An electrical connecting arrangement includes a multi-prong plug unit. The plug unit is comprised of a plug housing and at least two electrical conductors each leading into the plug housing and having an end portion. At least two prong units are provided, each partially accommodated within the plug housing and in electrically conductive engagement with the end portion of a respective one of the electrical conductors, and each partially projecting out of the plug housing. The prong units define between themselves an intermediate space. At least a portion of each prong unit is resiliently mounted relative to the plug housing so as to yieldingly press against two electric contacts of an electrical device into which the plug unit can be plugged. The two electrical contacts of the electrical device define between themselves a space. The plug unit is further provided with a separating member projecting from the plug housing and extending through the space intermediate the two prong units past the two prong units so as to enter the space intermediate the two electrical contacts when the plug unit is in plugged-in position.

17 Claims, 3 Drawing Figures
ELECTRICAL CONNECTING ARRANGEMENT

BACKGROUND OF THE INVENTION

The present invention relates to a two-pronged plug unit for establishing an electrical connection with two electrical contacts of an electrical device, of the type comprised of a plug housing in which there are partially accommodated two prong units each electrically connected to the end of a respective one of two conductors which enter the plug housing.

A great variety of two-pronged plug units are already known in which the prong units, which are electrically connected to the ends of the conductors entering the plug housing, have the form of female electrical connectors, flat prong members, prong rods or clip- or clamp-type prongs. A disadvantage of all the known prong arrangements is that they are not capable of resiliently and yieldingly engaging the sides of flat electrical contacts of an electrical device into which the plug unit is plugged, when such flat electrical contacts are necessary on account of space or mounting considerations.

SUMMARY OF THE INVENTION

It is a general object of the invention to provide a two-pronged plug unit for establishing an electrical connection with an electrical device by yieldingly electrically engaging the flat sides of electrical contacts of such devices.

This object, and others which will become more understandable from the detailed description below of an exemplary embodiment, can be met, according to one advantageous concept of the invention by providing, in an electrical connecting arrangement, a multi-prong plug unit, comprising, in combination, a plug housing and at least two electrical conductors each leading into the plug housing and each having an end portion. At least two prong units are provided, each partially accommodated within the plug housing and in electrically conductive engagement with the end portion of a respective one of the electrical conductors, and each partially projecting out of the plug housing, the prong units defining between themselves an intermediate space. At least a portion of each of the prong units is resiliently mounted relative to the plug housing so as to yieldingly press against two electrical contacts spaced in correspondence to the spacing between the prong units, when the plug unit is plugged into an electrical device provided with such electrical contacts.

The plug unit of the invention has the advantage that, even when the electrical contacts which are to be engaged by the prongs of the plug unit are not evenly disposed, the desired electrical connection will be effected, with the electrically connected contacts being sealed and thereby protected from the effects of dirt, water and temperature.

According to another advantageous concept of the invention, the separating members can be specially dimensioned and/or configured to serve as a "key" to prevent the plug unit from being plugged into the electrical device in the wrong manner, or to prevent the wrong plug unit from being plugged in.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a view, partially broken away and partially in section, of a plug unit plugged into an electrical device;

FIG. 2 is a section taken on line II—II of FIG. 1; and FIG. 3 is an enlarged longitudinal sectional view of a portion of the structure shown in FIGS. 1 and 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A two-pronged plug unit 1 is comprised of a plug housing 2 made of high-temperature-stabilized elastic plastic material, for example silicon rubber. The plug housing 2 is formed with a sealing rim 3 and a conical sealing section 4. The plug housing 2 is cast around two parallel spaced prong units 5, with the shape of the sealing rim 3 and of the sealing section 4 being selected in correspondence to the surface of the housing 6 of an electrical device 10. The housing 6 of the electrical device 10 has an opening 7 into which the plug unit is plugged and when the plug unit is in-plugged-in position, the sealing rim 3 and the conical sealing portion 4 seal off a chamber 8 formed by the housing 6 of the electrical device, so as to seal-tightly enclose the electrically engaged electrical contacts.

Each prong unit 5 is comprised of a guide sleeve or jacket 11 (FIG. 3) provided with an outwardly bulging annular ridge 12. Fitted into the annular depression 13 corresponding to the ridge 12 is one turn of a coiled electrically conductive spring member 14. The coiled lower end 15 of the electrically conductive spring member 14 projects out of the guide sleeve 11. The other end portion 16 of the spring 14 extends in direction parallel to the direction of elongation of the coiled spring. The straight end portion 16 of the contact spring 14 lies against a bore end portion 17 of an electrical conductor 18. The end portions 16 and 17 are both located in a clamping sleeve 19 which is slid into the guide sleeve 11. The electrical conductor 18 and the contact spring 14 are mechanically and electrically connected to each other by squeezing in a portion of the clamping sleeve 19 and guide sleeve 11, as shown.

The two prong units 5, thusly connected to the conductor ends 17, pass through and are supported by a supporting frame 20. The supporting frame 20 consists of insulating material, for example nylon, and has a generally rectangular form. The supporting frame 20 has a first portion provided with two spaced circular openings 21 through which the prong units 5 pass, the diameter of these openings corresponding to the outer diameter of the guide sleeves 11. The portion of the guide sleeve 11 which accommodates the clamping sleeve 19 and the conductor and spring ends 17, 16 extends upwardly past the first portion of the supporting frame 20, with the outwardly projecting annular ridge 12 of the guide sleeve 11 being located just below such first portion of the supporting frame 20. The supporting frame 20 is further comprised of a second portion 22 constituting a separating member which extends through the space intermediate the portions of the two guide sleeves 11 which accommodate the coiled springs 14. The separating member 22 projects through this in-
intermediate space past the end portions 15 of the contact springs 14, and has a generally rectangular outline.

The upper portions of the prong units 5 are surrounded by high-temperature-stabilized elastic plastic material forming the plug housing 2, with the separating member 22, the lower portions of the prong units 5, and in particular the lower end portions 15 of the spring contacts 14, projecting downwardly out of the plug housing 2.

In FIGS. 1 and 2, the electrical connecting arrangement is shown with the plug unit in plugged-in position. The plug housing 2 and the housing 6 of the electrical device 10 together form a seal-tight chamber 8, by virtue of the sealtight engagement between the sealing rim portion 3 of plug housing 2 and the rim portion of the opening 7 of housing 6, as well as by virtue of the seal contact between the conical sealing portion 4 of plug housing 2 and the bounding surface portions of the opening 7 of housing 6. The spring contacts 14 yieldingly engage the flat electrical contacts 9 of the electrical device 10, with the separating member 22 extending into the space intermediate the electrical contacts 9 and being seated at the base of the sealed chamber 8. Advantageously, the separating member 22 separates the interior of sealed chamber 8 into two separate compartments. The plug housing 2 is held in place in the illustrated embodiment additionally by means of a bracket 23 which presses down against the top of plug housing 2 and is releasably screwed onto the housing 6 of the electrical device 10.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the type described above.

While the invention has been illustrated and described as embodied in an electrical connecting arrangement and in particular a plug unit therefor, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

We claim:

1. In an electrical connecting arrangement, a multi-prong plug unit, comprising, in combination, a plug housing, at least two electrical conductors each leading into said plug housing and having an end portion, at least two prong units each partially accommodated within said plug housing and in electrically conductive engagement with the end portion of a respective one of said electrical conductors, and each partially projecting out of said plug housing, said prong units defining between themselves an intermediate space, at least a portion of each of said prong units being resiliently mounted relative to said plug housing so as to yieldingly press against two electrical contacts spaced in correspondence to the spacing between said prong units when the plug unit is in plugged-in position, and a separating member projecting from said plug housing and extending through the space intermediate said two prong units past said two prong units so as to occupy the space intermediate such two electrical contacts when the plug unit is in plugged-in position, wherein each of said prong units comprises a guide jacket, and an electrically conductive spring member in said guide jacket, one end of said electrically conductive spring member being in direct electrical and mechanical contact with the end of the respective one of said conductors and the other end of said electrically conductive spring member projecting out of said guide jacket.

2. In an electrical connecting arrangement as defined in claim 1, and further including an electrical device provided with two electrical contacts spaced in correspondence to the spacing between said prong units, said electrical device including means for holding said plug unit in plugged-in position relative to said electrical device, with at least a portion of each of said prong units yielding pressing against a respective one of said electrical contacts, and with said separating member extending into the space intermediate said two electrical contacts.

3. In an electrical connecting arrangement as defined in claim 1, wherein said plug unit further comprises a supporting frame having a first portion located and supported in said plug housing and having a second portion constituting said separating member, and wherein said prong units pass through and derive support from said first portion of said supporting frame.

4. In an electrical connecting arrangement as defined in claim 1, wherein said plug housing is comprised of high-temperature-stabilized synthetic plastic material.

5. In an electrical connecting arrangement as defined in claim 1, wherein each of said prong units further comprises a clamping jacket accommodated inside said guide jacket and surrounding and clamping together said one end of said electrically conductive spring member and said end of said electrical conductor.

6. In an electrical connecting arrangement as defined in claim 1, wherein said electrically conductive spring member is an elongated coiled spring accommodated in said guide jacket.

7. In an electrical connecting arrangement as defined in claim 1, wherein said plug unit further comprises a supporting frame having a first portion located and supported in said plug housing and having a second portion projecting away from said first portion at a first side of said first portion and constituting said separating member, and wherein said prong units pass through and derive support from said first portion of said supporting frame, and wherein the guide jacket of each of said prong units is provided with an outwardly projecting annular ridge located adjacent and in contact with said first side of said first portion of said supporting frame.

8. In an electrical connecting arrangement as defined in claim 5, wherein said guide jacket and said clamping jacket therein are in partially squashed-in condition to maintain said one end of said spring member, said end of said electrical conductor, said clamping jacket and said guide jacket in tight engagement with each other.

9. In an electrical connecting arrangement as defined in claim 3, wherein said supporting frame is comprised of plastic material.

10. In an electrical connecting arrangement as defined in claim 3, wherein said separating member serves as a key and is so dimensioned and configured relative to the spacing between said electrical contacts.
as to enter into said space and thereby permit said prong units to engage said electrical contacts, whereby separating members of different dimensions and/or configurations will prevent such engagement by not being able to enter the space intermediate said electrical contacts.

11. In an electrical connecting arrangement as defined in claim 1, wherein said plug housing is comprised of high-temperature-stabilized elastic rubber material.

12. In an electrical connecting arrangement as defined in claim 2, wherein said plug housing is provided with a sealing rim, and wherein said electrical device is comprised of a socket housing at least partially accommodating said plug housing and having a sealing rim, and wherein the sealing rim of said plug housing and the sealing rim of said socket housing are in seal-tight engagement with each other.

13. In an electrical connecting arrangement as defined in claim 12, wherein said socket housing defines a closed chamber when said plug unit is plugged thereinto, and wherein said plug housing has a conical sealing portion extending into said socket housing and seal-tightly closing off said chamber.

14. In an electrical connecting arrangement as defined in claim 3, wherein said plug housing is a cast body surrounding said supporting frame.

15. In an electrical connecting arrangement as defined in claim 2, wherein said electrical contacts of said electrical device are flat contacts, and wherein said prong units yielding engage the flat sides of said flat contacts.

16. In an electrical connecting arrangement as defined in claim 2, and further including releasably mechanical connecting means releasably maintaining said plug unit in plugged-in position relative to said electrical device.

17. In an electrical connecting arrangement as defined in claim 16, wherein said releasable mechanical connecting means comprises a holding bracket releasably mounted on said electrical device.

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