to lift the contact (3) to create a gap between said contact surfaces (5, 6) through which the conductor may be inserted and whereby subsequently rotating the swivel means in the other direction will lower said one contact (3) until its end (9) is free of the abutment surface (19) and the projecting part (13) is positioned adjacent the counterelement (16), said conductor thereby being electrically contacted by said spring biased contact surfaces (5, 6) and also being retained by the clamping action between the projecting part (13) and the counterelement (16).

2. The connector of Claim 1, wherein the swivel means is a cylindrical element (12) and the projecting part (13) is a projecting, arc-shaped portion of the annular surface of the cylindrical element (12) said arc-shaped portion having teeth (14) to form a friction surface which cooperates with a surface of the counterelement (16) to retain the conductor (10).

3. The connector of Claim 1, wherein the projecting part (13) is provided a protrusion (21) and the counterelement (16) is provided with a cavity (22) so that when the swivel means is rotated in the other direction, the protrusion (21) will engage the conductor (10) and bend it downward into the cavity (22).

4. The connector of Claim 1, further comprising a lever (17) for rotating the swivel means and means for stopping the lever (17) when the swivel means is rotated to position where the projecting part (13) and stationary counterelement (16) are adjacent one another to retain said conductor (10).

5. A connector according to Claim 1 wherein a plurality of parallel conductors within a flat cable or flexible foil are to be contacted, the connector

including within the casing of insulating material a plurality of said electrical contacting means (3, 4) and said retaining means for each parallel conductor, said swivel means adapted to rotate each said projecting part (13) simultaneously about the same point (11) by means of a common lever (17) to simultaneously contain and retain all the conductors.

6. The connector of Claim 5 further including protrusions (25) extending from the casing (1) for engaging openings located between the parallel conductors in the flat cables or flexible foil when the swivel means is rotated in the other direction to retain said conductors.

Patentansprüche

1. Verbinder für ein oder mehrere Leiter, der eine Schwenkeinrichtung aufweist, die in einem Gehäuse (1) aus isolierendem Material zum elektrischen Kontaktieren und zum mechanischen Festlegen jedes Leiters angeordnet ist, wobei die Schwenkeinrichtung derart ausgelegt ist, daß sie um einen Punkt (11) drehbar ist und ein vorspringendes Teil (13) hat, das mit einem stationären Gegenelement (16) zusammenarbeitet, um den Leiter festzulegen, wodurch beim Drehen der Schwenkeinrichtung in einer Richtung der vorstehende Teil (13) von einer dem Gegenelement (16) benachbart liegenden Position wegbewegt wird,

dadurch gekennzeichnet, daß die Kontakteinrichtung den Verbindungsteil (8) und zwei parallel verlaufende Kontakte (3, 4) mit Kontaktflächen (5, 6) enthält, die gegeneinander federbelastet sind, und daß die Schwenkeinrichtung ferner eine Anlagefläche (19) hat, die derart ausgelegt ist, daß sie mit einem Ende (9) eines der parallel verlaufenden Kontakte zusammenarbeitet, und welche derart ausgelegt ist, daß das Drehen der Schwenkeinrichtung bewirkt, daß die Anlagefläche (19) mit dem Ende (9) dieses einen Kontaktes (3) derart zusammenarbeitet, daß der Kontakt (3) angehoben wird, um einen Spalt zwischen den Kontaktflächen (5, 6) zu erzeugen, durch den der Leiter eingeführt werden kann, und welche bei einem anschließendem Drehen der Schwenkeinrichtung in die andere Richtung diesen einen Kontakt (3) absenkt, bis sein Ende (9) von der Anlagefläche (19) freikommt und das vorspringende Teil (13) dem Gegenelement (16) benachbart liegt, wobei der Leiter hierbei durch die federbelasteten Kontaktflächen (5, 6) elektrisch kontaktiert und durch die Klemmwirkung zwischen dem vorspringenden Teil (13) und dem Gegenelement (16) festgelegt wird.

2. Verbinder nach Anspruch 1, bei dem die Schwenkeinrichtung ein zylindrisches Element (12) und des vorspringende Teil (13) ein vorspringender, bogenförmiger Abschnitt einer ringförmigen Fläche des zylindrischen Elements (12) ist, wobei der bogenförmige Abschnitt Zähne (14) hat, um eine Reibfläche zu bilden, die mit einer Fläche des Gegenelementes (16) zum Festlegen des Leiters (10) zusammenarbeitet.

3. Verbinder nach Anspruch 1, bei dem das

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and 6 may be mounted on a board 27 having a printed wiring, while the connecting pins 8 are accommodated in suitable openings in this board 27 and can be soldered into them.

Claims

1. Connector for one or more conductors, comprising:

swivel means disposed within a casing (1) of insulating material for electrically contacting and mechanically retaining each conductor, said swivel means being adapted to be rotated about one point (11) and having a projecting part (13) cooperating with a stationary counterelement (16) to retain said conductor, whereby rotating the swivel means, in one direction will move the projecting part (13) away from a position adjoining the counterelement (16),

characterized in that said contact means including a connector part (8) and two parallel extending contacts (3, 4) with contact surfaces (5, 6) spring biased against each other, and said swivel means further having an abutment surface (19) adapted to engage an end (9) of one of the parallel extending contacts and upon rotating will cause the abutment surface (19) to engage the end (9) of said one contact (3) so as to lift the contact (3) to create a gap between said contact surfaces (5, 6) through which the conductor may be inserted and whereby subsequently rotating the swivel means in the other direction will lower said one contact (3) until its end (9) is free of the abutment surface (19) and the projecting part (13) is positioned adjacent the counterelement (16), said conductor thereby being electrically contacted by said spring biased contact surfaces (5, 6) and also being retained by the clamping action between the projecting part (13) and the counterelement (16).

2. The connector of Claim 1, wherein the swivel means is a cylindrical element (12) and the projecting part (13) is a projecting, arc-shaped portion of the annular surface of the cylindrical element (12) said arc-shaped portion having teeth (14) to form a friction surface which cooperates with a surface of the counterelement (16) to retain the conductor (10).

3. The connector of Claim 1, wherein the projecting part (13) is provided a protrusion (21) and the counterelement (16) is provided with a cavity (22) so that when the swivel means is rotated in the other direction, the protrusion (21) will engage the conductor (10) and bend it downward into the cavity (22).

4. The connector of Claim 1, further comprising a lever (17) for rotating the swivel means and means for stopping the lever (17) when the swivel means is rotated to position where the projecting part (13) and stationary counterelement (16) are adjacent one another to retain said conductor (10).

5. A connector according to Claim 1 wherein a plurality of parallel conductors within a flat cable or flexible foil are to be contacted, the connector

including within the casing of insulating material a plurality of said electrical contacting means (3, 4) and said retaining means for each parallel conductor, said swivel means adapted to rotate each said projecting part (13) simultaneously about the same point (11) by means of a common lever (17) to simultaneously contain and retain all the conductors.

6. The connector of Claim 5 further including protrusions (25) extending from the casing (1) for engaging openings located between the parallel conductors in the flat cables or flexible foil when the swivel means is rotated in the other direction to retain said conductors.

Patentansprüche

1. Verbinder für ein oder mehrere Leiter, der eine Schwenkeinrichtung aufweist, die in einem Gehäuse (1) aus isolierendem Material zum elektrischen Kontaktieren und zum mechanischen Festlegen jedes Leiters angeordnet ist, wobei die Schwenkeinrichtung derart ausgelegt ist, daß sie um einen Punkt (11) drehbar ist und ein vorspringendes Teil (13) hat, das mit einem stationären Gegenelement (16) zusammenarbeitet, um den Leiter festzulegen, wodurch beim Drehen der Schwenkeinrichtung in einer Richtung der vorstehende Teil (13) von einer dem Gegenelement (16) benachbart liegenden Position wegbewegt wird,

dadurch gekennzeichnet, daß die Kontakteinrichtung den Verbindungsteil (8) und zwei parallel verlaufende Kontakte (3, 4) mit Kontaktflächen (5, 6) enthält, die gegeneinander federbelastet sind, und daß die Schwenkeinrichtung ferner eine Anlagefläche (19) hat, die derart ausgelegt ist, daß sie mit einem Ende (9) eines der parallel verlaufenden Kontakte zusammenarbeitet, und welche derart ausgelegt ist, daß das Drehen der Schwenkeinrichtung beweist, daß die Anlagefläche (19) mit dem Ende (9) dieses einen Kontaktes (3) derart zusammenarbeitet, daß der Kontakt (3) angehoben wird, um einen Spalt zwischen den Kontaktflächen (5, 6) zu erzeugen, durch den der Leiter eingeführt werden kann, und welche bei einem anschließendem Drehen der Schwenkeinrichtung in die andere Richtung diesen einen Kontakt (3) absenkt, bis sein Ende (9) von der Anlagefläche (19) freikommt und das vorspringende Teil (13) dem Gegenelement (16) benachbart liegt, wobei der Leiter hierbei durch die federbelasteten Kontaktflächen (5, 6) elektrisch kontaktiert und durch die Kämmerwirkung zwischen dem vorspringenden Teil (13) und dem Gegenelement (16) festgelegt wird.

2. Verbinder nach Anspruch 1, bei dem die Schwenkeinrichtung ein zylindrisches Element (12) und des vorspringende Teil (13) ein vorspringender, bogenförmiger Abschnitt einer ringförmigen Fläche des zylindrischen Elements (12) ist, wobei der bogenförmige Abschnitt Zähne (14) hat, um eine Reibfläche zu bilden, die mit einer Fläche des Gegenelementes (16) zum Festlegen des Leiters (10) zusammenarbeitet.

3. Verbinder nach Anspruch 1, bei dem das



Vorspringende Teil (13) mit einem Vorsprung (21) versehen ist, und das Gegenelement (16) mit einem Hohlraum (22) versehen ist, so daß, wenn die Schwenkeinrichtung in die andere Richtung gedreht wird, der Vorsprung (21) mit dem Leiter (10) zusammenarbeitet und diesen in den Hohlraum (22) nach unten biegt.

4. Verbinder nach Anspruch 1, der ferner einen Hebel (17) zum Drehen der Schwenkeinrichtung und eine Einrichtung zum Anhalten des Hebels (17) aufweist, wenn die Schwenkeinrichtung in die Position gedreht worden ist, in der das vorspringende Teil (13) und das stationäre Gegenelement (16) zum Festlegen des Leiters (10) einander benachbart liegen.

5. Verbinder nach Anspruch 1, bei dem eine Mehrzahl von parallelen Leitern in einem Flachkabel oder einer flexiblen Folie zu kontaktieren ist, der Verbinder in dem Gehäuse aus isolierendem Material eine Mehrzahl von diesen elektrischen Kontakteinrichtungen (34) und die Festlegeeinrichtung für jeden parallelen Leiter enthält, und bei dem die Schwenkeinrichtung derart ausgelegt ist, daß jedes vorspringende Teil (13) gleichzeitig um denselben Punkt (11) mit Hilfe eines gemeinsamen Hebels (17) drehbar ist, um gleichzeitig alle Leiter mitzunehmen und festzulegen.

6. Verbinder nach Anspruch 5, der ferner von dem Gehäuse (11) weg verlaufende Vorsprünge (25) für Eingriffsöffnungen aufweist, die zwischen den parallelen Leitern in den Flachkabeln oder der flexiblen Folien liegen, wenn die Schwenkeinrichtung in die andere Richtung zum Festlegen der Leiter gedreht wird.

Revendications

1. Connecteur pour un ou plusieurs conducteurs, comprenant:

un organe basculant disposé à l'intérieur d'un boîtier (1) en matière isolante pour venir en contact électrique avec chaque conducteur et les retenir mécaniquement, ledit organe basculant étant adapté à pivoter autour d'un point (11) et ayant une partie en saillie (13) coopérant avec une partie antagoniste stationnaire (16) pour immobiliser ledit conducteur, une rotation de l'organe basculant dans un sens déplaçant la partie en saillie (13) en l'éloignant d'une position dans laquelle elle touche la partie antagoniste (16),

caractérisé en ce que lesdites moyens de contact comprennent une partie de raccordement (8) et deux contacts s'étendant parallèlement (3, 4) ayant des surfaces de contact (5, 6) sollicitées élastiquement l'une vers l'autre, et ledit organe basculant comporte en outre une surface de butée (19) adaptée à venir en contact avec une extrémité (9) de l'un des contacts s'étendant parallèlement et provoque, quand il tourne, la venue en contact de la butée (19) avec l'extrémité

(19) dudit premier contact (3) afin de soulever ce contact (3) et créer un intervalle entre lesdites surfaces de contact (5, 6) à travers lequel le conducteur peut être inséré et une rotation ultérieure de l'organe basculant dans l'autre sens abaisse ledit premier contact (3) jusqu'à ce que son extrémité (9) soit libre par rapport à la surface de butée (19) et que la partie en saillie (13) se trouve au voisinage de la partie antagoniste (16) lesdites surfaces de contact (5, 6) sollicitées élastiquement venant ainsi en contact électrique avec ledit conducteur, ce dernier étant également retenu par l'action de serrage entre la partie en saillie (13) et la partie antagoniste (16).

2. Connecteur suivant la revendication 1, dans lequel l'organe basculant est un élément cylindrique (12) et la partie en saillie (13) est une portion en saillie, de forme incurvée, de la surface annulaire de l'élément cylindrique (12), ladite portion de forme incurvée comportant des dents (14) pour former une surface de friction qui coopère avec une surface de la partie antagoniste (16) afin de retenir le conducteur (10).

3. Connecteur suivant la revendication 1, dans lequel la partie en saillie (13) présente un bossage (21) et la partie antagoniste (16) présente une cavité (22) de manière que lorsque l'organe basculant est tourné dans l'autre sens le bossage (21) vienne en contact avec le conducteur (10) et la courbe vers le bas pour le faire pénétrer dans la cavité (22).

4. Connecteur suivant la revendication 1, comprenant en outre un levier (17) pour faire tourner l'organe basculant et des moyens pour arrêter le levier (17) lorsque l'organe basculant a été tourné jusque dans une position dans laquelle la partie en saillie (13) et la partie antagoniste stationnaire (16) sont adjacentes l'une à l'autre afin de retenir ledit conducteur (10).

5. Connecteur suivant la revendication 1, dans lequel plusieurs conducteurs parallèles à l'intérieur d'un câble plat ou d'une feuille souple doivent être mis en contact, le connecteur comprenant à l'intérieure du boîtier en matière isolante plusieurs desdits moyens de contact électriques (3, 4) et lesdits moyens de retenue pour chaque conducteur parallèle, ledit organe basculant adapté pour tourner simultanément chacune desdites parties en saillie (13) autour du même point (11) au moyen d'un levier commun (17) pour recevoir et immobiliser simultanément tous les conducteurs.

6. Connecteur suivant la revendication 5, comprenant en outre des saillies (25) s'étendant à partir du boîtier (11) pour pénétrer dans des ouvertures situées entre les conducteurs parallèles des câbles plats ou des feuilles souples, afin de retenir lesdits conducteurs, lorsque l'organe basculant tourne dans l'autre sens.



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