

AN IMPROVED ELECTRIC PLUG ASSEMBLY

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This invention relates to electric plug assemblies of the kind comprising an electric plug whose pin terminal or pin terminals is or are permanently electrically connected to the conductor or conductors of a length of flexible electric cable. More particularly, the invention is concerned with electric plug assemblies of this kind in which the electric plug is a three-pin electric plug whose terminals are permanently electrically connected to the ends of associated conductors of a length of flexible electric cable and whose live pin is integral with or mechanically and electrically connected to one of two substantially U-shaped spring contacts for reception of a cartridge fuse in a recess in that surface of the plug that will abut a socket outlet, such an electric plug assembly being suitable for use in domestic and similar wiring systems and hereinafter, for convenience, being referred to as "a non-rewirable three-pin electric plug assembly of the kind described".

In one kind of non-rewirable three-pin electric plug assembly of the kind described, the insulating body of the plug is formed of a separately formed premoulded base and a separately formed premoulded cover which are permanently secured together to form a housing enclosing the electrical connections between the terminals and the cable conductors.

A non-rewirable three-pin electric plug assembly of this kind has the serious disadvantage that, should the means permanently securing together the base and cover of the plug

housing fail as the plug assembly is being disconnected from a socket outlet, then the cover of the housing will be removed to leave connected in the socket outlet the plug base with exposed live metal parts. Exposure of live metal parts of a plug assembly by failure of the permanent joint between the base and cover can be extremely dangerous, especially if the user has damp hands.

It is an object of the present invention to provide an improved non-rewirable three-pin electric plug assembly of the kind described in which the risk of exposure of live metal parts in the event of failure of a permanent joint between the base and cover of a plug housing is substantially reduced.

According to the invention, the improved non-rewirable three-pin electric plug assembly has a housing of electrically insulating material comprising a preformed base and a preformed cover which are permanently secured together in such a way that the base and cover cannot be deliberately separated without effecting permanent damage to the base and/or cover, wherein the live pin and the substantially U-shaped fuse contact integral with or mechanically and electrically connected to the live pin are mounted in and secured to the cover and the neutral pin, the earth pin, the other substantially U-shaped fuse contact and their associated terminals are mounted on the base, the arrangement being such that when the body and cover are assembled together the live pin passes through a hole in the base and its associated fuse

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contact passes through holes in the base into the fuse recess and, in the event of failure of the means permanently securing together the base and cover of the plug housing as the plug assembly is being disconnected from a socket outlet, as the cover is removed the live pin is disengaged from its associated contact in the socket outlet and is withdrawn with the cover.

Where the fuse contact associated with the live pin is integral with the live pin, as the cover is removed and the live pin is disengaged from its associated contact in the socket outlet, the fuse contact associated with the live pin is disengaged from the cartridge fuse and is withdrawn with the cover and live pin.

Preferably, where the fuse contact associated with the live pin is mechanically and electrically connected to the live pin, the mechanical connection between the fuse contact and live pin is such that, as the cover is removed and the live pin is disengaged from its associated contact in the socket outlet, the fuse contact associated with the live pin is disengaged from the cartridge fuse and is withdrawn with the cover and live pin. Alternatively, the mechanical connection between the live pin and its associated fuse contact may be such that, as the cover is removed and the live pin is disengaged from its associated contact in the socket outlet, the mechanical connection fractures, and the live pin is withdrawn with the cover.

In all cases, there will be no exposed live metal parts on the base of the plug assembly although the base is still connected to the socket outlet.

Preferably, the live pin is mechanically and electrically connected to its associated substantially U-shaped fuse contact via a strap integral with the pin, which strap is gripped between substantially rigid elongate members extending transversely from a wall of the cover and supports upstanding from the inner face of the top of the cover.

In a preferred embodiment, the cartridge fuse is so tightly resiliently gripped by the fuse contact associated with the live pin and by the other fuse contact that, at least initially, the cartridge fuse and fuse contacts will provide substantial resistance against separation of the base and cover and this resistance may be such as to prevent separation of the base and cover.

The means for permanently securing together the base and cover of the insulating housing of the plug assembly may take any convenient form provided that deliberate separation of the base and cover cannot be effected without damaging the base and/or cover. In one embodiment, boundary edges of the base and cover are in inter-facial contact and are welded together or bonded together by a suitable adhesive. In another embodiment, one or each of the base and cover has at least one resilient lug which effects a snap engagement behind a step

on, or within a recess in, the cover or base when boundary edges of the base and cover are in tight inter-facial engagement; in this case, preferably one or each of the base and cover has a plurality of resilient lugs mutually spaced around its periphery, each of which effects a snap engagement behind a continuous or discontinuous step on, or within a continuous or discontinuous recess in, the cover or base and which together provide a peripheral shield that reduces risk of the fingers of a user, when removing the cover from the base, touching a live metal part of the plug assembly. Preferably, also, the or each step or recess on or in the cover and/or base is located remote from the boundary edge of the cover or base by which it is carried so that disengagement of the resilient lug or lugs by deliberate insertion of a sharp blade between tightly abutting boundary edges of the base and cover is extremely difficult, if not impossible, without effecting permanent damage to one or both of the base or cover. In a preferred embodiment, the base and cover are permanently secured together by at least two permanent securing means, each of which is independent of the other and neither of which can be deliberately disengaged without effecting permanent damage to one or both of the base and cover.

The invention is further illustrated by a description, by way of example, of a preferred non-rewirable three-pin electric plug assembly of the kind described, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded isometric view of the 3-pin electric plug assembly;

Figure 2 is an isometric view of the cover of the plug housing with the live pin and associated fuse contact removed;

Figure 3 is an isometric view of the live pin and associated fuse contact;

Figure 4 is a fragmental sectional side view of the assembled plug housing before insertion of the cartridge fuse, and

Figure 5 is a fragmental sectional side view of the assembled plug housing with the cartridge fuse in position.

Referring to the drawings, the preferred non-rewirable three-pin electric plug assembly has an insulating plug housing formed of a separately formed premoulded base 1 and a separately formed premoulded cover 11 which are permanently secured together in such a way that the base and cover cannot

be deliberately separated without effecting permanent damage to the base and/or cover.

The base 1 has, integral with the base, one part 2 of a cable entry through which a flexible cable C is fed into the housing to enable its conductors to be electrically connected to the terminals of the neutral and earth pins and the neutral fuse contact. Protruding outwardly through holes in the base 1 are a live pin 3, a neutral pin 4 and an earth pin 5 and positioned in a fuse recess 6 in the base are two substantially U-shaped resilient fuse contacts 7 and 8, the contact 7 being mechanically and electrically connected to the live pin 3 and, as previously mentioned, the fuse contact 8 being electrically connected to the neutral conductor of the cable C. Resilient lugs 9, each having a shoulder 10, upstand from the peripheral edge of the base 1.

The cover 11 has, integral with the cover, the other part 12 of the cable entry. Two substantially rigid elongate members 33 and 34 are integral with and extend transversely from the peripheral wall 13 of the cover and upstanding from the inner surface of the top of the cover between these elongate members is a support pad 20 having a step or shoulder 21 part way along its length. The live pin 3 has, integral with one of its major side walls, a strap 18 which extends transversely of the pin and is so folded as to form in the strap transversely extending troughs 23 and 24. The U-shaped fuse contact 7 associated with the live pin 3 is spot welded

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to the strap 18 between the troughs 23 and 24. The live pin 3 and its associated fuse contact 7 are mounted on and secured to the cover 11 by so positioning the strap 18 that the troughs 23 and 24 underlie the elongate members 33 and 34 and the part of the strap to which the fuse contact 7 is welded is supported on the support 20 with an edge of the strap bearing against the shoulder 21 and with the end of the pin remote from its free or nose portion supported on a boss 14 upstanding from the inner face of the top of the cover. Bosses 15 and 16 upstanding from the inner face of the top of the cover 11 bear against the inner ends of the pins 4 and 5 to ensure that they are fully in place with the correct extent of pin protruding from the base 1.

The cover 11 has in its peripheral wall 13 a number of steps 19 with which the shoulders 10 of the resilient lugs 9 on the base 1 effect a snap fit so that the base and cover cannot be deliberately separated without effecting permanent damage to the base and/or cover. In the unlikely event that the resilient lugs 9 should fail and the cover 11 be removed from the base 1 when the base is electrically connected to a socket outlet, the resilient lugs provide a peripheral shield that reduces risk of the fingers of a user, when removing the cover from the base, touching a live metal part of the plug assembly before the live pin is disengaged from its associated socket contact.

Should the snap engagement between the shoulders 10 on the resilient lugs 9 and the steps 19 fail, then initially the cartridge fuse F and fuse contacts 7 and 8 will initially provide substantial resistance against separation of the base 1 and cover 11. In the event that the force inserted on the cover 11 is sufficient to overcome the resistance imparted by the cartridge fuse F and fuse contacts 7 and 8, then as the cover is removed from the base, the cover will carry with it the live pin 3 and associated fuse contact 7, thereby ensuring that no live metal parts remain accessible on the exposed base 1 of the plug assembly housing.



CLAIMS:

1. A non-rewirable three-pin electric plug assembly having a housing of electrically insulating material comprising a preformed base and a preformed cover which are permanently secured together in such a way that the base and cover cannot be deliberately separated without effecting permanent damage to the base and/or cover, wherein the live pin and a substantially U-shaped fuse contact integral with or mechanically and electrically connected to the live pin are mounted in and secured to the cover and the neutral pin, the earth pin, an other substantially U-shaped fuse contact and their associated terminals are mounted on the base, the arrangement being such that, when the body and cover are assembled together the live pin passes through a hole in the base and its associated fuse contact passes through holes in the base into the fuse recess and, in the event of failure of the means permanently securing together the base and cover of the plug housing as the plug assembly is being disconnected from a socket contact, as the cover is removed the live pin is disengaged from its associated contact in the socket outlet and is withdrawn with the cover.

2. A non-rewirable three-pin electric plug assembly as claimed in Claim 1, wherein the mechanical connection between the live pin and its associated fuse contact is such that, as the cover is removed and the live pin is disengaged from its associated



contact in the socket outlet, the fuse contact associated with the live pin is disengaged from the cartridge fuse and is withdrawn with the cover and live pin.

3. A non-rewirable three-pin electric plug assembly as claimed in Claim 1, wherein the mechanical connection between the live pin and its associated fuse contact is such that, as the cover is removed and the live pin is disengaged from its associated contact in the socket outlet, the mechanical connection fractures, and the live pin is withdrawn with the cover.

4. A non-rewirable three-pin electric plug assembly as claimed in Claim 2 or 3, wherein the live pin is mechanically and electrically connected to its associated substantially U-shaped fuse contact via a strap integral with the pin, which strap is gripped between substantially rigid elongate members which extend transversely from the peripheral wall of the cover and a support which upstands from the inner surface of the top of the cover.

5. A non-rewirable three-pin electric plug assembly as claimed in any one of the preceding Claims, wherein the cartridge fuse is so tightly resiliently gripped by the fuse contact associated with the live pin and by the other fuse contact that initially the cartridge fuse and the fuse contacts will, at least initially, provide substantial resistance against separation of the body and cover.



6. A non-rewirable three-pin electric plug assembly as claimed in any one of the preceding Claims, wherein boundary edges of the base and cover are in inter-facial contact and are welded together or bonded together by a suitable adhesive.
 7. A non-rewirable three-pin electric plug assembly as claimed in any one of the preceding Claims, wherein one or each of the base and cover has at least one resilient lug which effects a snap engagement behind a step on, or within a recess in, the cover or base when boundary edges of the base and cover are in tight inter-facial engagement.
 8. A non-rewirable three-pin electric plug assembly as claimed in Claim 7, wherein one or each of the base and cover has a plurality of resilient lugs mutually spaced around its periphery, each of which effects a snap engagement behind a continuous or discontinuous step on, or within a continuous or discontinuous recess in, the cover or base and which together provide a peripheral shield.
 9. A non-rewirable three-pin electric plug assembly as claimed in Claim 7 or 8, wherein the or each step or recess on or in the cover and/or base is positioned remote from the boundary edge of the cover or base by which it is carried so that disengagement of the resilient lug or lugs by deliberate insertion of a sharp blade between tightly abutting boundary edges of the base and cover is extremely difficult without effecting permanent damage to one or both of the base and cover.
 10. A non-rewirable three-pin electric plug assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.
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