

INNER FRAME FOR PLUG

BACKGROUND OF THE INVENTION

The present invention relates to an inner frame for a plug and, more particularly, to an inner frame for a plug capable of bundling wire sleeves within a short distance and
5 capable of receiving a fuse.

An AC power source for electric appliances or electronic devices used in daily life and industries is generally supplied to the electric appliances or electronic devices through use of a plug and a socket to conduct electric current. A typical plug generally includes two blades and an optional grounding blade. For safety consideration, a type of
10 plug receives a fuse (which is generally cylindrical and, thus, dubbed as a "fuse cylinder") that melts and breaks to form an open circuit when overload current occurs. Formation of such a plug receiving a fuse generally includes placing blades in a frame to form an inner frame, placing the inner frame in a mold, and forming an outer housing surrounding the inner frame by injection molding.

15 FIGS. 1 and 2 show a conventional inner frame 1 capable of receiving a fuse. The inner frame 1 generally includes a frame 11 having a first side 10 with a recessed portion (not shown) for receiving a fuse. The recessed portion forms a protruded portion 121 on a second side 12 opposite to the first side 10 to accommodate the fuse. A lower, first recessed portion 122 and a lower, second recessed portion 123 are formed on
20 opposite sides of the protruded portion 121. First, second, and third blades 131 and 132, and 133 are placed in three corners of the frame 11 of the inner frame 1. The first blade 131 can be the grounding blade.

The first blade 131 extends through the frame 11 at the first recessed portion 122. The second and third blades 132 and 133 extend through the frame 11 at the second
25 recessed portion 123. A first wire rivet portion 134 is provided on a distal end of the first

blade 131. A second wire rivet portion 135 is provided on a distal end of the second blade 132. The first and second wire rivet portions 134 and 135 extend away from the second side 12. A third rivet wire portion 136 for the third blade 133 is generally provided on the protruded portion 121 and in the form of a hollow cylinder. After
5 mounting a wire sleeve 136A, the third rivet wire portion 136 is electrically connected to the fuse and, hence, to the third blade 133. However, the third rivet wire portion 136 of the third blade 133 is a cylinder having a certain height, and the protruded portion 121 also has a height. Namely, the overall height of the inner frame 12 is relatively large. Thus, it is difficult to obtain a compact, low-profile design. Furthermore, even if it is
10 intended to bend the third wire rivet portion 136 to reduce the profile, bending of the third wire rivet portion 136 would be interfered by the collinear arrangement of the second and third wire rivet wire portions 135 and 136. Thus, the bending operation and wire riveting can not proceed continuously.

FIGS. 3 and 4 show another conventional inner frame 2 capable of receiving a
15 fuse. The inner frame 2 generally includes a frame 21 having a first side 20 with a recessed portion (not shown) for receiving a fuse. The recessed portion forms a protruded portion 221 on a second side 22 opposite to the first side 20 to accommodate the fuse. A lower, first recessed portion 222 and a lower, second recessed portion 223 are formed on opposite sides of the protruded portion 221. First, second, and third blades
20 231 and 232, and 233 are placed in three corners of the frame 21 of the inner frame 2. The first blade 231 is the grounding blade.

The first blade 231 extends through the frame 21 at the first recessed portion 222. The second and third blades 232 and 233 extend through the frame 21 at the second recessed portion 223. A first wire rivet portion 234 is provided on a distal end of the first
25 blade 231. A second wire rivet portion 235 is provided on a distal end of the second

blade 232. The first and second wire rivet portions 234 and 235 extend away from the second side 22.

A flat conductive plate 237 is provided on an outer face of the protruded portion 221 and has an extension extending to the second recessed portion 223. A third rivet wire
5 portion 236 for the third blade 233 is provided on the extension and in the form of a hollow cylinder. Since the third rivet wire portion 236 is located in the second recessed portion 223, the overall height of the inner frame 2 is smaller than that of the inner frame 1 of FIGS. 1 and 2.

However, due to the location of the third rivet wire portion 236 in the second
10 recessed portion 223, the first, second, and third wire sleeves 234A, 235A, and 236A for the first, second, and, third wire rivet portions 234, 235, and 236 can only be bundled in a common sheath in a location outside of the inner frame 21, as shown in FIG. 4. The concentrating strength is insufficient to pass sudden pull tests and anti-sway tests.

Thus, a need exists for a plug capable of bundling wire sleeves within a short
15 distance and capable of receiving a fuse.

BRIEF SUMMARY OF THE INVENTION

The present invention solves this need and other problems in the field of inner frames for plugs by providing, in a preferred form, an inner frame including a frame having opposite first and second sides. The first side has a recessed portion for receiving
20 a fuse. The recessed portion receives first and second fuse holding sections for holding the fuse. The recessed portion forms a protruded portion on the second side to accommodate the fuse. A lower, first recessed portion and a lower, second recessed portion are formed on opposite sides of the protruded portion. First, second, and third blades are placed in three corners of the frame. The third blade is electrically connected
25 to the first fuse holding section via a first conductive plate. The first blade extends through the frame at the first recessed portion. The second and third blades extend

through the frame at the second recessed portion. A first wire rivet portion is provided on a distal end of the first blade. A second wire rivet portion is provided on a distal end of the second blade. Each of the first and second wire rivet portions extends away from the second side. The third blade includes a third wire rivet portion on an outer face of the protruded portion. The third wire rivet portion is connected to a second conductive plate that is electrically connected to the second fuse holding section. The second side includes an imaginary dividing line passing through the protruded portion. The third wire rivet portion has an outer side distant to the imaginary dividing line. A first tangent to the third wire rivet portion at the outer side is parallel to the imaginary dividing line. The second wire rivet portion has an inner side facing the imaginary dividing line. A second tangent to the second wire rivet portion at the inner side is parallel to the imaginary dividing line and parallel to and spaced from the first tangent. A spacing between the first tangent and the imaginary dividing line is smaller than a spacing between the second tangent and the imaginary dividing line.

In a preferred form, the third wire rivet portion is in the form of a hollow cylinder having an opening facing away from the second side. In another preferred form, the third wire rivet portion is in the form of a hollow cylinder having an opening parallel to the second side and extending away from the first wire rivet portion.

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

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

FIG. 1 shows a perspective view of a conventional inner frame for a plug after wires are riveted.

FIG. 2 shows a plan view of the inner frame of FIG. 1

FIG. 3 shows a perspective view of another conventional inner frame for a plug.

FIG. 4 shows a plan view of the inner frame of FIG. 3 after wires are riveted.

FIG. 5 shows a perspective view of an inner frame for a plug according to the
5 preferred teachings of the present invention.

FIG. 6 shows a plan view of the inner frame of FIG. 5.

FIG. 7 shows a perspective view of the inner frame of FIG. 5 with wires in an
initial stage of riveting.

FIG. 8 shows a perspective view of an inner frame of another embodiment
10 according to the preferred teachings of the present invention after wires are riveted.

FIG. 9 shows a top view of the inner frame of FIG. 8.

FIG. 10 shows a bottom plan view of the inner frame according to the preferred
teachings of the present invention.

All figures are drawn for ease of explanation of the basic teachings of the
15 present invention only; the extensions of the figures with respect to number, position,
relationship, and dimensions of the parts to form the preferred embodiments 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
20 likewise be within the skill of the art after the following teachings of the present
invention have been read and understood.

DETAILED DESCRIPTION OF THE INVENTION

With reference to FIG. 5, an inner frame 3 according to the preferred teachings
of the present invention can receive a fuse and allow bundling of wire sleeves within a
25 short distance. The inner frame 3 includes a frame 31 having a first side 30. The first side
30 includes a recessed portion 330 (FIG. 10) receiving two fuse holding sections 339A

and 339B for holding a fuse. The recessed portion 330 forms a protruded portion 321 on a second side 32 opposite to the first side 30 to accommodate the fuse. A lower, first recessed portion 322 and a lower, second recessed portion 323 are formed on opposite sides of the protruded portion 321.

5 First, second, and third blades 331 and 332, and 333 are placed in three corners of the frame 31 of the inner frame 3. The first blade 331 is the grounding blade. The third blade 333 is electrically connected to the fuse holding section 339B via a conductive plate 338.

 The first blade 331 extends through the frame 31 at the first recessed portion
10 322. The second and third blades 332 and 333 extend through the frame 31 at the second recessed portion 323.

 A first wire rivet portion 334 is provided on a distal end of the first blade 331. A second wire rivet portion 335 is provided on a distal end of the second blade 332. The first and second wire rivet portions 334 and 335 extend away from the second side 32.
15 Each of the first and second wire rivet portions 334 and 335 is in the form of a hollow cylinder having an opening 334A, 335A facing away from the second side 32.

 With reference to FIGS. 5 and 6, the second side 32 includes an imaginary dividing line L1 passing through the protruded portion 321. The third blade 333 includes a third wire rivet portion 336 on an outer face of the protruded portion 321. The third
20 wire rivet portion 336 has an outer side distant to the imaginary dividing line L1. A first tangent L2 to the third wire rivet portion 336 at the outer side is parallel to the imaginary dividing line L1. The second wire rivet portion 335 has an inner side facing the imaginary dividing line L1. A second tangent L3 to the second wire rivet portion 335 at the inner side is parallel to the imaginary dividing line L1 and parallel to and spaced
25 from the first tangent L2. A spacing between the first tangent L2 and the imaginary

dividing line L1 is smaller than a spacing between the second tangent L3 and the imaginary dividing line L1.

Preferably, the third wire rivet portion 336 is in the form of a hollow cylinder having an opening 336A facing away from the second side 32. Furthermore, the third wire rivet portion 336 is connected to a conductive plate 337 that is electrically connected to the other fuse holding section 339A (FIG. 10).

In another embodiment shown in FIG. 8, the third wire rivet portion 336 is in the form of a hollow cylinder having an opening 336A parallel to the second side 32 and extending away from the first wire rivet portion 334. Thus, the riveting operation of the third wire rivet portion 336 will be neither impeded nor interfered by the second wire rivet portion 335. Continuous riveting operation is, thus, allowed. It can be appreciated that the third wire rivet portion 336 in FIG. 8 can be formed by bending the third wire rivet portion 336 in FIG. 7.

FIG. 7 shows that wire sleeves 41, 42, and 43 are respectively riveted at the first, second, and third wire rivet portions 334, 335, and 336.

With reference to FIGS. 8 and 9, by providing the third wire rivet portion 336 on the outer face of the protruded portion 321, the overall height of the frame 31 at second recessed portion 323 is lower than that in the conventional inner frame of FIGS. 3 and 4. This arrangement allows the wire sleeves 41, 42, and 43 to be bundled in a sheath within a short distance, and the bundling point is not outside the extent of the frame 31. Thus, the bundled wire sleeves 41, 42, and 43 possess sufficient concentrating strength to withstand sudden pull tests and anti-sway tests. Thus, each wire sleeve 41, 42, 43 is less likely to break. The final plug product can pass quality tests and provides safety during use.

Furthermore, the third wire rivet portion 336 is not collinear to the second wire rivet portion 335, and the first and second wire rivet portions 334 and 335 protrude from

the second side 32. Further, each of the first and second wire rivet portions 334 and 335 is in the form of a cylinder having an opening 334A, 335A facing away from the second side 32. Further, the third wire rivet portion 336 is in the form of a cylinder having an opening 336A facing away from the second side 32. Compared to the conventional inner frame 2 of FIGS. 1 and 2, the third wire rivet portion 336 can be bent so that the opening 336A is parallel to the second side 32 to avoid interference by the second wire rivet portion 335 and to allow continuous wire riveting operation. Such bending also provides the inner frame 3 with a low profile.

Thus since the invention disclosed herein may be embodied in other specific 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 embraced therein.

CLAIMS

1. An inner frame for a plug comprising:

a frame including opposite first and second sides, with the first side having a recessed portion for receiving a fuse, with the recessed portion receiving first and second fuse holding sections for holding the fuse, with the recessed portion forming a protruded portion on the second side to accommodate the fuse, with a lower, first recessed portion and a lower, second recessed portion formed on opposite sides of the protruded portion; and

first, second, and third blades placed in three corners of the frame, with the third blade electrically connected to the first fuse holding section via a first conductive plate, with first blade extending through the frame at the first recessed portion, with the second and third blades extending through the frame at the second recessed portion, with a first wire rivet portion provided on a distal end of the first blade, with a second wire rivet portion provided on a distal end of the second blade, with each of the first and second wire rivet portions extending away from the second side, with the third blade including a third wire rivet portion on an outer face of the protruded portion, with the third wire rivet portion connected to a second conductive plate that is electrically connected to the second fuse holding section,

with the second side including an imaginary dividing line passing through the protruded portion, with the third wire rivet portion having an outer side distant to the imaginary dividing line, with a first tangent to the third wire portion at the outer side being parallel to the imaginary dividing line, with the second wire rivet portion having an inner side facing the imaginary line, with a second tangent to the second wire rivet portion at the inner side being parallel to the imaginary dividing line and parallel to and spaced from the first tangent, with a spacing between the first tangent and the imaginary dividing line smaller than a spacing between the second tangent and the imaginary dividing line, such that wires and wire sleeves connected respectively to the first, second and third wire rivet portions are being bent and bundled in a sheath so that the sheath lies inside the frame and the wires and wire sleeves bundled together by the sheath possess strength to withstand pull, push, twist or flex tests, at least according to British Standard 1363-1.

2. The inner frame for a plug as claimed in claim 1, with the third wire rivet portion being in the form of a hollow cylinder having an opening facing away from the second side.

3. The inner frame for a plug as claimed in claim 1, with the third wire rivet portion being in the form of a hollow cylinder having an opening parallel to the second side and extending away from the first wire rivet portion.