

PLASTIC TERMINAL FOR PLUG

BACKGROUND OF THE INVENTION

The present invention relates to a plastic terminal for a plug and, more particularly, to a plastic terminal for a plug that can couple with a socket to supply
5 electricity.

Electric appliances or equipment utilized in daily lives or industries generally a plug for coupling with a socket for electrical connection. According to safety requirements of electricity in many countries, a standard plug must include three terminals (including a positive terminal, a negative terminal, and a grounding terminal)
10 for coupling with a standard socket having three slots. However, the plugs in some countries have no grounding wires, and the grounding terminal is replaced by a plastic terminal that can be inserted into the grounding slot originally designed for receiving the grounding terminal, so that inadvertent contact can be avoided. The plastic terminal, when inserted into the grounding slot, acts as a member for activating electric connection
15 between gates of the positive and negative terminals.

Although different from metal grounding terminals, there are still safety requirements for plastic terminals in some countries. As an example, when a plastic terminal is integrally formed with a plug inner frame by injection molding, the coupling force between a smooth outer periphery of the plastic terminal and the inner frame may
20 be insufficient, such that the resultant plug may fail in the safety tests. Furthermore, use of such a plug may cause hazards.

FIGS. 1 and 2 show a conventional plastic terminal 6, and FIG. 3 shows an inner frame 5 and the plastic terminal 6. Plastic terminal 6 includes a body 61 having a coupling section coupled with inner frame 5. Two notches 62 are formed in the coupling
25 section of body 61 to provide enhanced bonding between plastic terminal 6 and inner

frame 5. However, the strength of body 61 is reduced in the coupling section having notches 62, for the sectional area of the coupling section is reduced. As a result, body 61 is liable to break during safety tests such as a tumbling barrel test. Particularly, in the tumbling test, the plug is put into a barrel that is rotated for predetermined rounds to test whether the plastic terminal loosens or breaks. Test results showed that plastic terminal 6 were liable to break due to notches 62.

BRIEF SUMMARY OF THE INVENTION

A plastic terminal for a plug according to the preferred teachings of the present invention includes a body having a coupling section integrally formed with an inner frame by injection molding. The coupling section of the body of the plastic terminal includes a flange to provide enhanced bonding strength between the plastic terminal and the inner frame. The sectional area and the mechanical strengths of the plastic terminal are not sacrificed.

In an embodiment, the flange is annular and extends around an outer periphery of the coupling section of body. In another embodiment, the flange extends across a portion of an outer periphery of the coupling section of body.

The coupling section of the body of the plastic terminal can further include a through-hole extending through the body. Molten plastic material can fill the through-hole. After hardening, the weight hanging properties of the plastic terminal are enhanced so that plastic terminal can pass weight hanging test. Although a through-hole is formed to provide enhanced weight hanging properties, the sectional area and the mechanical properties are still larger than those required for passing safety tests.

The flange can includes a chamfered face or a rounded corner at a portion adjoining the body, avoiding stress concentration in the portion due to sudden rise in the contour. Deficiency in bending strength of plastic terminal resulting from stress concentration is, thus, avoided.

The present invention will become clearer in light of the following detailed description of illustrative embodiments of this invention described in connection with the drawings.

DESCRIPTION OF THE DRAWINGS

5 The illustrative embodiments may best be described by reference to the accompanying drawings where:

FIG. 1 shows a perspective view of a conventional plastic terminal.

FIG. 2 shows a cross-sectional view of the plastic terminal of FIG. 1 according to section line A-A of FIG. 1.

10 FIG. 3 shows a cross-sectional view of the plastic terminal of FIG. 1 and an inner frame to which the plastic terminal is coupled.

FIG. 4 shows a perspective view of a plastic terminal for a plug of an embodiment according to the preferred teachings of the present invention.

15 FIG. 5 shows a cross-sectional view of the plastic terminal of FIG. 4 according to section line B-B of FIG. 4.

FIG. 6 shows a perspective view of a semi-product of a plug including an inner frame and the plastic terminal of FIG. 4.

FIG. 7 shows a side view of the semi-product of FIG. 6.

20 FIG. 8 shows a cross-sectional view of the semi-product according to section line C-C of FIG. 7.

FIG. 9 shows a perspective view of a plastic terminal for a plug of another embodiment according to the preferred teachings of the present invention.

FIG. 10 shows a cross-sectional view of the plastic terminal of FIG. 9 according to section line D-D of FIG. 9.

25 FIG. 11 shows a cross-sectional view of a semi-product of a plug including an inner frame and the plastic terminal of FIG. 9.

FIG. 12 shows a perspective view of a plastic terminal for a plug of a further embodiment according to the preferred teachings of the present invention.

FIG. 13 shows a cross-sectional view of the plastic terminal of FIG. 12.

FIG. 14 shows a cross-sectional view of a semi-product of a plug including an
5 inner frame and the plastic terminal of FIG. 12.

FIG. 15 shows a cross-sectional view of the semi-product of FIG. 14 according to section line F-F of FIG. 14.

FIG. 16 shows a cross-sectional view of another semi-product of a plug utilizing an embodiment of the plastic terminal according to the preferred teachings of the present
10 invention.

FIG. 17 shows a cross-sectional view of the semi-product of FIG. 16 according to section line G-G of FIG. 16.

FIG. 17A shows an enlarged view of a circled portion of FIG. 17.

FIG. 18 shows a cross-sectional view of a further semi-product of a plug
15 utilizing another embodiment according to the preferred teachings of the present invention.

FIG. 18A shows an enlarged view of a circled portion of FIG. 18.

All figures are drawn for ease of explanation of the basic teachings of the present invention only; the extensions of the Figures with respect to number, position,
20 relationship, and dimensions of the parts to form the preferred embodiment will be explained or will be within the skill of the art after the following teachings of the present invention have been read and understood. Further, the exact dimensions and dimensional proportions to conform to specific force, weight, strength, and similar requirements will likewise be within the skill of the art after the following teachings of the present
25 invention have been read and understood.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 6 shows a semi-product of a plug including an inner frame 1 and a plastic terminal 2 of an embodiment according to the preferred teachings of the present invention. Plastic terminal 2 is mounted to inner frame 1. Also mounted to inner frame 1
5 are a positive terminal 3 and a negative terminal 4 (FIG. 7) that are conventional.

With reference to FIGS. 4-8, plastic terminal 2 includes a body 21 having a coupling section integrally formed with inner frame 1 by injection molding. A flange 22 is formed on an outer periphery of the coupling section of body 21. Flange 22 provides enhanced bonding strength between plastic terminal 2 and inner frame 1 without
10 sacrificing mechanical strengths of body 21 of plastic terminal 2, for the sectional area of body 21 is not reduced. Flange 22 is annular and extends around an entire outer periphery of the coupling section of body 21 (FIG. 8).

In another embodiment of plastic material 2 shown in FIGS. 9-10, flange 22 includes a plurality of discontinuous flange sections on the outer periphery of the
15 coupling section of body 21. Namely, flange 22 extends across a portion of the outer periphery of the coupling section of body 21. Flange 22 of this embodiment also provides enhanced bonding strength between plastic terminal 2 and inner frame 1 without sacrificing mechanical strengths of body 21 of plastic terminal 2 (FIG. 11).

The coupling between plastic terminal 2 of the present invention and inner
20 frame 1 can be seen in FIG. 11. A final plug product obtained from the semi-product of FIG. 11 can pass the tumbling barrel test and the pressing test and, thus, meet mechanical strength requirements. This is because the sectional area of flange 22 is larger than that required by safety requirements.

FIGS. 12-15 show a further embodiment, wherein the coupling section of body
25 21 of plastic terminal 2 includes a through-hole 211 extending through two opposite flange sections 22 on two opposite sides of the outer periphery of the coupling section of

body 21. Thus, through-hole 211 extends through body 21 and allows molten plastic material to fill through-hole 211. After hardening, the weight hanging properties of plastic terminal 2 are enhanced so that plastic terminal 2 can pass the weight hanging test. Specifically, plastic terminal 2 can withstand 25 pounds for more than 1 minute without
5 falling. Although a through-hole 211 is formed to provide enhanced weight hanging properties, the sectional area and the mechanical properties are still larger than those required for passing safety tests.

Flange 22 can include a rounded corner 213 (FIGS. 16, 17, and 17A) at a portion adjoining body 21. Alternately, flange 22 can include a chamfered face 212
10 (FIGS. 18 and 18A) at the portion adjoining body 21. Rounded corner 213 and chamfered face 212 avoid stress concentration in the portion due to sudden rise in the contour. Deficiency in bending strength of plastic terminal 2 resulting from stress concentration is, thus, avoided.

Thus since the invention disclosed herein may be embodied in other specific
15 forms without departing from the spirit or general characteristics thereof, some of which forms have been indicated, the embodiments described herein are to be considered in all respects illustrative and not restrictive. The scope of the invention is to be indicated by the appended claims, rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are intended to be
20 embraced therein.

CLAIMS:

1. A plastic terminal for a plug, with the plastic terminal (2) including a body (21) having a coupling section adapted to be integrally formed with an inner frame (1) by injection molding, the improvements comprising:
 - the coupling section of the body (21) of the plastic terminal (2) including a flange (22) adapted to provide enhanced bonding strength between the integrally formed plastic terminal (2) and the inner frame.
2. The plastic terminal as claimed in claim 1, wherein the flange (22) is annular and extends around an outer periphery of the coupling section of body (21).
3. The plastic terminal as claimed in claim 1, wherein the flange (22) extends across a portion of an outer periphery of the coupling section of body (21).
4. The plastic terminal as claimed in claim 1, wherein the coupling section of the body (21) of the plastic terminal (2) includes a through-hole (211) extending through the body (21).
5. The plastic terminal as claimed in claim 1, wherein the flange (22) includes a chamfered face (212) at a portion adjoining the body (21).
6. The plastic terminal as claimed in claim 1, wherein the flange (22) includes a rounded corner (213) at a portion adjoining the body (21).
7. A plug for coupling with a socket to supply electricity, the plug comprising:
 - a plastic inner frame (1);
 - a plastic terminal (2) including a body (21) having a coupling section, the coupling section including a flange (22);
 - wherein the plastic terminal (2) is integrally formed with the inner frame (1) by injection molding, and the flange (22) is adapted to provide enhanced bonding strength between the plastic terminal (2) and the inner frame (1).
8. The plug according to claim 7, wherein the flange (22) is annular and extends around an outer periphery of the coupling section of body (21).
9. The plug according to claim 7, wherein the flange (22) extends across a portion of an outer periphery of the coupling section of body (21)

10. The plug according to claim 7, wherein the coupling section of the body (21) of the plastic terminal (2) includes a through-hole (211) extending through the body (21).

11. The plug according to claim 7, wherein the flange (22) includes a chamfered face (212) at a portion adjoining the body (21).

12. The plug according to claim 7, wherein the flange (22) includes a rounded corner (213) at a portion adjoining the body (21).

13. A method for forming a plug for coupling with a socket to supply electricity, comprising the steps of:

providing a plastic terminal (2) including a body (21) having a coupling section, the coupling section including a flange (22); and

injecting molding said inner frame (1),

wherein said plastic terminal (2) is integrally formed with said inner frame (1) during the injection molding step, and the flange (22) is adapted to provide enhanced bonding strength between the plastic terminal and the inner frame.

ABSTRACT

A plastic terminal (2) for a plug includes a body (21) having a coupling section integrally formed with an inner frame (1) by injection molding. The coupling section of the body (21) of the plastic terminal (2) includes a flange (22) to provide enhanced
5 bonding strength between the plastic terminal (2) and the inner frame (1). The sectional area and the mechanical strengths of the plastic terminal (2) are not sacrificed.

