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ELECTRICAL CONNECTOR WITH BENT PIN CONTACT

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

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This invention relates generally to electrical connectors, and pertains more particularly to an electrical connector having a bent pin contact.

One object of the present invention is to provide an electrical connector having high current carrying capabilities even though fabricated in miniature form. In this regard, the demand for smaller and smaller connectors has introduced various problems and one of these problems is the design of a good electrical path when the two components comprising the connector are mated or engaged. More specifically, the invention has for an aim the provision of a bent or angled pin that is flexed by the socket contact or component when the two parts are coupled together.

Another object of the invention is to provide an electrical connector having a hood surrounding the pin contact so as to prevent damage to the pin contact and at the same time serve as a guide for the reception of the socket contact when engagement is made with the pin contact.

A further object is to provide an electrical connector that can be manufactured quite inexpensively which will be rugged in actual use and which is not likely to separate due to vibrations and the like.

Yet another object of the invention is to provide an electrical connector that will not require adherence to close manufacturing tolerances.

Still another object of the invention is to provide an electrical connector having a hood which can be readily removed when circumstances so dictate. In this regard, the invention has for an aim the provision of a latching mechanism which permits the hood to be snapped into place, the latching mechanism normally retaining the hood in an encircling relationship with the pin contact but permitting the hood to be removed whenever it is desired to do so.

A further object of the invention is to provide an electrical connector having a latching mechanism as referred to above which mechanism can be disengaged with a suitable implement but which will not inadvertently be disengaged by the socket component or contact.

These and other objects and advantages of the invention will more fully appear from the following description, made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIGURE 1 is a side elevational view of one form the electrical connector can assume, the view showing the components before they are brought into engagement;

FIGURE 2 is a view similar to FIGURE 1 but with the components engaged with each other;

FIGURE 3 is a view generally similar to FIGURE 1 but showing a modified construction that the invention may constitute;

FIGURE 4 is a view corresponding generally to FIGURE 2 but illustrating the connector of FIGURE 3 in its engaged position, and

FIGURE 5 is a sectional view of the pin component and encircling hood, an appropriate implement having been inserted into the hood from one end in order to effect the disengagement of the hood from the pin component.

Referring now to FIGURES 1 and 2, the electrical connector there shown which exemplifies the invention has been designated generally by the reference numeral 10. At the right in FIGURE 1 is a socket component 12 having a tubular configuration with a conventional solder pot 14 at one end and beveled entrance 16 at the other end.

Cooperable with the socket component 12 is a pin component 18 also having a conventional solder pot 20. The component 18 further includes a flange 22 and a cylindrical body 24. Projecting from the cylindrical body 24 is a resilient pin 26 having a rounded end 28 thereon. Encircling the resilient pin 26 is a cylindrical hood 30 having a beveled entrance end 32 which constitutes one surface of a circumferential rib 34. The cylindrical hood 30 may be considered to be pressfitted over the cylindrical body 24, thereby providing a fixed attachment in this particular embodiment.

Inasmuch as the purpose of the hood 30 is to protect the bent pin 26, it can be made of metal or plastic. Stated somewhat differently, the hood is not intended to function as an electrically conductive member, although it could if it is desired that it do so. The bent or angular pin 26 serves as one of two electrical connections and therefore should be of metal in order to render it electrically conductive. Also, since the pin 26 is to be flexed, as will be presently described, it should possess good spring qualities. An appropriate copper alloy, such as beryllium copper, is satisfactory. Still further, the resilient pin 26 could be of Phosphor bronze or spring brass, or it could be steel. The socket component, since it functions as the second contact in the described connector, should also be of an appropriate metal and can be any one of those listed above, as well as still additional materials which would be satisfactory.

In use, the outer diameter of the socket component or contact 12 is such as to pass through the entrance defined by the circumferential rib 34. The rounded end 28 on the resilient pin 26 will normally lie quite close to the rib 34 on the hood 30 and is preferably in engagement therewith. Hence, when the socket component 12 is inserted into the hood 30, the resilient pin 26 will be flexed away from the rib 34 as can clearly be seen from FIGURE 2. The bevel 32 facilitates the insertion of the socket component 12 and the thickness of the socket component is adequate to cause sufficient deflection of the resilient pin 26 so that the rounded end 28 thereafter pressurally bears or engages against the interior of the socket component, all as is clearly evident in FIGURE 2. Consequently, a good electrical path is established between the two components and the curvature is thereby enabled to carry a relatively high current even when fabricated on a miniaturized scale.

The embodiment depicted in FIGURES 3-5 varies in certain respects from the embodiment of FIGURES 1 and 2. Consequently, the reference numeral 18a designates the connector shown in FIGURES 3-5. The suffix "a" will be utilized for the purpose of distinguishing the parts, even though certain parts differ only slightly from those of the embodiment previously described and which has been given reference numeral 10. For instance, the socket component 12a has a circumferential flange 36 extending about its outer surface for a purpose hereinafter explained. The pin component 18a has a bent pin 26a formed with an integral collar 38 thereon. The collar 38 has a shoulder at 40 and a tapered or conical cam surface at 42.

The cylindrical hood labeled 30a has an internal annular flange 44 provided with a central opening 46 of a size sufficient to allow passage of the collar 38 therethrough when the hood 30a is to be detached from the pin component 18a.
In contradistinction to the embodiment 10, the embodiment 16a is constructed so that the hood 30a slidably circumscribes the body 24 rather than being fixedly secured thereto. It is the function of the collar 32 to latch the hood 30a in place. The latched relationship is pictured in FIGURE 4 and it will be observed that the shoulder 40 is abutting against one side of the flange 54. To produce this latching relationship, the pin 26a is first bent downwardly and then upwardly during its manufacture. Stated somewhat differently, the pin 26a has a bowed appearance when viewed from one side.

Hence, when assembling the hood 30a with the pin component 18a, insertion of the pin 26a into the left end of the hood 30a will be instrumental in causing the cam surface 42 to flex the pin 26a sufficiently so that the collar 38 snaps into the position shown in FIGURES 3 and 4.

As shown in FIGURE 3, the rounded end on the pin 26a is in close proximity with the rib 54, this being the relationship also utilized in the embodiment 10. Thus, when the socket component 12a is inserted into the hood 30a, the rounded end of the pin 26a will be deflected in the same manner that it is in the embodiment of FIGURES 1 and 2. It will be noted that the deflection of the rounded end of the pin 26a will not unlatch the collar 38 from the flange 44. However, just as in the embodiment shown in FIGURES 1 and 2, a firm electrical engagement is derived by reason of the pressural action of the rounded end of the pin 26a against the interior of the socket component 12a.

Through the agency of the flange 36, the socket component 12a cannot be inserted to the extent that it would cause its left end to ride against the cam surface 42 which would be apt to cause undesired detachment of the hood 30a from the pin component 18a. However, when disengagement of the hood 30a from the pin component 18a is desired, a suitable implement can be utilized for effecting the unlatching of the collar 38 from the flange 36. To do this, an implement in the form of the tool 48 includes a cylindrical bushing portion 50 having one end 52 which cams against the surface 42. The other end of the tool 48 is provided with a head 54 by which the tool can be properly manipulated. All that is necessarily is that the implement or tool 48 be inserted sufficiently so as to cause the pin 26a to be flexed in the region of the collar 38 as depicted in FIGURE 5. Forcing of the collar 38 into substantial alignment with the central opening 46 will allow the hood 30a to be readily withdrawn, the collar 38 passing through said opening 46 in so doing. Therefore, not only can the hood 30a be readily installed initially, but it can be replaced quickly if the hood 30a is to be replaced.

It will, of course, be understood that various changes may be made in the form, details, arrangements and proportions of the parts without departing from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. An electrical connector comprising:
(a) a tubular socket component;
(b) a resilient pin component;
(c) a cylindrical hood encircling said pin component,
(d) said hood having a projection extending radially inward,
(e) said pin component having a projection thereon engageable with said hood projection,
(f) said pin component being bent in a direction to normally maintain its projection in engagement with said hood projection to prevent detachment of said hood from said pin component and also in a direction so that the end of said pin component that is to be received in said socket component lies adjacent one end of said hood,
(g) whereby said pin component end will be flexed away from said hood when said socket component is inserted therein.

2. An electrical connector in accordance with claim 1 in which:
(a) said hood projection constitutes an annular flange having a centrally disposed opening, and
(b) said pin component projection constitutes an integral collar having a shoulder which abuts said annular flange but of a size to pass through said centrally disposed opening.

3. An electrical connector in accordance with claim 2 in which:
(a) said collar tapers to a smaller size in a direction away from said shoulder toward said one hood end,
(b) whereby said tapered collar provides a cam surface capable of engagement by an inserted implement in effecting release of said shoulder from said flange and resulting detachment of said hood.

4. An electrical connector in accordance with claim 3 including:
(a) a projection on said socket component extending radially outward and spaced axially from the entrance end of said socket component a distance less than the distance from the end of said pin to said collar for abutting the end of said hood and thereby preventing insertion of said socket component into said hood to a distance sufficient to effect release of said shoulder.

5. An electrical connector comprising:
(a) a tubular socket component;
(b) a resilient pin component receivable in said socket component;
(c) a detachable cylindrical hood having one end thereof mounted in a fixed relationship with one end of said pin component with the other ends of said component and hood being substantially adjacent each other,
(d) said pin component extending at an angle with respect to the longitudinal axis of said hood so that said other end of the pin component is substantially contiguous the other end of said hood,
(e) a portion of said pin component being in latching engagement with said hood to normally prevent detachment thereof,
(f) whereby the thickness of the socket component will flex said pin component away from said hood when said socket component is inserted therein to cause said other end of said pin component to pressurally engage the interior of said socket component.

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