

"Improvements relating to Electric Plugs"

In the use of electric appliances, the leads of a current-carrying cable must be connected to the terminals of an electric plug, and to prevent strain on the cable being taken at the point of connection, it is desirable to utilise additional means to hold the cable against withdrawing movement relative to the plug. One such means is provided by opposed clamping strips secured to the plug on screws, such that, on rotation of the screws, the clamping strips may be caused to move relative to one another. In use, the screws are rotated to separate the clamping strips, the cable is threaded between the clamping strips, and the leads thereof are connected to the terminals of the plug. The screws of the plug are then rotated to cause the clamping strips to be moved together, to clamp the cable therebetween, and thereby to prevent movement of the cable relative to the plug.

Presently available means for securing a current-carrying cable to a plug are in general either expensive in their construction or time consuming in their operation, and it is one of the various objects of this invention to provide a means, adapted to secure a current-carrying cable against withdrawing movement relative to the plug, which means is both inexpensive in its construction and simple in its use.

According to this invention there is provided an electric plug comprising a base member, plug pins extending through the base member, means being provided which is operative between the base member and the pins to restrain movement of the pins relative to the base member, a cover member comprising a formation which is adapted for hinging engagement with a formation of the base member, at least one screw threaded member co-operable between the base member and cover member to secure the base and cover members together, respective parts of the base and cover members when so secured together defining an aperture in a part of the plug remote from the hinged engagement through which a cable may extend into the interior of the plug, a skirt on the cover member extending peripherally

around the base member, the construction and arrangement being such that the size of the aperture may be varied, to accomodate cable of differing sizes, by varying the degree of tightening of said screw threaded member.

Thus, tightening of said screw causes relative angular movement between the base and cover members to vary the size of the aperture.

Preferably, the aperture-defining parts of the base member and the cover member are afforded with gripping means such as toothed formations, adapted when a cable is within the aperture to grip the cable to resist withdrawing movement of the cable from the interior of the plug. Conveniently on at least one of the base member and the cover member, preferably the cover member, the ^{aperture-} defining part is afforded by a tongue extending (when the base and cover members are secured together) towards the aperture-defining part of the base member.

If desired, the base and cover members may be moulded in one-piece, being connected together by a web of material.

The base and cover members of an electric plug in accordance with this invention may be moulded of a relatively resilient material, so that a cable is clamped between the aperture-defining parts of the cover and base members with some resilience. Alternatively however, the base and cover members may be moulded from a relatively rigid material resilient clamping of the cable being afforded by a resilience of the cable itself.

Additionally, in a conventional plug the pins are normally held in position in the plug base by the plug cover, and when the cover member has been removed, for example for rewiring, refusing or the like, there is a tendency for the pins to fall out from the base member.

Preferably therefore, the base member comprises apertures through which the pins of the plug extend from the interior thereof, wherein the pins are provided in side faces thereof with at least one aperture into which a protrusion on the base member extends, the construction and arrangement being such that the protrusion may readily be deformed to permit movement of the pin into a desired position in the aperture, but which restrains subsequent movement of the plug pin from said desired position in at least one direction.

In this manner, on initial assembly of the plug, the pins may be inserted in the base member relatively easily, and are unlikely to fall from the base member on subsequent removal of the cover member from the base member, such as for example when the plug is being wired or rewired.

A face of the protrusion may be inclined, such as that face which, when the pin is being inserted through the aperture into its desired position, is engaged by the pin. In this manner, engagement of the protrusion by the pin, and deformation of the protrusion, may be effected relatively easily. However, forces on the pin when in its desired position, in the opposite direction (that is, tending to push the pin towards the interior of the plug) may be taken on planar, abutting faces of the protrusion and pin.

A further difficulty encountered in a conventional plug is the securing of a fuse terminal to the plug base. In particular, whereas the pins are inserted in the plug pin apertures, and one fuse terminal is carried by the live pin, the other fuse terminal (which is connected to wire-connecting means) is in general merely located in a recess, to be clamped in position by the cover member when it is secured to the base member. This renders said other fuse terminal particularly liable to separation from the plug base, and particularly when heavy duty wiring is connected to the connecting means, may be difficult to relocate and hold in said recess, whilst the cover member is being manipulated into position relative to the base member.

Preferably therefore, the plug comprises a terminal member which is adapted to be inserted in an aperture or recess of the plug, part of or secured to the terminal member frictionally engaging the wall of the plug bounding said aperture or recess.

Thus, insertion of said part into the aperture or recess may involve deformation of either said part, or of the wall bounding said aperture or recess. Said part may be resiliently deformable (for example be made of relatively soft plastics material), being compressed upon the insertion of the terminal member or said part into the aperture or recess.

Preferably however said part is provided by a fixing member of relatively rigid material secured to or extending from an underside of the terminal member, and which resiliently deforms the wall bounding the aperture or recess. Preferably, said fixing member is of metal, and comprises serrations.

Where the terminal member is a fuse terminal, conveniently it comprises a base plate, and two terminal tags extending therefrom at

opposite ends, each of which is adapted to be inserted into an associated aperture or recess, to provide fixing members for the fuse terminal at opposite ends of the base member.

Such a construction allows the fuse terminal to be located in a desired position on the base member of the electric plug relatively easily, resisting undesired movement of the fuse terminal from its desired position, yet allowing removal of the fuse terminal from the base member, should this become desired.

There will now be given detailed descriptions, to be read with reference to the accompanying drawings, of an electric plug which is a preferred embodiment of this invention, and which have been selected to illustrate the invention by way of example.

In the accompanying drawings:-

FIGURE 1 is an underneath plan view of the plug which is the preferred embodiment of this invention;

FIGURE 2 is a sectional view, taken on the lines II-II of Figure 1;

FIGURE 3 is a plan view of the base member of the plug, the cover thereof having been removed;

FIGURE 4 is a sectional view, taken on the lines IV-IV of Figure 1;

FIGURES 5 and 6 are views illustrating the securing of a fuse contact to the plug; and

FIGURE 7 shows an underside of a modification of the preferred embodiment.

The plug which is the preferred embodiment of this invention comprises a base 6 and a cover 8 adapted to be secured together by two screws 10, inserted through apertures 12 in the base and threadedly received in bores of the cover. The base and cover are moulded from plastics material, and the plug is provided with conventional live, neutral and earth pins 16, 18 and 20 respectively. The cover is provided with a skirt which, when the cover and base are secured together, extends peripherally around the base.

At an end portion adjacent to the earth pin, the base is provided with an exterior shoulder 22, and the cover is provided with an in-turned lip 24, adapted to engage behind the shoulder 22 and thus to provide for hinging movement of the cover relative to the base.

At the end portion of the plug opposite to the hinge formations 22 and 24, the plug is provided with an aperture 26, through which electric cable connected to the plug pins extends. The aperture 26 is defined by

parts of the base and cover, specifically an interior wall portion 28 of the base 6, and a tongue 30 of the cover 8.

5 In the use of the plug which is the preferred embodiment of this invention, with the cover separated from the base, the conductive elements of the cable are connected to the three pins in conventional manner, as shown in Figure 3.

10 The lip 24 of the cover is then engaged behind the shoulder 22, and the screws 10 inserted into the threaded bores of the cover, drawing the cover towards the base, and the tongue 30 into engagement with a cable located in the aperture 26, firmly gripping the cable, and in particular (by virtue of serrations 29 and 31 on the wall portion 28 and tongue 30, respectively) preventing withdrawal movement of the cable from the plug, and thereby removing strain from the connection of the conductive elements with the plug pins.

15 The distance of separation between the wall portion 28 and the tongue 30, as shown in full lines in Figure 2, represents the smallest diameter cable with which the plug is likely to be used; conversely, the position adopted by the front face of the cover, and the tongue 30, as shown in dotted lines in Figure 2, illustrates the largest diameter with which the plug may be used.

20 Thus, the size of the aperture 26 is decreased to grip the cable by tightening of the screws 10, which effects a pivotal or hinging movement between the base and cover about a pivot axis defined generally by the line of contact between the lip 24 and the shoulder 22. In use, the screws 10 will be tightened to a degree which causes an adequate gripping of the cable between the wall portion 28 and the tongue 30, such gripping being aided by resilient deformation of the cable.

25 Whereas the base and cover 6, 8 are shown in Figure 1 as being moulded in two parts, if desired the base and cover may be produced as a single moulding, as is illustrated in Figure 7, the base and cover in such a construction being connected together by a web 55 of resilient plastics material. Thus, from the position shown in Figure 7, the cover 8 may be hinged generally about the web 55 into a position corresponding to that shown in Figure 2, with the lip 24 engaging beneath the shoulder 22.

30 As is shown in Figures 2 and 4, the three pins 16, 18, and 20 each extend through a respective pin aperture 36, 38 and 40, having been inserted therein to the desired position, as shown, from the interior of the base.

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Each of the pins is provided, extending into the pin through the face thereof of the smallest dimension, with two apertures 17, 19 and 21, respectively: extending into each of the apertures 36, 38 and 40 are pairs of respective protrusions 37, 39 and 41.

5 Inner faces of these protrusions are angled, and by the pressing of the appropriate pin into the aperture, the wall portions bounding the aperture may be outwardly deformed, permitting passage of the pin through the aperture, until the protrusions 37, 39 or 41 enter the associated aperture 17, 19 or 21.

10 When in this position, forces acting on the pins, tending to move the pins towards the interior of the plug, are taken by abutting planar faces of the protrusion and pin, effectively preventing such movement. Forces acting on the pin, tending to move the pin further outwardly, are taken by abutment of an enlarged head of the pin with planar surfaces of the plug face, bounding the aperture.

15 As can be seen in Figure 3, the live lead of the cable is connected to a terminal member 42 of a fuse terminal 43, the opposite fuse terminal 44 being connected to the live pin 16.

20 The fuse terminal 43 is formed from sheet metal as a pressing, and as can be seen from Figures 5 and 6 comprises a base plate 45, and two fuse-gripping arms 46 extending upwardly therefrom.

25 At each end of the base plate, there is provided a down-turned tag 47, each of which is provided on its outer side faces with serrations. By location of the two tags 47 in corresponding slots 48 of the base member, the fuse terminal 43 may be pressed into a desired position, and restrained against movement therefrom, by virtue of the frictional engagement between the tags 47 and the walls of the base bounding the slots 48.

Attention is drawn to the specification of our co-pending divisional application No. 8333940 (Serial No.)



CLAIMS:

1. An electric plug comprising a base member, plug pins extending through the base member, means being provided which is operative between the base member and the pins to restrain movement of the pins relative to the base member, a cover member comprising a formation which is adapted for hinging engagement with a formation of the base member, at least one screw threaded member co-operable between the base member and cover member to secure the base and cover members together, respective parts of the base and cover members when so secured together defining an aperture in a part of the plug remote from the hinged engagement through which a cable may extend into the interior of the plug, a skirt on the cover member extending peripherally around the base member, the construction and arrangement being such that the size of the aperture may be varied, to accomodate cable of differing sizes, by varying the degree of tightening of said screw threaded member.

2. An electric plug according to Claim 1 wherein said parts of the base member and the cover member are afforded with gripping means adapted, when a cable is within the aperture, to grip the cable to resist withdrawing movement of the cable from the interior of the plug.

3. An electric plug according to one of Claims 1 and 2 wherein on at least one of the base member and the cover member, said part is afforded by a tongue extending (when the base and cover members are secured together) towards the part of the other member.

4. An electric plug according to any one of the preceding claims, the formations of the cover and base members which are adapted for said hinging engagement are provided at portions thereof remote from said parts.

5. An electric plug according to any one of the preceding claims wherein the base and cover members are moulded in one-piece, being connected together by a web of material.

6. An electric plug according to any one of the preceding claims wherein the base member comprises apertures through which the pins of the plug



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extend from the interior thereof, wherein the pins are provided in side faces thereof with at least one aperture into which a protrusion on the base member extends, the construction and arrangement being such that the protrusion may readily be deformed to permit movement of the pin into a desired position in the aperture, but which restrains subsequent movement of the plug pin from said desired position in at least one direction.

7. An electric plug according to Claim 6 wherein a face of the protrusion is inclined, said face being that which, when the pin is being inserted through the aperture into its desired position, is engaged by the pin, in a manner whereby engagement of the protrusion by the pin, and deformation of the protrusion, may be effected relatively easily.

8. An electric plug according to any one of the preceding claims wherein a terminal member thereof is adapted to be inserted into an aperture or recess of the plug, part of or secured to the terminal member frictionally engaging the wall of the plug bounding said aperture or recess.

9. An electric plug according to Claim 8 wherein insertion of said part into the aperture or recess involves deformation of either said part, or of the wall bounding said aperture or recess.

10. An electric plug according to Claim 9 wherein said part is resiliently deformable, being compressed upon the insertion of the terminal member or said part into the aperture or recess.

11. An electric plug according to Claim 8 wherein said part is provided by a fixing member of relatively rigid material secured to or extending from an underside of the terminal member, and which resiliently deforms the wall bounding the aperture or recess.

12. An electric plug according to Claim 11 wherein said fixing member is of metal, and is provided with serrations.

13. An electric plug according to Claim 6 wherein the terminal member is a fuse terminal, comprising a base plate, and two terminal tags extending therefrom at opposite ends thereof, each of which is adapted to be inserted



into an associated aperture or recess, to provide fixing members for the fuse terminal at opposite ends of the base plate.

14. An electric plug constructed and arranged substantially as hereinbefore described, with reference to any of the accompanying drawings.
