

SPECIFICATION

Male pin plug

5 This invention relates to a male pin plug for connecting a three core electrical cable to a power supply, and particularly but not exclusively to such plugs for use with mains electrical supply systems.

10 Until now, a male pin plug for connection to an electrical cable and adapted to mate with a conventional power supply socket, has conventionally used solid pins of, for example, brass. The solid pins are often retained in a
15 plug body of insulating material by screw-threaded connections or by rivetting. Terminals are often provided in the form of a nut on a screw thread machined on the end of the pin, or alternatively in some examples the
20 terminals are remote from the pins, a connecting conductive strip being provided between each respective pin and terminal, the connecting strip being connected to the pin by welding, rivetting or the like methods. In another
25 example, wherein the pins are inserted in holes in a base and retained therein by an overlying cover, a terminal is provided in the form of a screw tapped in a longitudinal hole for clamping an electrical wire in a cross hole.
30 All such solid pin and terminal arrangements are inherently costly both in terms of cost of materials and of manufacture.

In recent years it has been compulsory to provide such plugs with a replaceable encapsulated fuse, provision for which is customarily
35 made by suitably adapting the line pin and its corresponding terminal to each include a fuse holder, so that a fuse may form an electrical connection between the line pin and its corresponding terminal, see, for example, BS
40 1363. One arrangement used hitherto has a fuse holder fastened to the top of the line pin by means of a rivet engaging a hole machined in the root of the pin, whilst another arrangement utilises a fuse holder which is spot
45 welded to a pin.

A problem arising from the provision of plugs with fuses is that the fuse generates considerable heat which must not result in an
50 unacceptable rise in temperature of the plug parts. A standard test for this purpose is the rise in temperature of the line terminal under conditions specified in BS 1363.

It is an object of the present invention to
55 provide an improved and simplified male pin plug adapted to receive a conventional encapsulated fuse.

Thus the present invention provides a male pin plug for connecting an electrical cable to a
60 power supply, said plug including a moulded plastics cover part and a cooperating moulded plastics base part, a line pin and associated fuse holder, a neutral pin and an earth pin and associated terminals, and a line terminal
65 and associated fuse holder, the said pins each

being hollow and formed from sheet metal integrally with a conductive strip extending from the root of the pin and providing electrical connection with the associated terminal or
70 fuse holder, the fuse holder associated with the line terminal being formed of sheet metal integrally with a conductive strip providing electrical connection with said line terminal, the fuse holder associated with said line pin
75 also being formed of sheet metal as an integral extension of said conductive strip extending from the root of the line pin, said pins being supported on plastics reinforcing pins formed integrally with and extending from the
80 inner face of said cover part, holes being provided in said base part through which the reinforced pins pass, the conductive strip extending between the line terminal and the fuse holder being mounted in good thermal
85 contact with the cover part of the plug.

In the arrangement according to the invention access to the plug terminals is with the base part removed rather than with the cover part removed as is conventional. In the result
90 the fuse holder associated with the line terminal can by virtue of the conductive strip serve to conduct heat away from the fuse into the plug cover and hence to atmosphere, this readily avoiding overheating.

The provision of hollow pins and fuse holders integrally formed from sheet metal reduces greatly the cost of material and much simplifies the manufacture of these components of the plug. Again the provision of the reinforcing pins as an integral part of the plug cover
100 results in further simplification and reduction in the number of parts of the plug.

The integral conductive strips providing electrical connection with the terminals of the
105 plug may themselves simply serve as said terminals as when, for example, electrical connection thereto is made by soldering. Alternatively they may be adapted mechanically to engage bare electrical conductors e.g. as by
110 being crimped thereto, thereby to make permanent electrical connections. Yet again nuts and bolts may be associated with said strips whereby non-permanent electrical connections can be made thus providing a plug which is
115 rewirable by the user.

Non-rewirable plugs i.e. plugs fitted permanently to original equipment, are increasingly regarded as desirable to avoid the possibility of faulty or dangerous electrical connections being made thereto by the end user. In
120 a preferred non-rewirable plug the aforesaid terminals are formed of sheet metal integrally with said conductive strips and are constituted by at least one piercing means adapted to
125 pierce the insulation of an insulated multi-strand conductor to make electrical connection therewith.

The piercing means avoids the need to bare the multistrand electrical conductor as is presently usual thus greatly speeding the making
130

of an electrical connection. For this purpose the plug can readily be constructed to facilitate correct presentation of the electrical conductors to the piercing means e.g. as by
5 locating the piercing means in a groove in said cover part shaped to receive an electrical conductor and furthermore the interconnection of cover and base parts of the plug can serve to bring about a controlled and predetermined
10 piercing action thus ensuring that correct electrical connections are made reliably and without difficulty.

The piercing means may comprise one or more teeth, each tooth preferably being
15 pointed and bevelled to provide a sharp leading end. If one or two teeth are used, it is preferred that the teeth enter the insulation from one side, pass through the strand bundle of the electrical conductor and then pass
20 through the insulation at the opposite side to that at which the teeth entered the insulation.

If three teeth are used, the centre tooth is preferably shorter than the two outer teeth. In this way, the two outer teeth first pass
25 through the conducting strand bundle, tightening the strand bundle between them due to the spreading action of the teeth, and then the centre tooth enters the bundle, further tightening the already tightened strand bundle
30 which is anchored by the two outer teeth.

As previously stated the piercing means is preferably located in a groove in the cover part shaped to receive an electrical conductor. Such groove can advantageously be formed
35 as a trap to receive as a press fit the electrical conductor, desirably so that the piercing means just engages the insulating sheath to locate the conductor against axial displacement. Where the piercing means comprises
40 three teeth, the centre one of which is shorter than the two outer teeth then the arrangement is preferably such that only the outer teeth engage the insulation when the conductor is first pressed into said groove. The base part of
45 said plug may be provided with a knuckle adapted to enter each said trap to engage said conductor and force it further into said groove, said complete piercing of the conductor then being achieved as the traps and
50 knuckles are brought together. Holes or recesses may be provided in the knuckles to receive the piercing means, e.g. the teeth of a toothed piercing means, extending through the conductor, which inter-engagement of
55 holes or recesses and piercing means serves to locate and guide the piercing means relative to the knuckles as the knuckles complete their entry into said traps.

It is preferred for the piercing means to be
60 folded along one or more lines extending in the direction in which the piercing means enters the electrical conductor. This gives the piercing means additional rigidity which is important when the connector element is
65 formed from relatively thin sheet material. In

addition, the folding enables the piercing means to be supported as an interference fit in a comparatively broad slot in the cover part, such a broad slot being more easily
70 moulded than a narrow slot of width equal to the thickness of the sheet metal from which the connector element is made. Where the piercing means comprises one or more teeth, it is preferred to provide at least one fold
75 along the axis of the or each tooth and at each side of the or each tooth.

In a further preferred arrangement, the or each tooth is formed into a V-shape in cross-section, having a first fold along the axis
80 thereof, and two further folds in the opposite direction, one each side of and parallel to the first fold. In this way extremely rigid teeth can be formed from thin sheet material. Each fold preferably includes an angle of approximately
85 60°.

The plug may be arranged for access to be had to the fuse by removal of the plug's base part. Alternatively the plug may be arranged
90 for external access to the fuse for removal and replacement. In this case the fuse holders are accessible through apertures in the base part of the plug. This latter feature permits the plug to be supplied permanently attached to an electrical cable and with its base part fixed
95 permanently to the cover part.

The line terminal is, as previously stated, connected to the fuse holder by a conductive strip in good thermal contact with the cover part. In this way, heat generated by the fuse
100 is dissipated into the cover part so as to prevent excessive heating of the line terminal. This intimate contact can be achieved by clamping the conductive strip between two parts of the plug e.g. the cover part and the base part. Alternatively, the conductive strip can be secured to the insulating body, for example by hot staking. This can be achieved
105 by arranging a plurality of holes in the strip through which pegs of thermo-plastics material formed integrally with the cover part are passed, whereafter the pegs are warmed and pressed down.

The formation of hollow pins from sheet metal is known from British Patent Specification No. 1370613. The pins described therein
115 suffer however from certain disadvantages and it is preferred to employ pins of the kind described in British Patent Application No. 35360/76. The pins therein described each
120 have a substantially rectangular outline in cross-section and comprise two channel sections each having a web of substantially the same width as the other and two flanges, disposed one on each side of the web, said
125 channel sections being arranged in side by side relationship with said webs parallel and spread apart and with each of said flanges extending between the webs, and abutting a corresponding flange of the other channel
130 section, the webs being joined at the tip of

the pin. Preferably the flanges are additionally folded adjacent their free edges so that the free edges face inwardly toward the centre of the pin. The reinforcing pin is then provided with longitudinally extending grooves to receive the intumed edges of the abutting flanges to hold the adjacent flanges in contact.

In the accompanying drawings;

10 *Figure 1* is a perspective exploded view of a male pin plug according to the invention;

Figure 2 is a perspective view of the underside of a base part of the plug of Fig. 1;

15 *Figure 3* is an underneath plan view of the plug with the base part removed;

Figure 4 is an underneath plan view of the assembled plug;

Figure 5 is a side elevation of the plug viewed in the direction X of Fig. 4;

20 *Figures 6, a, b, c and d* are plan views of the sheet metal blanks from which are formed respectively the line pin and fuse holder, the earth pin and terminal, the neutral pin and terminal, and the line terminal and fuse holder;

25 *Figures 7 and 8* are detail views to an enlarged scale showing the cross-sectional shape of formed-up pins and associated reinforcing pins;

30 *Figure 9* is a plan view of a detail of part of the plug unit of Figs. 1 to 5;

Figures 10a, 11a and 12a are part sectional views to an enlarged scale showing the progressive engagement of terminal piercing means with an insulated conductor to make electrical connection therewith

35 *Figures 10b, 11b and 12b* are sectional views on the lines b-b of Figs. 10a, 11a and 12a respectively.

40 *Figure 13* is a plan view of a second embodiment of a plug unit according to the invention;

Figure 14 is a side view of the plug unit of Fig. 13;

45 *Figure 15* is a view corresponding to Fig. 13, with a base part removed;

Figure 16 is a cross-section on line A-A of Fig. 15;

Figure 17 is a view corresponding to Fig. 15, with a clamping part removed;

50 *Figure 18* is a plan view of the clamping part showing the opposite side to that seen in Fig. 13;

55 *Figure 19* is a cross-section on line B-B of Fig. 15 but with the base part in place;

Figure 20 is an end elevation of Fig. 15;

Figure 21 is an underside view of the base part.

60 Figs. 1 to 12 of the drawings shown an electrical interconnector in the form of a non-rewireable male pin plug comprising three electrical connectors in the form of hollow male pins 33, 34 and 35. As shown in Fig. 1, the plug comprises a moulded plastics cover part 31 and a moulded plastics base

part 32.

The pins 33, 34, 35 constitute an earth pin 33, a line pin 34 and a neutral pin 35, each pin being part of a connector element formed from a sheet metal blank as shown in Figs. 6 a, b, c, the fold lines being shown dotted. The pins 33, 34, 35 are held in position between the cover part 31 and the base part 32 and extend through holes 33a, 34a, 35a respectively in the base part 32. The pins 33, 34 and 35 being of hollow construction and being formed from a sheet metal blank, enables them to be formed integrally with respective conductive strips 33b, 34b, 35b.

80 The line pin 34 is formed integrally with a fuse holder 38 at an extension of conductive strip 34b, the holder 38 comprising a pair of spring members 39 which may be forced apart to receive one end of a fuse therein. A second fuse holder 40 is provided as part of a connector element formed from a sheet metal blank as shown in Fig. 6d. This fuse holder 40 also comprises a pair of spring members 41 formed integrally with a conductive strip

90 42. Each of the conductive strips 33b, 35b and 42 has formed integrally therewith as part of the same blank a terminal in the form of means 36 for piercing the insulation of a

95 multi-strand conductor so as to be in electrical contact therewith. Each piercing means 36 comprises three teeth, two outer teeth 43 and a centre tooth 44 shorter than the outer teeth. In addition, each tooth has a fold extending along the length thereof, and a fold is also arranged between the teeth and each side of the two outer teeth 43. It has been found that a fold through an angle of approximately 60° produces a strong piercing means. Adjacent folds face opposite sides of the strip, so that the strip forms a zig-zag in plan, as shown in Fig. 9. By virtue of this arrangement, the piercing means is strengthened and the piercing means can be an interference fit in a slot 110 45 in the cover part 31. Each tooth 43, 44 is bevelled to a sharp point on one side only on the obtuse side of the fold extending along the tooth. In this manner, the point of each tooth enters the insulation of the electrical conductor centrally thereof as described in more detail below.

105 Each of the pins is reinforced by a reinforcing pin 46 depending from and formed integrally with the cover part 31, which pins 46 extend the full length of the pins 33, 34, 35.

The plug also comprises a fuse carrier 47 which is removable to enable replacement of a fuse, the fuse holders 38, 40 extending through apertures 37 in the base part 32.

125 On the underside of the base part 32 are arranged three raised parts or knuckles 48 bearing chamfers 53, the knuckles being adapted to cooperate with the piercing means 36 and the electrical conductors as described in more detail below. Four apertures 49 are

also provided in the base part 32, the apertures being adapted to receive pegs 50 on the cover part 31 when the plug is assembled.

The plug is further provided with a cable grip comprising a series of teeth 51 formed integrally with the cover part 31 and a flexible sprag 52 which sits in a slot moulded into the cover part.

The interior face of cover part 31 is also provided with four pegs 54 adapted to be received in holes 55 in the conductive strip 42 connecting the line terminal 36 with the fuse holder 40.

In the assembly of the plug, the three pins 33, 34, 35 are mounted on their respective reinforcing pins 46. As shown particularly in Figs. 7 and 8 the pins 33, 34, 35 each have a substantially rectangular outline in cross-section and comprises two channel sections 69 each having a web of substantially the same width as the other and two flanges 70, disposed one on each side of the web, said channel sections 69 being arranged in side by side relationship with said webs parallel and spaced apart and with each of said flanges 70 extending between the webs and abutting a corresponding flange of the other channel section, the webs being joined at the tip of the pin. The flanges are additionally folded adjacent their free edges so that the free edges 71 face inwardly towards the centre of the pin. The reinforcing pin 46 is provided with longitudinally extending grooves 72 to receive the intumed edges of the abutting flanges to hold the adjacent flanges 70 in contact.

Each of the piercing means 36 of the pins 33, 35 is a press fit in a slot 45 formed in the base of a groove or channel 60 formed in a boss 61 forming an integral part of the cover part 31. The points of the longer teeth 43 terminate below the top of the groove 60 by an amount which is slightly less than the diameter of the conductor 62 with which electrical connection is to be made as shown in Figs. 10, 11 and 12. In addition, the piercing means 36 of the line terminal is likewise received in a slot 45 of a similar boss 61 and the strip 42 is secured to the cover part 31 by hot staking i.e. welding over, the pegs 54. The fuse holders 38, 40 are also secured to the cover part 31 by hot staking. The cable 63 supported by a cable support 64 is then placed in position, with each conductor 62 overlying a respective piercing means (Fig. 10), and the base part 32 is placed over the conductors, each conductor having first been pressed into its respective groove 60, the sides of which are provided with trapping ribs 65. The chamfered surfaces of the knuckles 48 pick up the conductors 62 as shown in Fig. 10b.

At this stage the teeth 43 just engage the insulating sheath of the conductors to locate them against axial displacement. Then, as the

cover and base parts are pressed together, the piercing means progressively enter the electrical conductors. Firstly, the outer teeth 43 enter the conducting strand bundle, tightening the strand bundle between them due to the spreading action of the teeth, and then the centre tooth 44 enters the bundle, further tightening the bundle. As this happens, the knuckles 48 are each received in the grooves 60 of the corresponding bosses 61 of the cover part 31. Finally, the position shown in Fig. 12 a and b is achieved, in which the base part 32 is arranged below a rim 66 on the cover part 31, and the cover and base are secured together either by hot staking of pegs 50 in apertures 49, or as alternatively shown in Fig. 12b by means of screws 67. If screws 67 are to be used, of course, the pegs 50 shown in Fig. 1 are replaced by threaded bores.

It will be noted that this method of assembly results in the conductive strip 42 being secured in intimate contact with the cover part 31. This enhances dissipation of heat generated by the fuse into the cover part 31, to ensure that the line terminal 36 is not excessively heated. A similar role is played by holes 67 in the fuse holders and cooperating pegs 68 on the cover part which enhance the conduction of heat from the fuse holders 38, 40 to cover part 31 and hence reduce the flow of heat to the line terminal 36 and line pin 34.

As shown in Figs. 13 to 21 of the drawings, a rewirable male pin plug comprises a moulded plastics cover part 101, a moulded plastics clamping support part 102 and a moulded plastics base part 103. An earth pin 104, a line pin 105 and a neutral pin 106 extend through supporting sleeves 102a of the clamping support part 102 and through apertures 103a in the base part 103.

Each of the pins 104, 105 and 106 is of hollow construction, being formed from a sheet metal blank enabling the earth and neutral pins to be formed integrally with respective conductive strips 107, 108 which are drilled to accept bolts 109. The bolts 109 receive nuts 110 and serve as terminals for the connection of electrical conductors to the respective pins.

The line pin 105 is formed integrally with a conductive strip 105a, a fuse holder 113 constituting an extension of said strip and comprising a pair of sprung members 114 which may be forced apart to receive one end of a fuse therein.

A second fuse holder 116 is formed integrally from a sheet metal blank with an extended conductive strip 115 terminating in an enlarged portion also drilled to receive a bolt 109 which together with a nut 110 constitutes the line pin terminal. The second fuse holder 116 also comprises sprung members 116c and is disposed to receive the other end

of the fuse. As shown in Fig. 17, the conductive strip 115 is folded at 117.

Each of the pins 104, 105, 106 is reinforced by a reinforcing pin 104a, 105a, 106a depending from and formed integrally with the cover part 101, which reinforcing pins extend the full length of the pins 104, 105, 106. The cross-sectional shape of the pins 104, 105, 106 and their reinforcing pins are generally as described in connection with the first embodiment with reference to Figs. 7 and 8.

The plug also includes a fuse carrier 118, by means of which a fuse can be replaced without removing the base part of the plug, the fuse holders 113, 116 being accessible externally of the plug through apertures 113a, 113b and 116a, 116b in the base part 103 and support part 102 respectively.

As may be seen from Figs. 14 and 20, the line and neutral pins 105, 106 each have a side portion which does not extend the full length of the pin. In this way, a portion 121 of the reinforcing pins is revealed on the outside of these pins, so that if the plug is grasped in such a way that the user's fingers come into contact with the sides of these pins while the plug is partly in a socket, the user does not receive a shock. This feature is also present in the first described embodiment.

A further feature of the plug is a cable grip which is formed integrally with the clamping part 102. The cable grip comprises a substantially rigid series of teeth 119 and a flexible tongue 120. Thus, a cable extending between the tongue 120 and the teeth 119 is prevented from being withdrawn axially from the plug. However, once the base part 103 has been removed, the cable may be raised so as to be disengaged from the grip and removed from the plug.

In order to assemble the plug the three nuts 109 are placed in position in recesses formed to receive them in the cover part 101, the four formed metal blanks constituting the line pin 105 and fuse holder 113, the neutral pin 106 and conductive strip 108, the second fuse holder 116 and conductive strip 115, and the earth pin 104 and conductive strip 107 are then set in place on the cover part 101, the pins being mounted on their respective reinforcing pins of the cover part, and the clamping part 102 is mounted over the pins 104, 105, 106 and pressed into place within the cover part 101, thus clamping the conductive strips 107, 115, 108 of the metal blanks between the clamping part and the cover part. The base part 103 can then be presented to the cover part and secured thereto by means of a screw 129 engaging a threaded bore 129a formed in the cover part 101. The fuse carrier 118, with a fuse therein can then be pressed into place, the ends of the fuse being received by the fuse holders 113, 116.

An important feature of the second embodiment of a plug according to the invention described above is the fact that a length of the conductive strip 117 interconnecting fuse holder 116 and line terminal 109, 110 is clamped to the cover part by the clamping part 102 when base part 103 is screwed into position. This enables heat generated by the fuse to be dissipated into the cover part of the plug so as to avoid an undesirable temperature increase occurring at the line terminal. Clamping part 102 also defines housings 102b to locate screws 110 and the bared wire ends of the cable conductors making electrical connections therewith.

Pegs 130 formed integrally with the cover part 101 engage in apertures 131 in the fuse holders 113, 116 to locate the fuse holders and can be hot welded over, if desired, as indicated in Figs. 15 and 16 permanently to secure the holders in position and also to assist in the dissipation of heat generated by the fuse into the cover part 101. In Figs. 17 and 19 the pegs are shown in their unwelded condition. If desired similar pegs can be provided to engage conductive strip 115 as in the first embodiment.

CLAIMS

1. A male pin plug for connecting an electrical cable to a power supply, said plug including a moulded plastics cover part and a cooperating moulded plastics base part, a line pin and associated fuse holder, a neutral pin and an earth pin and associated terminals, and a line terminal and associated fuse holder, the said pins each being hollow and formed from sheet metal integrally with a conductive strip extending from the root of the pin and providing electrical connection with the associated terminal or fuse holder, the fuse holder associated with the line terminal being formed of sheet metal integrally with a conductive strip providing electrical connection with said line terminal, the fuse holder associated with said line pin also being formed of sheet metal as an integral extension of said conductive strip extending from the root of the line pin, said pins being supported on plastics reinforcing pins formed integrally with and extending from the inner face of said cover part, holes being provided in said base part through which the reinforced pins pass, the conductive strip extending between the line terminal and the fuse holder being mounted in good thermal contact with the cover part of the plug.

2. A plug as claimed in claim 1, wherein the fuse holders are accessible through apertures in said base part for removal and replacement of a fuse externally of the plug.

3. A plug as claimed in claim 1 or 2, wherein said conductive strip extending between the line terminal and fuse holder is clamped between the cover part and base



of the fuse. As shown in Fig. 17, the conductive strip 115 is folded at 117.

Each of the pins 104, 105, 106 is reinforced by a reinforcing pin 104a, 105a, 106a depending from and formed integrally with the cover part 101, which reinforcing pins extend the full length of the pins 104, 105, 106. The cross-sectional shape of the pins 104, 105, 106 and their reinforcing pins are generally as described in connection with the first embodiment with reference to Figs. 7 and 8.

The plug also includes a fuse carrier 118, by means of which a fuse can be replaced without removing the base part of the plug, the fuse holders 113, 116 being accessible externally of the plug through apertures 113a, 113b and 116a, 116b in the base part 103 and support part 102 respectively.

As may be seen from Figs. 14 and 20, the line and neutral pins 105, 106 each have a side portion which does not extend the full length of the pin. In this way, a portion 121 of the reinforcing pins is revealed on the outside of these pins, so that if the plug is grasped in such a way that the user's fingers come into contact with the sides of these pins while the plug is partly in a socket, the user does not receive a shock. This feature is also present in the first described embodiment.

A further feature of the plug is a cable grip which is formed integrally with the clamping part 102. The cable grip comprises a substantially rigid series of teeth 119 and a flexible tongue 120. Thus, a cable extending between the tongue 120 and the teeth 119 is prevented from being withdrawn axially from the plug. However, once the base part 103 has been removed, the cable may be raised so as to be disengaged from the grip and removed from the plug.

In order to assemble the plug the three nuts 109 are placed in position in recesses formed to receive them in the cover part 101, the four formed metal blanks constituting the line pin 105 and fuse holder 113, the neutral pin 106 and conductive strip 108, the second fuse holder 116 and conductive strip 115, and the earth pin 104 and conductive strip 107 are then set in place on the cover part 101, the pins being mounted on their respective reinforcing pins of the cover part, and the clamping part 102 is mounted over the pins 104, 105, 106 and pressed into place within the cover part 101, thus clamping the conductive strips 107, 115, 108 of the metal blanks between the clamping part and the cover part. The base part 103 can then be presented to the cover part and secured thereto by means of a screw 129 engaging a threaded bore 129a formed in the cover part 101. The fuse carrier 118, with a fuse therein can then be pressed into place, the ends of the fuse being received by the fuse holders 113, 116.

An important feature of the second embodiment of a plug according to the invention described above is the fact that a length of the conductive strip 117 interconnecting fuse holder 116 and line terminal 109, 110 is clamped to the cover part by the clamping part 102 when base part 103 is screwed into position. This enables heat generated by the fuse to be dissipated into the cover part of the plug so as to avoid an undesirable temperature increase occurring at the line terminal. Clamping part 102 also defines housings 102b to locate screws 110 and the bared wire ends of the cable conductors making electrical connections therewith.

Pegs 130 formed integrally with the cover part 101 engage in apertures 131 in the fuse holders 113, 116 to locate the fuse holders and can be hot welded over, if desired, as indicated in Figs. 15 and 16 permanently to secure the holders in position and also to assist in the dissipation of heat generated by the fuse into the cover part 101. In Figs. 17 and 19 the pegs are shown in their unwelded condition. If desired similar pegs can be provided to engage conductive strip 115 as in the first embodiment.

CLAIMS

1. A male pin plug for connecting an electrical cable to a power supply, said plug including a moulded plastics cover part and a cooperating moulded plastics base part, a line pin and associated fuse holder, a neutral pin and an earth pin and associated terminals, and a line terminal and associated fuse holder, the said pins each being hollow and formed from sheet metal integrally with a conductive strip extending from the root of the pin and providing electrical connection with the associated terminal or fuse holder, the fuse holder associated with the line terminal being formed of sheet metal integrally with a conductive strip providing electrical connection with said line terminal, the fuse holder associated with said line pin also being formed of sheet metal as an integral extension of said conductive strip extending from the root of the line pin, said pins being supported on plastics reinforcing pins formed integrally with and extending from the inner face of said cover part, holes being provided in said base part through which the reinforced pins pass, the conductive strip extending between the line terminal and the fuse holder being mounted in good thermal contact with the cover part of the plug.

2. A plug as claimed in claim 1, wherein the fuse holders are accessible through apertures in said base part for removal and replacement of a fuse externally of the plug.

3. A plug as claimed in claim 1 or 2, wherein said conductive strip extending between the line terminal and fuse holder is clamped between the cover part and and base



part.

4. A plug as claimed in claim 1 or 2, wherein said conductive strip extending between the line terminal and fuse holder is secured to the cover part by hot staking.
5. A plug as claimed in any preceding claim, wherein said hollow pins each have a substantially rectangular outline in cross-section and comprise two channel sections each having a web of substantially the same width as that of the other, and two flanges disposed one on each side of the web, the channel sections being arranged in opposed relationship with said webs parallel and spaced apart and with each of said flanges extending towards and abutting a corresponding flange of the other channel section, the webs being joined at the tip of the pin.
6. A plug as claimed in claim 5, wherein the flanges are folded adjacent and parallel to their face edges so that the free edges face inwardly towards the centre of the pin, longitudinal grooves being provided in the reinforcing pin to receive the returned free edges.
7. A plug as claimed in any of claims 1, 2, 5 and 6, further comprising a moulded plastics clamping part which clamps said conductive strips between the cover part and itself.
8. A plug as claimed in claim 7, wherein a cable grip is provided on said clamping part.
9. A plug as claimed in any preceding claim, wherein each said terminal is constituted by at least one piercing means adapted to pierce the insulation of an insulated multi-strand conductor and the strand bundle thereof to make electrical connection therewith.
10. A plug as claimed in claim 9, wherein said piercing means comprises a tooth pointed and bevelled to provide a sharp leading end.
11. A plug as claimed in claim 9 or 10, wherein each said terminal is constituted by a plurality of teeth, the teeth being adapted to enter the insulation from one side and pass diametrically through the conductor and strand bundle.
12. A plug as claimed in any of claims 9 to 11, wherein each said terminal is constituted by three teeth, the centre tooth of which is shorter than the two outer teeth.
13. A plug as claimed in any of claims 9 to 12, wherein each said terminal is located in a groove in said cover part, said groove being shaped to receive an electrical conductor.
14. A plug as claimed in claim 13, wherein each said terminal is mounted in a slot in the base of said groove.
15. A plug as claimed in claim 13 or 14, wherein said base part is provided with knuckles adapted to enter said grooves and engage the conductors as to face the conductor into the grooves.
16. A plug as claimed in claim 15, wherein at least one hole or recess is provided

in each said knuckle to receive the end of the piercing means which extends through the conductor.

17. A plug as claimed in any of claims 9 to 16, wherein each said terminal is constituted by one or more teeth, each tooth being folded along one or more lines extending in the direction in which the tooth enters the conductor.
18. A plug as claimed in claim 17, wherein a fold extends axially along each tooth, and at least one further fold is provided on each side of each tooth.
19. A plug as claimed in claim 18, wherein each tooth is W-shaped in cross-section.
20. A plug for connecting an electrical cable to a power supply, substantially as herein described with reference to Figs. 1 to 12 of the accompanying drawings.
21. A plug for connecting an electrical cable to a power supply, substantially as herein described with reference to Figs. 13 to 21 of the accompanying drawings.

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