

Description

This invention relates to an electrical contact.

The majority of known electrical contacts have a mating portion adapted to mate with only a single type of mating contact in a single possible orientation.

However, some pieces of electrical equipment, for example automobile headlamp bulbs, have a plurality of contacts, for example male tabs, arranged in different orientations, for example in mutually perpendicular planes, and thus an electrical connector for mating with such an array of contacts must when using known contacts either use two different forms of contact, or use only one form of contact but in different orientations.

For reasons of cheapness and ease of manufacture it is preferable to use only a single form of contact, and thus known contacts are normally used in different orientations in such circumstances.

Such use of known contacts does not present difficulties when the contacts are connected to conductors by conventional soldering or crimping techniques, but when contacts having slotted-plate conductor connecting portions are used, such use presents difficulties since the slots in the conductor connecting portions will not have their axes parallel, and thus connection of conductors to all of the contacts of such a connector in a single stroke is normally not possible or is at best only possible with difficulty.

In Patent Specification DE—A—1 465 461 there is disclosed an electrical contact having a contact portion comprising two pairs of opposed cantilever contact arms all extending in the same direction, each arm of each pair presenting a contact projection to a similar projection on the opposed arm, the two pairs of opposed arms defining a common male-contact-receiving slot. This known contact is designed to mate with either a flat tab or a round pin male contact which is engaged by the four contact projections on the arms of the contact, which thereby provide four independent points of contact on the inserted male contact, in known manner.

However, this known contact does not have a slotted-plate conductor connection portion, and thus there is no difficulty in mounting the contact in any desired orientation to receive a male contact. This known contact is therefore not in any way adapted to mate with a male contact in other than one orientation, that is with the male contact being engaged by the contact projections on the arms of the contact.

US—A—1 508 474 discloses a plug socket adapted to receive a circular contact member or flat contact member in either of two orthogonal orientations. The socket contact is formed from a blank folded to define opposed slotted arms each of which is arcuately formed in section to define a circular section contact receiving cavity bounded by four contact arms, edges of each arm being reversely curved to define between adjacent arms, flat blade receiving spaces of parallel sided

form.

This known contact is adapted for wire connection at the folded portion by a wire clamping screw.

In an electrical contact formed in one piece from sheet metal which is folded to define a pair of opposed cantilever arms extending in spaced apart relation from the fold in convergent manner towards free ends at which each is formed with a slot to define two pairs of opposed contact arms all extending in the same direction, the slots being aligned in a direction perpendicular to a first contact receiving slot defined between the cantilever arms, each arm of each pair presenting a contact projection opposed to a similar projection on the opposed arm of the other pair, the opposed pairs of projections defining the contact receiving slot, according to the invention each arm of each pair presents a second contact projection opposed to a similar contact projection on the adjacent arm of the pair, the two pairs of opposed second contact projection defining, at the aligned slots, a second male-contact-receiving slot, the fold extending transversely of the first contact receiving slot and being formed with a wire receiving slot extending transversely of the fold to define bridging portions at either side of the wire receiving slot and between the cantilever arms, the wire receiving slot extending into spaced parallel plate portions of the arms.

Such a contact portion gives the advantage that a plurality of the contacts of the same form can be mounted in a common housing in the same orientation, this making connection of conductors to the conductor connection portions of the contacts easy when the conductor connection portions are slotted plates, to provide a connector capable of being mated with an array of male tab contacts in which the tabs are arranged in mutually perpendicular planes, such as is found on automobile headlight bulbs.

Further, if a plurality of the contacts are mounted in a common housing with their first slots in line and without housing portions therebetween, then a substrate such as a printed circuit board can be mated with the contacts.

Attention is drawn to our EP 21731 of the same priority as this application and which is directed to an electrical contact member having a wire receiving slot of the character disclosed in the embodiment of the invention described below.

An electrical contact according to this invention will now be described by way of example with reference to the drawings, in which

Figure 1 is a side elevational view of the contact;

Figure 2 is a side elevational view of the contact at right-angles to the view of Figure 1; and

Figures 3 to 6 diagrammatically illustrate use of the contact with four different sizes of conductor.

The contact shown in Figures 1 and 2 is stamped and formed from sheet metal, and comprises a conductor connection portion 1 and a contact portion 2.

The portion 1 comprises two similar plates 3

and 4 arranged in spaced parallel planes, the plates being joined by two bridging strips 5 and 6 extending between the plates 3 and 4 from adjacent edges thereof.

Each plate 3 or 4 has a slot 7 therein, and since the slots 7 are similar only one thereof will be described in detail with particular reference to Figure 1.

Each slot 7 has a mouth 8 at the edge of the plate from which the bridging strips 5 and 6 extend, the bridging strips 5 and 6 being on opposite sides of the mouth 8.

The mouth 8 leads to a first inwardly tapering section 9 having converging straight sides, which in turn leads to a second parallel straight sided section 10. Preferably the sides of the second section 10 are bevelled to provide relatively sharp cutting edges.

The second section 10 leads into a third inwardly tapering section 11 having convex converging sides leading to a throat 12.

The throat 12 opens into a short fourth outwardly tapering section 13 the walls of which constitute shoulders facing away from the throat 12.

The fourth section 13 leads into a fifth inwardly tapering section 14 having convex converging sides, the maximum width of the fifth section 14 being less than that of the third section 11.

The fifth section 14 terminates in an enlarged circular aperture 15 which serves in known manner to determine the resiliency of two arms of the portion 1 defining the slot 7.

For use of the contact member described above an insulated conductor having a core formed from a plurality of strands is urged transversely of its axis into the slot 7 through the mouth 8. The first section 9 guides the conductor into the second section 10, the sharp edges of which cut through the insulation of the conductor, possibly up to the core thereof depending upon the size, that is the diameter, of the conductor.

The conductor then enters the third section 11 of the slot 7, the walls of which section 11 complete the cutting of the insulation of the conductor if necessary, and also apply a gradually increasing compressive force on to the core of the conductor while guiding the core to the throat 12.

The core then at least partially passes through the throat 12 into the fourth and fifth sections 13 and 14 of the slot 7, the walls of the fourth section 13 engaging over some of the strands of the core to retain the core in the slot 7.

Figures 3 to 6 diagrammatically illustrate a slot as described above having four different sizes of core therein, the core size increasing from Figure 3 to Figure 6. It can clearly be seen that in each case the core is engaged under the shoulders formed by the sides of the fourth section of the slot, with the strands of the core being compressed between the sides of the third and fifth sections of the slot, thereby to establish an electrical and mechanical connection between the core and the contact member containing the slot.

As described, the contact shown in Figures 1 and 2 contains two slots as described above, and

for termination a conductor would be urged into the two slots simultaneously thereby to establish connection to the conductor at two spaced locations, in known manner.

The conductor is preferably urged into the slots by means of a tool which is preferably part of a connector assembly comprising an insulating housing in which the contact is mounted, and an insulating cover which serves to urge the conductor into the slots and then remain secured to the housing covering the connection between the contact and the conductor. The cover is preferably formed with a stuffer member which serves to engage the conductor to urge it into the slots as necessary, and which remains in contact with the conductor in the final assembly, serving to retain the conductor at the required position in the slots in the contact. Since conductors of different size must be urged to different depths in the slots, the size of the stuffer member would be set in dependence upon the size of conductor to be terminated.

As shown in Figure 1, the two slots in the contact are of mutually different width over their second, third and fourth sections 10, 11 and 13, the slot in the rear (in Figure 1) plate being narrower than that in the front plate over these sections. Such a contact is usable with a relatively wide range of conductor sizes since it is ensured that at the ends of the range at least one of the slots will give a satisfactory connection while over most of the range both slots will give a satisfactory connection.

Considering now the contact portion 2 of the contact shown in Figures 1 and 2, as shown this comprises two opposed pairs 20 and 21 of resilient contact arms 22, each arm 22 presenting a first rounded contact surface 23 to the opposed arm 22 of the other pair, and presenting a second rounded contact surface 24 to the other arm 22 of the same pair. The two pairs of opposed first contact surfaces 23 define a first slot into which a substrate such as a printed circuit board or a male tab contact can be inserted for connection to the contact, while the two pairs of opposed second contact surfaces 24 define a second such slot into which a similar substrate or male contact can be inserted, the first and second slots thus defined being mutually perpendicular.

As clearly shown in Figure 2, the free ends of the arms 22 of each pair 20 or 21 are bent to provide a flared mouth 25 for the first slot defined by the first contact surfaces 23.

Claim

An electrical contact formed in one piece from sheet metal which is folded to define a pair of opposed cantilever arms (3, 4) extending in spaced apart relation from the fold (5, 6) in convergent manner towards free ends at which each is formed with a slot to define two pairs of opposed contact arms (22), all extending in the same direction, the slots being aligned in a direction perpendicular to a first contact receiving

and 4 arranged in spaced parallel planes, the plates being joined by two bridging strips 5 and 6 extending between the plates 3 and 4 from adjacent edges thereof.

Each plate 3 or 4 has a slot 7 therein, and since the slots 7 are similar only one thereof will be described in detail with particular reference to Figure 1.

Each slot 7 has a mouth 8 at the edge of the plate from which the bridging strips 5 and 6 extend, the bridging strips 5 and 6 being on opposite sides of the mouth 8.

The mouth 8 leads to a first inwardly tapering section 9 having converging straight sides, which in turn leads to a second parallel straight sided section 10. Preferably the sides of the second section 10 are bevelled to provide relatively sharp cutting edges.

The second section 10 leads into a third inwardly tapering section 11 having convex converging sides leading to a throat 12.

The throat 12 opens into a short fourth outwardly tapering section 13 the walls of which constitute shoulders facing away from the throat 12.

The fourth section 13 leads into a fifth inwardly tapering section 14 having convex converging sides, the maximum width of the fifth section 14 being less than that of the third section 11.

The fifth section 14 terminates in an enlarged circular aperture 15 which serves in known manner to determine the resiliency of two arms of the portion 1 defining the slot 7.

For use of the contact member described above an insulated conductor having a core formed from a plurality of strands is urged transversely of its axis into the slot 7 through the mouth 8. The first section 9 guides the conductor into the second section 10, the sharp edges of which cut through the insulation of the conductor, possibly up to the core thereof depending upon the size, that is the diameter, of the conductor.

The conductor then enters the third section 11 of the slot 7, the walls of which section 11 complete the cutting of the insulation of the conductor if necessary, and also apply a gradually increasing compressive force on to the core of the conductor while guiding the core to the throat 12.

The core then at least partially passes through the throat 12 into the fourth and fifth sections 13 and 14 of the slot 7, the walls of the fourth section 13 engaging over some of the strands of the core to retain the core in the slot 7.

Figures 3 to 6 diagrammatically illustrate a slot as described above having four different sizes of core therein, the core size increasing from Figure 3 to Figure 6. It can clearly be seen that in each case the core is engaged under the shoulders formed by the sides of the fourth section of the slot, with the strands of the core being compressed between the sides of the third and fifth sections of the slot, thereby to establish an electrical and mechanical connection between the core and the contact member containing the slot.

As described, the contact shown in Figures 1 and 2 contains two slots as described above, and

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The conductor is preferably urged into the slots by means of a tool which is preferably part of a connector assembly comprising an insulating housing in which the contact is mounted, and an insulating cover which serves to urge the conductor into the slots and then remain secured to the housing covering the connection between the contact and the conductor. The cover is preferably formed with a stuffer member which serves to engage the conductor to urge it into the slots as necessary, and which remains in contact with the conductor in the final assembly, serving to retain the conductor at the required position in the slots in the contact. Since conductors of different size must be urged to different depths in the slots, the size of the stuffer member would be set in dependence upon the size of conductor to be terminated.

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Considering now the contact portion 2 of the contact shown in Figures 1 and 2, as shown this comprises two opposed pairs 20 and 21 of resilient contact arms 22, each arm 22 presenting a first rounded contact surface 23 to the opposed arm 22 of the other pair, and presenting a second rounded contact surface 24 to the other arm 22 of the same pair. The two pairs of opposed first contact surfaces 23 define a first slot into which a substrate such as a printed circuit board or a male tab contact can be inserted for connection to the contact, while the two pairs of opposed second contact surfaces 24 define a second such slot into which a similar substrate or male contact can be inserted, the first and second slots thus defined being mutually perpendicular.

As clearly shown in Figure 2, the free ends of the arms 22 of each pair 20 or 21 are bent to provide a flared mouth 25 for the first slot defined by the first contact surfaces 23.

Claim

An electrical contact formed in one piece from sheet metal which is folded to define a pair of opposed cantilever arms (3, 4) extending in spaced apart relation from the fold (5, 6) in convergent manner towards free ends at which each is formed with a slot to define two pairs of opposed contact arms (22), all extending in the same direction, the slots being aligned in a direction perpendicular to a first contact receiving



(12)

slot defined between the cantilever arms (3, 4), each arm (22) of each pair presenting a contact projection (23) opposed to a similar projection (23) on the opposed arms (22) of the other pair the opposed pairs of projections (23) defining the contact receiving slot, characterised in that each arm (22) of each pair presents a second contact projection (24) opposed to a similar contact projection (24) on the adjacent arm (22) of the pair, the two pairs of opposed second contact projection (24) defining, at the aligned slots, a second male-contact receiving slot, the fold extending transversely of the first contact receiving slot and being formed with a wire receiving slot (7) extending transversely of the fold to define bridging portions (5, 6) at either side of the wire receiving slot (7) and between the cantilever arms (3, 4), the wire receiving slot (7) extending into spaced parallel plate portions of the arms (3, 4).

Revendication

Contact électrique fait d'une pièce en tôle qui est pliée pour définir deux branches en porte à faux opposées (3, 4) s'étendant à une certaine distance l'une de l'autre à partir du pli (5, 6) de manière à converger vers des extrémités libres où chacune d'elles présente une fente destinée à définir deux paires de branches de contact opposées (22), qui s'étendent toutes dans le même sens, les fentes étant alignées dans un sens perpendiculaire à une première fente réceptrice de contact définie entre les branches en porte à faux (3, 4), chaque branche (22) de chaque paire présentant une saillie de contact (23) opposée à une saillie semblable (23) sur les branches opposées (22) de l'autre paire, les paires opposées de saillies (23) définissant la fente réceptrice de contact, caractérisé en ce que chaque branche (22) de chaque paire présente une seconde saillie de contact (24) opposée à une saillie de contact semblable (24) sur la branche adjacente (22) de la paire, les deux paires de secondes saillies de contact opposées (24) définissant, au niveau des fentes alignées, une seconde fente réceptrice de contact mâle, le pli s'étendant transversalement à la première fente réceptrice de contact et présen-

tant une fente réceptrice de conducteur (7) qui s'étend transversalement au pli afin de définir des parties de pontage (5, 6) de chaque côté de la fente réceptrice de conducteur (7) et entre les branches en porte à faux (3, 4), la fente réceptrice de conducteur (7) s'étendant dans deux parties planes parallèles espacées des branches (3, 4).

Patentanspruch

Elektrischer Kontakt, der in einem Stück aus Metallblech geformt ist, das derart gefaltet ist, daß es ein Paar gegenüberliegender freikragender Arme (3, 4) begrenzt, die sich im Abstand zueinander von der Faltung (5, 6) in konvergierender Weise zu freien Enden hin erstrecken, an denen jeder mit einem Schlitz versehen ist, so daß zwei Paare gegenüberliegender Kontaktarme (22) gebildet sind, die sich in der gleichen Richtung erstrecken, wobei die Schlitze in einer Richtung ausgerichtet sind, die senkrecht zu einem ersten Kontaktaufnahmeschlitz steht, der zwischen den freikragenden Armen (3, 4) begrenzt ist, wobei ferner jeder Arm (22) jedes Paares einen Kontaktvorsprung (23) aufweist, der einem ähnlichen Vorsprung (23) an den gegenüberliegenden Armen (22) des anderen Paares gegenüberliegt, und wobei die gegenüberliegenden Paare von Vorsprüngen (23) den Kontaktaufnahmeschlitz begrenzen, dadurch gekennzeichnet, daß jeder Arm (22) jedes Paares einen zweiten Kontaktvorsprung (24) aufweist, der einem ähnlichen Kontaktvorsprung (24) am benachbarten Arm (22) des Paares gegenübersteht, daß die beiden Paare gegenüberstehender zweiter Kontaktvorsprünge (24) an den ausgerichteten Schlitzen einen zweiten Aufnahmeschlitz für einen Steckkontakt begrenzen, daß sich die Faltung quer zum ersten Kontaktaufnahmeschlitz erstreckt und mit einem Drahtaufnahmeschlitz (7) versehen ist, der sich quer zur Faltung erstreckt und Überbrückungsabschnitte (5, 6) an beiden Seiten des Drahtaufnahmeschlitzes (7) und zwischen den freikragenden Armen (3, 4) begrenzt, und daß sich der Drahtaufnahmeschlitz (7) in im Abstand parallel zueinander angeordnete Plattenteile der Arme (3, 4) erstreckt.

