

SPECIFICATION

Non-rewireable plug or connector

- 5 This invention relates to non-rewireable electric plugs or connectors.
- Mains-operated electrical appliances, unless permanently connected to a mains supply, are usually provided with an electrical cable
- 10 (which may be, for example, either twin-core, if the appliance is not to be earthed, or three-core, if the appliance is to be earthed). One end of the cable is arranged to carry an appropriate plug having projecting contact pins for insertion into a corresponding mains outlet socket, the plug and socket thereby forming plug-and-socket connection. The other end of the cable may be permanently wired to the appliance or it may be provided
- 20 with a connector having untouchable metallic contact tubes or the like arranged to cooperate with metallic contact pins on the appliance, the connector and metallic contact pins again forming a plug-and-socket connection.
- 25 For circumstances in which the cable connected to an electrical appliance may be insufficiently long, an extension lead may be used. This lead has a plug at one end and a connector at the other in the form of an
- 30 extension socket of appropriate type to receive a plug electrically connected to the appliance, again thereby forming a plug-and-socket connection.
- Such plugs and connectors may be detachably connected to the cable so that the plug or connector can be removed from the cable when desired. Alternatively the plug or connector may be moulded on or otherwise permanently attached to the cable itself so that
- 40 the plug or connector is non-rewireable. It is with such non-rewireable plugs or connectors that the present invention is concerned.
- According to the present invention a non-rewireable plug or connector, which is
- 45 adapted to form together with a corresponding mating member a connection of the plug-and-socket type, comprises a base member, at least one contact element mounted in the base member for providing electrical contact
- 50 with a corresponding co-acting contact element of the mating member and having means by which an electrical conductor can be connected to the element and a housing of electrically insulating material fitted over the
- 55 base member to cover said means on the, or each, element, said housing or said base member having projections each having been passed through a corresponding opening in the other member and subsequently permanently fixed with respect thereto, so that the housing and the base member are secured together by means of the projections in a manner which prevents the housing and the base member from being separated without
- 60 permanently damaging the base member and
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d/or the housing.

- In the case of a plug, the or each contact element may comprise a contact pin having a first part which provides electrical contact with a corresponding co-acting contact element of the mating member and a second part which includes the means by which an electrical conductor can be connected to the pin. The two parts are arranged on opposite sides of a
- 70 face of the base member. In the case of a connector, the or each contact element may comprise a contact tube, sleeve or similar female element mounted entirely on one side of the face of the base member.
- 80 The or each contact element may include one or more additional electrically conductive parts, for example, a fuse and its appropriate clips or sockets and connectors, electrically connected to the contact element.
- 85 By the term "connector" we intend to include not only connectors of the type having untouchable metallic female contact elements arranged to cooperate with metallic contact pins on an electrical appliance but also connectors of the extension socket type.
- In one embodiment of the invention the housing is provided with a plurality of fingers and the base member is provided with a corresponding number of openings so arranged that when the housing is fitted over or on to the base member the fingers project into the openings.
- 95 Alternatively, the fingers may extend into the openings in the base member and the end portions of the fingers may be accessible from the exterior and may be distorted, as for example by heating them, so that they deform and form a shape which prevents the fingers from being withdrawn back through the openings. The end portions of the fingers may be heated by high frequency electrical heaters. Further material may be added to the ends of the fingers in the openings so that the end portions become enlarged and thus cannot be withdrawn back through the openings. The added material may be the same as that from which the fingers are formed or alternatively it may be some form of adhesive material.
- 100 It is convenient for the fingers to be integral with the housing, but the fingers could be formed separately from the housing and in some way connected thereto.
- In an alternative arrangement some form of mechanical means, such as toothed washers, may be connected to the end portions of the fingers so as to enlarge the end portions, thereby preventing the fingers from being withdrawn back through the openings in the base member.
- 105 In all embodiments of the invention it will be appreciated that, once the base member and the housing have been secured together, they can only be separated by permanently damaging the base member and/or the housing. For example, if the end portions of the
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projections are distorted to form enlarged end portions which prevent the projections from being withdrawn back through the openings, then it is clear that the end portions could be cut off but this would permanently damage the plug and prevent it from being used again.

The invention also provides a plug having a live contact pin formed with an integral and offset fuse clip, which clip projects in the same direction as the pin, the arms of the clip passing through openings in the base of the plug to the exterior thereof to accommodate a use outside the plug.

The invention also provides an electrical connection member comprising a cable having one or more electrically insulated conductors and a non-rewirable plug or connector as described above permanently attached thereto. The electrical connection member may thus include a non-rewirable plug or connector or may include both a non-rewirable plug and a non-rewirable connector.

One form of the invention, in the form of a plug, will now be described with reference to the accompanying drawings, in which:—

Figure 1 is an exterior plan view of the housing;

Figure 2 is an exterior side view of the housing;

Figure 3 is an interior plan view of the housing;

Figure 4 is a cross section on line IV—IV of *Fig. 3*;

Figure 5 is an exterior plan view of the plug base;

Figure 6 is an interior plan view of the plug base;

Figure 7 is a side view of the plug base;

Figure 8 is a side view of the fuse and fuse holder;

Figure 9 is an end view of the fuse and fuse holder;

Figure 10 is a side view of a combined pin and fuse carrier,

Figures 11 and 12 illustrate a cable clamp, and

Figure 13 shows a modified form of cable clamp.

The non-rewireable 13 amp fused plug shown in the drawings comprises a base member and a housing, with the housing and base member having cooperating parts which, when the housing is fitted over the base member, secure, or can be caused to secure, the housing and the base member together in such a manner which prevents the housing and base member from being separated without causing permanent damage to the base member and/or the housing.

As shown in *Figs. 1, 2, 3 and 4*, the housing 1 is in the form of a moulding of electrically insulating material shaped so as to fit over the base member 2 shown in *Figs. 5, 6 and 7*. The housing 1 has a neck 3 which

may be integral with the housing as shown or may be formed as a separate piece; the neck opens into the interior of the housing as shown in *Fig. 3* and forms a gland by which a cable, such as that shown at 4 in *Fig. 6*, can be introduced into the interior of the plug. The interior of the housing is formed with a number of fingers which project to differing extents from the housing wall. Two fingers 5 and two fingers 6 project to the greatest extent, while there are also provided fingers 7, 8, 9, which project to a lesser extent, and small projections 10, 11 and 12.

The base member 2, which is also a moulding of electrically insulating material, is in the form of a generally flat plate having an exterior face 13 and an interior face 14. The base member is formed with three through apertures 15 to receive contact pins 16, 17 and earthed contact pin 18, which pins extend through the base member 2 so that each has a contact portion on the side of the face 13 which permits it to provide electrical contact with a corresponding co-acting contact element of a mating member. Each of the pins 16, 17 and 18 has a portion projecting from the side 14 of the base member to which an electrical conductor can be connected to the pin. Of the three wires led into the plug from the cable 4 the neutral wire is connected to pin 16 in any suitable fashion, e.g. as described in our patent application of even date (Published under Serial No. 2004707A on 4th April 1979). The live wire is connected to pin 17 via a fuse 19 (see *Figs. 8 and 9*) which is held in a socket 20 form in the exterior face 13 of the base member as shown in *Fig. 5*. The fuse 19 is held in position in socket 20 by a separate fuse shield 21 with a retaining ring 22. The earth wire if provided is connected to the pin 18 in any suitable fashion.

Where the appliance requires no earth and a twin core cable is used, the conducting earth pin 18 may be replaced by a dimensionally similar pin moulded from a suitable synthetic resin.

When the base member 2 and the housing 1 are pushed together to form an integral unit, the fingers 5 and 6 on the housing 1 project through apertures 23 provided in the base member 2. The apertures 23 are of greater cross sectional area on the side of the face 13 of the base member 2, so that, when the plug is assembled, the projecting portions of the fingers 5 and 6 can be reached externally of the plug. When the fingers are made of a thermoplastic material, their ends can then be deformed, for example by heating and/or pressure, to a shape which provides an enlarged head. Alternatively, adhesive may be introduced into the openings 23 to secure the end portions of the fingers 5 and 6, or, alternatively, some form of mechanical gripping means, such as a toothed washer, may be

inserted permanently on the projecting portions of the fingers to form an enlarged head. Any of these methods can be used to prevent the fingers from being withdrawn back

5 through the openings 23. The base member and the housing are thus secured together and only by causing permanent damage to either the base member and/or the housing can the base member and the housing be
10 separated in order to gain access to the ends of the contact pins 16, 17 and 18 which are within the plug. When the plug is fitted into its corresponding socket, the projecting portions of the contact pins 16, 17 and 18 are
15 enclosed within the socket and the ends of these contact pins contained within the housing are non-accessible without causing permanent damage to the base member and/or the housing.

20 It will also be noted that, when the base member 2 and housing 1 are assembled together, the projecting fingers 5 and 9 of the housing 1 cooperate with a projecting finger 25 on the interior 14 of the base 2 to form
25 partition members which together isolate the compartment surrounding the earth pin 18 from the remainder of the plug interior. It will also be noted that the projecting fingers 7 and 8, and projections 10, 11 and 12 from the
30 housing 1, are positioned so as to hold in place the pins 16 and 17 and the wires leading from the cable 4 when the base member and housing are mated. The finger 9 has a similar function in relation to pin 18.

35 The live wire is, as described previously, linked to the pin 17 via an externally positioned fuse 19. This is effected by crimping the live wire at 26 to a projection from a U-shaped metal fuse clip 27, the arms of which
40 extend through a pair of apertures 28 in the base member 2 and grip one end of the fuse 19. The pin 17 is formed with a integral and offset fuse clip 17a projecting in the same direction as the pin 17, the arms of the fuse
45 clip 17a passing through a further pair of apertures 29 in the base member 2 so as to grip the other end of the fuse 19. A side view of the pin 17 is shown in Fig. 10.

It will be seen from Fig. 6 that the portion
50 of the cable 4 entering the plug, immediately before its separation into the component wires, is gripped to the plug base by a cable clamp 30. As shown in detail in Figs. 11 and 12, the clamp consists of a serrated strap 31
55 and a washer 32 which contains a slit 33 to receive a double thickness of the strap and an integral enlarged head 34. The strap 31 is passed through the slit 33 and then through a slot 35 leading from a pocket 36 in the
60 exterior of the base 2. The strap is passed round the cable 4 and back through the slots 35 and the washer 32 so that the serrated face of the two parts of the strap are in contact. The free end of the strap is pulled
65 tight with the result that the head 34 be-

comes located in the washer 32 and the washer in the pocket 36 and the cable 4 is held firmly to the base 2. Finally the end of the strap is cut off flush with the washer 32
70 (Fig. 12). The teeth of the strap prevent the slackening of the clamp and also have the function of preventing the cable 4 turning. The cable clamp thus holds the cable against both axial and rotational movements.

75 An alternative form of clamp is shown in Fig. 13 as consisting of the serrated strap 31 with an integral washer 37 having a serrated slit to receive the end of the strap.

The base member 2 of the plug may be
80 colour coded according to the fuse rating of the particular plug. Alternatively, or in addition, the fuse shield 22 may be colour coded according to the fuse rating of the plug.

Although the base 2 is shown as received
85 within the housing 1, instead the housing may be seated on the base.

CLAIMS

1. A non-rewireable plug or connector
90 which is adapted to form, together with a corresponding mating member, a connection of the plug-and-socket type, comprising a base member, at least one contact element mounted in the base member, for providing
95 electrical contact with a corresponding co-acting contact element of the mating member, the contact element having means by which an electrical conductor can be connected to the element, and a housing of electrically
100 insulating material fitted over the base member to cover the said means on the or each element, said housing or said base member having projections each having been passed
105 through a corresponding opening in the other member and subsequently permanently fixed with respect thereto, so that the housing and the base member are secured together by means of the projections in a manner which prevents the housing and the base member
110 from being separated without permanently damaging the base member and/or the housing.

2. A plug or connector according to claim 1, wherein the housing is provided with a
115 plurality of fingers and the base member is provided with a corresponding number of openings so arranged that when the housing is fitted over the base member the fingers project into the openings.

3. A plug or connector according to claim 2, wherein the end portions of the fingers are accessible from the exterior of the plug or
120 connector and can be distorted and deformed to a shape which prevents the fingers from being withdrawn back through the openings.

4. A plug or connector according to claim 2, wherein the end portions of the fingers are provided with mechanical means to prevent
125 their withdrawal from the openings in the base member after assembly of the plug or



inserted permanently on the projecting portions of the fingers to form an enlarged head. Any of these methods can be used to prevent the fingers from being withdrawn back through the openings 23. The base member and the housing are thus secured together and only by causing permanent damage to either the base member and/or the housing can the base member and the housing be separated in order to gain access to the ends of the contact pins 16, 17 and 18 which are within the plug. When the plug is fitted into its corresponding socket, the projecting portions of the contact pins 16, 17 and 18 are enclosed within the socket and the ends of these contact pins contained within the housing are non-accessible without causing permanent damage to the base member and/or the housing.

It will also be noted that, when the base member 2 and housing 1 are assembled together, the projecting fingers 5 and 9 of the housing 1 cooperate with a projecting finger 25 on the interior 14 of the base 2 to form partition members which together isolate the compartment surrounding the earth pin 18 from the remainder of the plug interior. It will also be noted that the projecting fingers 7 and 8, and projections 10, 11 and 12 from the housing 1, are positioned so as to hold in place the pins 16 and 17 and the wires leading from the cable 4 when the base member and housing are mated. The finger 9 has a similar function in relation to pin 18.

The live wire is, as described previously, linked to the pin 17 via an externally positioned fuse 19. This is effected by crimping the live wire at 26 to a projection from a U-shaped metal fuse clip 27, the arms of which extend through a pair of apertures 28 in the base member 2 and grip one end of the fuse 19. The pin 17 is formed with a integral and offset fuse clip 17a projecting in the same direction as the pin 17, the arms of the fuse clip 17a passing through a further pair of apertures 29 in the base member 2 so as to grip the other end of the fuse 19. A side view of the pin 17 is shown in Fig. 10.

It will be seen from Fig. 6 that the portion of the cable 4 entering the plug, immediately before its separation into the component wires, is gripped to the plug base by a cable clamp 30. As shown in detail in Figs. 11 and 12, the clamp consists of a serrated strap 31 and a washer 32 which contains a slit 33 to receive a double thickness of the strap and an integral enlarged head 34. The strap 31 is passed through the slit 33 and then through a slot 35 leading from a pocket 36 in the exterior of the base 2. The strap is passed round the cable 4 and back through the slots 35 and the washer 32 so that the serrated face of the two parts of the strap are in contact. The free end of the strap is pulled tight with the result that the head 34 be-

comes located in the washer 32 and the washer in the pocket 36 and the cable 4 is held firmly to the base 2. Finally the end of the strap is cut off flush with the washer 32 (Fig. 12). The teeth of the strap prevent the slackening of the clamp and also have the function of preventing the cable 4 turning. The cable clamp thus holds the cable against both axial and rotational movements.

An alternative form of clamp is shown in Fig. 13 as consisting of the serrated strap 31 with an integral washer 37 having a serrated slit to receive the end of the strap.

The base member 2 of the plug may be colour coded according to the fuse rating of the particular plug. Alternatively, or in addition, the fuse shield 22 may be colour coded according to the fuse rating of the plug.

Although the base 2 is shown as received within the housing 1, instead the housing may be seated on the base.

CLAIMS

1. A non-rewireable plug or connector which is adapted to form, together with a corresponding mating member, a connection of the plug-and-socket type, comprising a base member, at least one contact element mounted in the base member, for providing electrical contact with a corresponding co-acting contact element of the mating member, the contact element having means by which an electrical conductor can be connected to the element, and a housing of electrically insulating material fitted over the base member to cover the said means on the or each element, said housing or said base member having projections each having been passed through a corresponding opening in the other member and subsequently permanently fixed with respect thereto, so that the housing and the base member are secured together by means of the projections in a manner which prevents the housing and the base member from being separated without permanently damaging the base member and/or the housing.
2. A plug or connector according to claim 1, wherein the housing is provided with a plurality of fingers and the base member is provided with a corresponding number of openings so arranged that when the housing is fitted over the base member the fingers project into the openings.
3. A plug or connector according to claim 2, wherein the end portions of the fingers are accessible from the exterior of the plug or connector and can be distorted and deformed to a shape which prevents the fingers from being withdrawn back through the openings.
4. A plug or connector according to claim 2, wherein the end portions of the fingers are provided with mechanical means to prevent their withdrawal from the openings in the base member after assembly of the plug or



connector.

5. A plug or connector according to any one of the preceding claims provided with means for accommodating a fuse externally of the base member.

6. A plug or connector according to claim 5, wherein the means for accommodating the fuse comprises at least one clip projecting from the interior to the exterior of the base member and a separate fuse shield covering the fuse.

7. A plug or connector according to claim 6, wherein the fuse shield is colour coded to indicate the fuse rating of the plug or connector.

8. A plug or connector according to any one of the preceding claims wherein the base member is colour coded to correspond to the fuse rating of the plug or connector.

9. A plug or connector according to any one of the preceding claims wherein the electrical conductor or conductors are introduced to the contact element or elements via a cable which is held to the base member by a cable clamp in the form of a serrated strap, the free ends of which have been passed through an aperture in the base member and removed.

10. A non-rewirable plug according to any one of the preceding claims, wherein the or each contact element comprises a contact pin having a first part which provides electrical contact with a corresponding co-acting contact element of the mating member and a second part which includes the means by which an electrical conductor can be connected to the pin, the two parts being arranged on opposite sides of a face of the base member.

11. A plug according to claim 10, wherein projecting fingers from the interior of the housing cooperate with a projecting finger on the interior of the base member to provide partition members to isolate a compartment surrounding an earth pin from the remainder of the plug interior.

12. A connector according to any one of claims 1 to 9, wherein the or each contact element comprises a contact tube, sleeve or like female element mounted on one side of the base of the base member.

13. A non-rewirable plug or connector according to claim 1 substantially as described herein.

14. A non-rewirable plug substantially as shown in the accompanying drawings and described herein with reference thereto.

15. An electrical connection member comprising a cable having one or more electrically insulated conductors and a non-rewirable plug or connector as claimed in any one of the preceding claims permanently attached thereto.