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(54) IMPROVEMENTS IN OR RELATING TO ELECTRIC PLUGS

(71) We, J. A. CRABTREE & COMPANY LIMITED, a British Company, of Lincoln Works, Walsall WS1 2DN, in the County of Stafford, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with improvements in or relating to electric plugs, and is an improvement in or modification of the invention the subject of our U.K. Patent Number 1,496,486.

In the provision of sleeved plug pins, a desirable insulating material for the sleeve is nylon which, although being resiliently deformable, is so to a small extent. In view of the tolerances necessarily imposed on dimensions in large scale manufacture (for example, in the size of the pin-receiving apertures in the base and the cross sectional dimensions of the pin and sleeve), to avoid the undesirable possibility of producing a pin/sleeve combination which is a tight fit within the aperture over the entire length of the sleeve (which would produce difficulties in the assembly of the plug) it is standard practice to ensure that the pin/sleeve combination is a loose sliding fit in the aperture.

In the Specification of our above U.K. Patent, there is described an electric plug comprising a base, a cover for the base, apertures in the base through each of which the shank of a respective plug pin extends from the interior of the plug, and an insulating sleeve on the shank of at least one of the pins, the sleeve being provided with resiliently deformable means which allows the pin and sleeve combination to be inserted through one aperture into a desired position relative to the plug base and which co-operates with the plug base to restrain withdrawal of the pin and sleeve from the base.

In particular, the resiliently deformable means is afforded by two resilient flaps each of which, when the pin/sleeve combination is in a desired position within its respective aperture, engages a shoulder to restrain

withdrawal of the pin and sleeve from the aperture. 50

According to this invention there is provided an electric plug comprising a base, a cover for the base, apertures in the base through each of which the shank of a respective plug pin extends from the interior of the plug, and an insulating sleeve on the shank of at least one of the pins, the sleeve being provided with at least one resiliently deformable formation which is afforded by a local thickening of the sleeve wall and which when the pin and sleeve combination has been inserted through the aperture into a desired position co-operates frictionally with a side face of the aperture to restrain movement of the pin and sleeve relative to the plug base. 55 60 65

This construction is particularly suitable when a separate sleeve is mounted on a plug pin of rectangular cross-section, which is reduced in cross-sectional area over a portion of its length from an inner end thereof by an amount generally equal to the thickness of the sleeve and to an axial extent sufficient to accommodate the sleeve, exterior surfaces of the sleeve thus being generally flush with exterior surfaces of the remainder of the shank. 70 75

The dimensions of such exterior surfaces may thus be such that the pin and sleeve combination is a loose sliding fit within the aperture, whilst the frictional engagement between said formation and the side face of the aperture adequately restrains movement of the pin/sleeve combination relative to the base when for example the cover of the plug has been removed for re-wiring, refusing or the like. 80 85

There will now be given a detailed description, to be read with reference to the accompanying drawings, of an electric plug which is the preferred embodiment of this invention. It is to be understood that this embodiment has been selected to illustrate this invention by way of example. 90 95

In the accompanying drawings:

Figure 1 is a sectional front elevation of part of the preferred embodiment;

Figure 2 is a sectional side elevation of the view shown in Figure 1;

Figure 3 is a plan of the view shown in Figure 1, the plug pin having been removed; and

Figure 4 is an enlarged view of part of Figure 2.

The preferred embodiment of this invention is a fused domestic mains plug, comprising a plug and base 10, a cover (not shown) for the base, and three pins, namely a live pin 26 and neutral and earth pins (not shown). Both the live and neutral pins of the plug are provided with insulating sleeves 40 of a resilient, insulating material extending from a portion of the pin which in use is within the plug, to a position along the length of the pin such that, on withdrawal of the pin from the socket, but the time the sleeve is at least substantially clear of the socket opening, the pin will no longer be in electrical contact with socket terminals.

The base 10 is provided with three pin-receiving apertures of rectangular transverse section extending there through for each of the three pins, said apertures including an aperture 12 for the live pin 26.

The pin 26 has a portion of reduced cross-section which extends from an inner end thereof for a distance equal to the length of the sleeve and to a depth generally equal to the thickness of the sleeve. Thus, the sleeve may be slid onto said reduced portion (said reduced portion being indicated by the number 28 in the drawings) into engagement with a shoulder 29, provided where the reduced portion terminates, which shoulder serves as means to restrain movement of the sleeve relative to the pin longitudinally thereof away from said inner end portion.

The sleeve is provided at its inner end, and on each of the side faces thereof of larger dimension, with a pair of parallel slots, between each pair of which there being a resiliently deformable formation 41 afforded by a local thickening of the wall, said formations 41 being constructed as integral mouldings on sleeve 40 (See Figure 4).

Extending into the side faces of the pin 26 of smaller diameter, and at positions spaced a short distance from the inner end portion of the pin, are two recesses 30, 30 of rectangular cross-section. The sleeve 40 is provided with similar interior formations 42, 42 which formations, when the sleeve is positioned on the pin, are received within said recesses 30, upper surfaces 44, 44 of said formations being flat, and abutting against upper surfaces 31, 31 of said channels 30.

The sleeve 40 is also provided, on an inner end portion thereof, and on the side faces thereof of smaller dimension, with

transversely outwardly-extending formations 46, 46.

In the assembly of the sleeve 40 and the pin 26, the sleeve is slid over the inner end portion of the pin, sloping, under surfaces 43, 43 of the formations 42, 42 engaging the inner end face of the pin and aiding a deformation of the sleeve prior to movement of said inner formations 42 into the recesses 30.

Secured to said inner end portion of the pin 26 by a rivet 34 is a terminal member 36, said member 36 comprising a bracket adapted to receive one end portion of a fuse, the other end portion of said fuse being received by a further bracket connected to a live terminal of the plug.

Extending from the interior of the base 10 through the inner side thereof and bounding the aperture 12 is a recess 18, said recess being of a shape similar to that of the base of the terminal member 36 and providing a surface 19 presented interiorly of the plug base against which said member 36 may seat. Extending further into the base 10, at positions thereof one on either of the sides of the aperture 12 of smaller dimension, are two channels 14, 14 (see Figures 1 and 3).

Subsequent to sliding of the sleeve 40 onto the pin 26, the pin 26 is riveted to the terminal member 36, and the assembly of pin/sleeve and terminal member is presented to the plug base, and the pin/sleeve inserted into the aperture 12 in the plug base. The lead afforded by the shape of the formations 41, permits the pin to be inserted a desired distance through the aperture 12, (as shown in Figure 2) albeit with some restraint, whilst providing a greater restraint to movement of the pin/sleeve combination towards the inner side of the base, due to frictional engagement between the formations 41 and the side faces of the aperture 12.

In the assembled position of the pin/sleeve/terminal member, the outer formations 46, 46 of the sleeve seat against transverse-extending and interiorly-presented surfaces 15, 15 of the two channels 14. Thus, any forces tending to withdraw the pin from the base (acting in the direction A shown in Figure 1) are transmitted by said outer formations 46 to the plug base through the surfaces 15, 15 whilst engagement between the surfaces 44, 44 of the interior formations 42 with the upper surfaces 31 of the recesses 30 restrains relative longitudinal movement between the pin and sleeve.

Whereas in the preferred embodiment hereinabove described the terminal member 36 is shown spaced a short distance from the surface 19 of the recess 18, causing all such forces as mentioned to be transmitted from the pin to the plug base through the

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insulating sleeve 40, if desired, the member 36 may be arranged to seat against the surface 19, whereby said forces are transmitted to the base jointly by the sleeve and bracket. Alternatively, said forces may be wholly transmitted to the plug base by the action of the member 36 against said surface 19, engagement of the outer formations 46, 46 of the sleeve against the surface 15 of the channels 14 in said circumstances acting as a safety feature preventing removal of the pin from the plug base in the event that the rivet 34 breaks.

Attention is drawn to our U.K. Patent Application Number 5219/75 (Serial No. 1,552,241) from which the present application has been divided.

WHAT WE CLAIM IS:—

1. An electric plug comprising a base, a cover for the base, apertures in the base through each of which the shank of a respective plug pin extends from the interior of the plug, and an insulating sleeve on the shank of at least one of the pins, the sleeve being provided with at least one resiliently-deformable formation which is afforded by a local thickening of the sleeve wall and which when the pin and sleeve combination has been inserted through the aperture into a desired position co-operates frictionally with a side face of the aperture to restrain movement of the pin and sleeve relative to plug base.
2. An electric plug according to claim 1 wherein the sleeve is a separate sleeve and is mounted on a plug pin of rectangular cross section which is reduced in cross section over a portion of its length from an

inner end thereof to a depth generally equal to the thickness of the sleeve.

3. An electric plug according to one of claims 1 and 2 wherein the pin/sleeve combination is adapted to be inserted through the aperture from the inner side of the base.

4. An electric plug according to claim 3, the formation being constructed and arranged in a manner such as to provide a lesser restraint to the insertion of the pin/sleeve combination into the aperture in one direction, and a greater restraint to the withdrawal of the pin/sleeve combination from the aperture in the opposite direction.

5. An electric plug according to one of claims 3 and 4 wherein the aperture affords a shoulder which co-operates with the sleeve to limit movement of the pin/sleeve combination through the aperture from the inner side of the base.

6. An electric plug according to any one of the preceding claims wherein said one pin is a fused pin, the shank of the pin being secured to a terminal member comprising a fuse-receiving bracket.

7. An electric plug according to any one of the preceding claims comprising two such formations on opposite sides of the sleeve.

8. An electric plug according to any one of the preceding claims wherein the or said formations are wedge-shaped in construction.

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2. An electric plug according to claim 1 wherein the sleeve is a separate sleeve and is mounted on a plug pin of rectangular cross section which is reduced in cross section over a portion of its length from an

inner end thereof to a depth generally equal to the thickness of the sleeve.

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