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(54) **AC power plug assembly**

Wechselstromsteckereinheit

Fiche en courant alternatif

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Description

BACKGROUND OF THE INVENTION

Field of the Invention:

[0001] The present invention relates to an AC power plug assembly adapted for various foreign countries, particularly to an AC power plug assembly for electric devices such as AC power adapter, AC/DC converter, battery charger, and so on which are integrally combined with an AC plug.

Description of the Background Art:

[0002] AC plugs currently used over the world have not yet been standardized to a single shape. Accordingly, it is required to use a specially made plug adapter or exchange plug shape when electric devices commonly used in Japan are used or sold in various foreign countries especially in Europe. On the other hand, AC plug integrally formed electric devices such as battery chargers have been required to reconstruct their plug element so as to fit the plug shape with that of plug socket used in their destination. As shown in Fig. 4, in a typical conventional manner, a pair of pins or blades 2, 2 has been integrally disposed in a housing 1 of electric device by a molding process. In detail, a pair of plug pins 2, 2 should be previously inserted in a metal mold for molding the housing 1. The shape, dimension, and angle of the pair of plug pins 2, 2 may vary in accordance with the plug socket used in destination. This means the manufacturing process of such insert-molded plug will complicate. That is, the cost of the electric device having such insert-molded plug will rise.

[0003] US 5,046,961 discloses an improved AC plug assembly in combination with a housing made of insulating plastic material having two openings, comprising a pin block which includes a connecting member made of insulating plastic material and a pair of plug pins made of conductive metal material, integrally formed in the connecting member; and means for fixing said pin block to said housing so that said plug pins can be protruded out of said housing through said openings.

[0004] This known assembly permits a pair of plug pins to be easily assembled within a housing of electric device, but cannot easily be fit to any shape of plug sockets.

SUMMARY OF THE INVENTION

[0005] Therefore it is an object of the present invention to provide an improved AC plug assembly which can be easily fit to any shapes of plug sockets used over the world.

[0006] Further object of the present invention is to provide an improved AC plug assembly which has a sufficient mechanical strength after assembled.

[0007] To overcome the above discussed conventional problems and accomplish the above objects, the present invention provides an improved AC plug assembly adapted for a housing of electric device made of insulating plastic material which is provided with two openings. This plug assembly comprises a pin block including (a) a connecting member and (b) a pair of plug pins integrally formed in the connecting member to permit the plug pins to be protruded out of the housing through the openings formed in the housing.

[0008] According to the present invention, the pin block of the plug assembly is preferably fixed to the housing by engaging between a first engaging means formed in the connecting member in the vicinity of the base portion of the plug pin and a second engaging means formed in the opening of the housing. The first engaging means is preferably composed of a flange and an annular groove. The second engaging means is preferably formed in an annular internal edge. These annular groove and annular internal edge can be fit with each other to prevent the plug pins from falling off. Further, the connecting member is fixed securely to the housing through another fixing means such as a screw bolt.

[0009] Since the plug assembly according to the present invention uses a previously assembled single member, the pin block, composed of the plug pins and the connecting member, this plug assembly can be used as a common part to the other type housings of different electric devices through a simple fitting manner without complicated molding steps. In the other case, various pin blocks having different pin configurations can be easily fabricated in accordance with desired destinations and thus fabricated pin blocks can be fit to the same housing of electric device.

[0010] The pin block of the plug assembly according to the present invention is fixed to the housing by engaging between the annular groove in the connecting member in the vicinity of the base portion of the plug pin and the annular internal edge formed in the opening surface of the housing. Since this engagement is firmly performed, the connecting member is prevented from subjecting to the bending force owing to the impact along the axis of the plug pin. In order to achieve this engagement, the pin block is forcibly inserted into the two openings from the inside of the housing. This engagement is assisted by any irreversible mechanism such as tapered edge formed in the flange of the first engaging means.

[0011] Further, the screw member also assists the connecting member of the plug assembly in fixing with respect to the housing. As a result, the plug assembly can be firmly fixed to the housing by the combination of these two fixing means.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings.

Fig. 1 is a cross sectional view showing one embodiment of the plug assembly according to the present invention.

Fig. 2 is an elevational view showing an pin block composed of a pair of plug pins and a connecting member according to the present invention.

Fig. 3 is a plan view of the pin block shown in Fig. 2.

Fig. 4 is a partially sectional view showing a conventional plug section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] Referring to Fig. 1, there is shown one embodiment of a plug assembly according to the present invention which is adapted for a housing 10 of electric device such as a battery charger. The housing 10 is made of any insulating plastics, synthetic resins or the like by molding. The housing 10 is provided with two openings 11, 11 for plug pins 21, 21.

[0014] Fig. 2 shows a pin block 20 composed of these two plug pins 21, 21 formed in a rod shape made of conductive metal material, and a connecting member 22 made of insulating plastic, or synthetic resin material. These two plug pins 21, 21 are previously set in a metal mold for molding the connecting member 22 before injecting the melted synthetic resin into the mold.

[0015] The connecting member 22 is formed in a bridge shape whose both ends respectively contain the plug pins 21, 21 which are arranged at a predetermined angle. In the vicinity of each base portion of the plug pins 21, 21, the connecting member 22 further includes a first engaging means composed of a flange 23 and an annular groove 24. The flange 23 is further provided with a tapered front edge. In this shown embodiment, the connecting member 22 is additionally formed with a center bore for receiving a fixing means 12 such as a screw bolt.

[0016] On the other hand, each of the openings 11, 11 formed in the housing 11 is also provided with a second engaging means whose shape corresponds to that of the first engaging means. As shown in Fig. 1, the second engaging means is formed in an annular internal edge 13.

[0017] In order to assemble the pin block 20 in the predetermined position of the housing 10 as shown in Fig. 1, the plug pins 21, 21 are respectively inserted into the openings 11, 11 from the inside of the housing 10 and then the flanges 23, 23 of the connecting member 22 are pressed into the annular internal edges 13, 13. The tapered front edge facilitates the flange 23 to be passed through the annular internal edge 13 formed in the opening 11 and allows the annular groove 24 of the connecting member 22 and the annular internal edge 13 to be easily engaged. Once this engagement has been performed, the pin block 20 is kept in its predetermined position as shown in Fig. 1. Further, the screw bolt 12 is screwed in the housing 10 so that the connecting member 22 can be firmly fixed to the housing 10.

[0018] Obviously many modifications and variations of the present invention are possible in the light of the above descriptions. For example, while the above described embodiment shows two fixing means of the engagement defined between the first engaging means 23, 24 formed in the base portion of the plug pin 21 and the second engaging means 13 formed in the opening surface of the housing 10, and the fixing means 12 such as the screw bolt, one of these fixing means may be omitted or the fixing means 12 may be selected from more simple fixing means such as snap ring,resilient locking mechanism, chemical bonding, thermal bonding and so on.

[0019] As given explanation above, the plug assembly according to the present invention uses a previously assembled single member, that is the pin block, composed of the plug pins and the connecting member, and therefore this pin block can be used as a common part to the other type housings of different electric devices through a simple fitting manner without complicated molding steps. In the other case, various pin blocks having different configurations can be easily fabricated in accordance with desired destinations and thus fabricated plug assembly can be fit to the same housing of electric device. This assembly can realize various types of electric device having fine modified plug shapes depending on desired plug socket shape at a low cost.

[0020] The pin block of the plug assembly according to the present invention is fixed to the housing by engaging between the annular groove in the external surface of the base portion of the plug pin and the annular internal edge formed in the opening surface of the housing. Since this engagement is firmly performed, the connecting member is prevented from subjecting to bending force owing to the external impact along the axis of the plug pin. The pin block of this plug assembly is forcibly inserted into the two openings from the inside of the housing to perform this engagement. Further, this engagement can be kept by the screw bolt which assists the connecting member of the plug assembly in fixing with respect to the housing. As a result, the pin block of the plug assembly can be firmly fixed to the housing by the combination of these two fixing means.

Claims

1. An improved AC plug assembly in combination with a housing (10) made of insulating plastic material having two openings (11), comprising a pin block (20) which includes a connecting member (22) made of insulating plastic material and a pair of plug pins (21) made of conductive metal material, integrally formed in the connecting member (22); and means for fixing said pin block (20) to said housing (10) so that said plug pins (21) can be protruded out of said housing (10) through said openings (11),

characterised in that
said fixing means comprises a first engaging means (23, 24) formed in the connecting member (22) in the vicinity of the base portion of the plug pin (21) and a second engaging means (13) formed in the opening (11) of the housing (10),
said first engaging means comprises a flange (23) and an annular groove (24),
said second engaging means comprises an annular internal edge (13) so that said annular groove (24) and annular internal edge (13) can be fit with each other to prevent the plug pins (21) from falling off, and said pin block is forcibly inserted into the two openings from the inside of the housing.

2. The plug assembly as set forth in claim 1, wherein said fixing means additionally comprises a screw bolt (12) for fixing the pin block (20) to the inside of the housing (10).

Patentansprüche

1. Verbesserte Wechselstromsteckereinheit in Kombination mit einem Gehäuse (10) aus isolierendem Kunststoffmaterial mit zwei Öffnungen (11), umfassend einen Stiftblock (20), der ein Verbindungselement (22) aus isolierendem Kunststoffmaterial und ein Paar Steckerstifte (21) aus leitendem metallischem Material, die ein Ganzes bildend in das Verbindungselement (22) eingeformt sind, aufweist; sowie Mittel zur Befestigung des Stiftblocks (20) am Gehäuse (10), so dass die Steckerstifte (21) durch die Öffnungen (11) hindurch aus dem Gehäuse (10) hervortreten können, **dadurch gekennzeichnet, dass**
das Befestigungsmittel ein erstes Eingriffmittel (23, 24), das in dem Verbindungselement (22) in der Umgebung des Sockelbereichs des Steckerstifts (21) gebildet ist, und ein zweites Eingriffmittel (13), das in der Öffnung (11) des Gehäuses (10) gebildet ist, umfasst,
das erste Eingriffmittel einen Bund (23) und eine ringförmige Nut (24) umfasst,
das zweite Eingriffmittel einen ringförmigen Innenrand (13) umfasst, so dass die ringförmige Nut (24) und der ringförmige Innenrand (13) zusammengefügt werden können, um ein Abfallen der Steckerstifte (21) zu verhindern, und der Stiftblock vom Inneren des Gehäuses her unter Kraftanwendung in die zwei Öffnungen eingeführt ist.

2. Steckereinheit nach Anspruch 1, wobei das Befestigungsmittel zusätzlich eine Schraube (12) umfasst zum Befestigen des Stiftblocks (20) an der Innenseite des Gehäuses (10).

Revendications

1. Assemblage amélioré de fiche en courant alternatif combiné avec un logement (10) en matière plastique isolante ayant deux ouvertures (11), qui comprend un bloc de broches (20) consistant en un membre de connexion (22) en matière plastique isolante et en une paire de broches de fiche (21) en matière métallique conductrice formées intégralement dans le membre de connexion (22) et un moyen pour fixer ledit bloc de broches (20) audit logement (10) de telle manière que lesdites broches de fiche (21) puissent faire saillie à l'extérieur dudit logement (10) par lesdites ouvertures (11), **caractérisé en ce que**
ledit moyen de fixation comprend un premier moyen d'accouplement (23, 24) formé dans le membre de connexion (22) à proximité de la partie de base de la broche de fiche (21) et un deuxième moyen d'accouplement (13) formé dans l'ouverture (11) du logement (10),
ledit premier moyen d'accouplement comprend une collerette (23) et une rainure annulaire (24),
ledit deuxième moyen d'accouplement comprend un bord interne annulaire (13) afin que ladite rainure annulaire (24) et ledit bord interne annulaire (13) puissent être emboîtés l'un dans l'autre pour empêcher les broches de fiche (21) de tomber, et
ledit bloc de broches est inséré de force dans les deux ouvertures à partir de l'intérieur du logement.

2. Assemblage de fiche comme exposé dans la revendication 1, dans lequel ledit moyen de fixation comprend en outre un boulon fileté (12) pour fixer le bloc de broches (20) à l'intérieur du logement (10).

Fig. 1

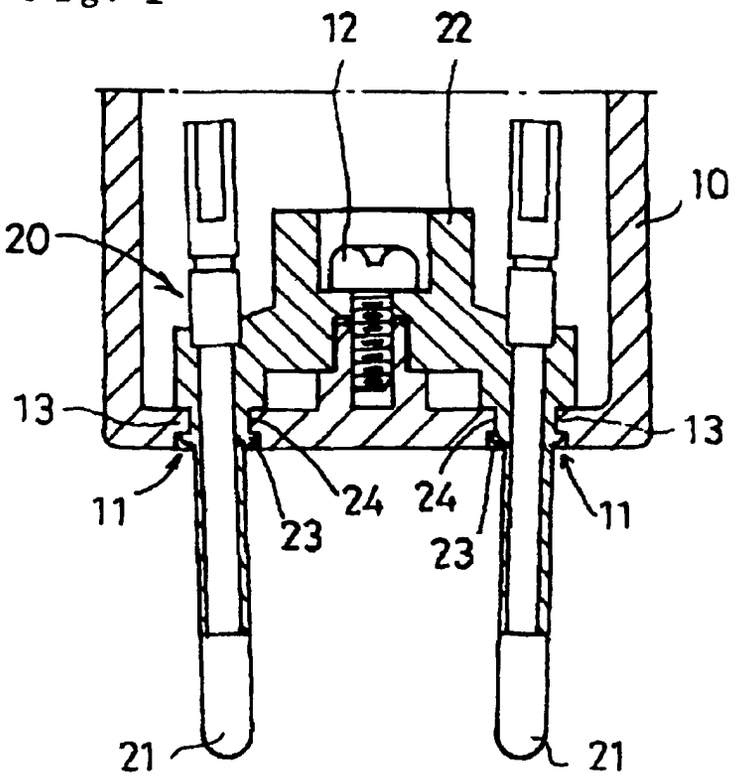

Fig. 2

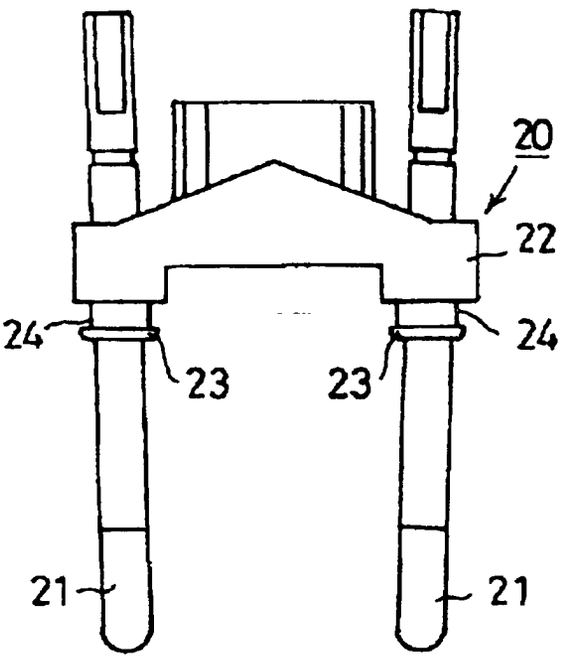

Fig. 3

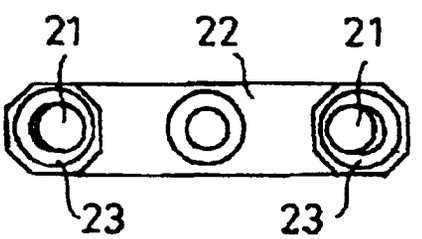

Fig. 4