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(54) **An improved structure of stepped plug terminals and its production method**

(57) An improved structure of stepped plug terminal and its production method; the terminal body, linkage part, and connector of the improved stepped plug terminal are formed integrally using an extrusion method. The production method of the present invention adopts the following technology: firstly, a stepped terminal body is made out using a forming machine; then, the neck of the terminal body is fixed by a mould with stepped cavity; and then, extrude the part of the neck extending to the rear of the cavity, making it distorted to form into the linkage part at the rear end of the cavity, while the part out of the cavity constitutes the connector. As the terminal body, linkage part, and connector are formed integrally through extrusion, the production process is simplified, processing speed is enhanced and no waste will be generated. Hence, the production cost of the plug terminals is considerably reduced. In addition, when processing the terminals using the production method of the present invention, no heavy metal of lead needs to be purposely added into the raw material, and the content of heavy metal of lead in the raw material can be as low as 0.5%. Hence, the environmentally friendliness of the terminals is greatly improved.

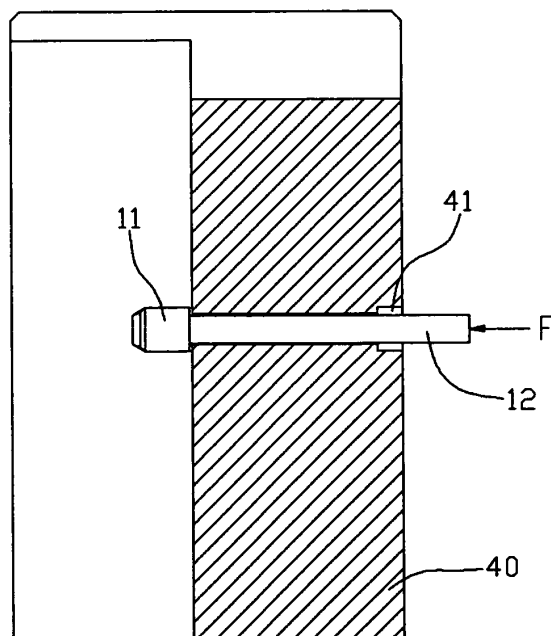


FIG. 6

Description

BACKGROUND OF INVENTION

1. Field of the Invention

[0001] The present invention relates generally to the technical field of electrical plugs, and more particularly to the plug terminals used in electrical plugs and its production method.

2. Description of Related Art

[0002] Terminals for electrical plugs are roughly divided into four categories according to the countries where they are used: USA-Japan-Canada system, Europe Union System, Great Britain System and China System. As shown in FIG. 1 and FIG. 2, there are electrical plugs 1 with two terminals and three terminals. There is a structure of stepped terminals as shown in FIG. 3 and FIG. 4: this kind of plug terminals is comprised of a terminal body 10, a linkage part 20, and a connector 30. The terminal body 10 is comprised of a front section 11 and a neck 12. The linkage part 20 is located between the neck 12 of the terminal body 10 and the connector 20. Currently, plug terminals of this kind of structure are produced using such methods as turning and milling. During production, a considerable amount of raw materials are wasted. As the major raw material is copper, which is very costly, the production cost of such plug terminals has always been too high. When there is currently no way to acquire raw materials with lower cost, how to reduce the production cost of plug terminals is a problem to be improved.

[0003] In addition, as currently stepped plug terminals are produced using such production methods as turning and milling, to facilitate machining, the material to make the terminals must be added with a percentage up to 1.8~3.7% of lead, which is heavy metal. As known, lead is a major source of pollution to underground water, and may jeopardize the central nervous system and blood circulation system of the human body. Hence, it is not environment-friendly.

SUMMARY OF THE INVENTION

[0004] The main objective of the present invention is to provide an improved structure of stepped plug terminals and its production method based on the shortcomings of prior art. This type of plug terminals has the features of simplified production processes, faster processing speed, lower production cost, and environmentally friendliness.

[0005] Based on the above objectives, the improved structure of stepped plug terminals disclosed in the present invention consists of a terminal body, a linkage part, and a connector, wherein, the terminal body is comprised of a front section and a neck, and the linkage part is located between the neck of the terminal body and the

connector. Said terminal body, linkage part, and connector are formed integrally through extrusion.

[0006] Said terminal body, linkage part, and connector can be cylindrical, prismatic, or flat.

5 [0007] The plug terminals of the present invention are produced using the following technical method: firstly, a stepped terminal body is made out using a forming machine; then, the neck of the terminal body is fixed by a mould with stepped cavity; and then, extrude the part of the neck extending to the rear of the cavity, making it distorted to form into the linkage part at the rear end of the cavity, while the part out of the cavity constitutes the connector.

10 [0008] In the above method, extrusions can be carried out for multiple times, with the sizes of the rear end of the mould cavity reducing one by one. The difference between the size of the rear end of the mould cavity adopted in the last extrusion and the expected size of the linkage part is within an allowance.

20 [0009] The beneficial effect of the present invention is as follows: as the terminal body, linkage part, and connector are formed integrally through extrusion, the production process is simplified, processing speed is enhanced and no waste will be generated. Hence, the production cost of the plug terminals is considerably reduced. In addition, when processing the terminals using the production method of the present invention, no heavy metal of lead needs to be purposely added into the raw material, and the content of heavy metal of lead in the raw material can be as low as 0.5%. Hence, the environment-friendliness of the terminals is greatly improved.

BRIEF DESCRIPTION OF THE DRAWINGS

35 [0010]

FIG. 1 shows the structure of a prior-art electrical plug;

FIG. 2 shows the structure of a second prior-art electrical plug;

FIG. 3 shows the structure of a stepped plug terminal; FIG. 4 shows the structure of a second stepped plug terminal;

40 FIG. 5 is an illustration of the forming of the plug terminals of the present invention;

FIG. 6 is a second illustration of the forming of the plug terminals of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

50 [0011] Following are only preferred embodiments reflecting the principle of the present invention and these embodiments shall not limit the protection range of the present invention.

55 [0012] FIG. 3 and FIG. 4 show two types of plug terminals. Plug terminals in other shapes are not represented one by one. The plug terminal comprises a terminal body 10, a linkage part 20, and a connector 30, wherein,

the terminal body 10 is comprised of a front section 11 and a neck 12, the linkage part 20 is located between the neck 12 of the terminal body 10 and the connector 30, and the terminal body 10, linkage part 20, and connector 30 are formed integrally through extrusion.

[0013] It shall be noted that, the structures and shapes of the stepped plug terminal are not limited to the ones shown in FIG. 5 and FIG. 6. Manufacturers can make changes as necessary according to the actual market demand.

[0014] Referring to FIG. 5 and FIG. 6, the production method of the present invention is as follows: firstly, make the stepped terminal body 10 using copper material and a forming machine, then, the neck 12 of the terminal body 10 is fixed by the upper bolster and lower bolster of a mould 40 with stepped cavity 41, and then, extrude the part of the neck 12 extending out of the rear end of the cavity 41, making it distorted to form into the linkage part 20 at the rear end of the cavity 41, while the part out of the cavity 41 constitutes the connector 30.

[0015] In order to control the processing accuracy of the plug terminals, extrusions can be carried out in multiple times, with the sizes of the rear end of the cavity 41 of the mould 40 reducing one by one. The difference between the size of the rear end of the cavity 41 of the mould 40 adopted in the last extrusion and the expected size of the linkage part 20 is within an allowance. Taking the plug terminal shown in FIG. 6 as an example, assuming the width and height of the linkage part 20 is 6.3mm and 4mm respectively, the allowance is +0.0/-0.05mm, and extrusions are carried out in three times, then, during the first extrusion, the width and height of the rear end of the cavity 41 of the mould 40 is 6.1mm and 3.8mm respectively; during the second extrusion, the width and height of the cavity 41 of the mould 40 is 6.2mm and 3.9mm respectively; and during the last extrusion, the width and height of the cavity 41 of the mould 40 is 6.3+0/-0.05mm and 4.0+0.0/-0.05mm respectively. In this way, the product obtained at last is a finished product meeting the accuracy requirements.

3. The production method defined in Claim 1, wherein a stepped terminal body (10) is firstly formed using an forming machine, then the neck (12) of the terminal body (10) is fixed by a mould (40) with a stepped cavity (41), and then, extrude the part of the neck (12) extending to the rear end of the cavity (41), making it distorted to form into the linkage part (20) at the rear end of the cavity (41), while the part out of the cavity (41) constitutes the connector (30).
4. The production method defined in Claim 3, wherein said extrusions can be carried out for multiple times, with the sizes of the rear end of the cavity of the mould reducing one by one; the difference between the size of the rear end of the cavity (41) of the mould (40) adopted in the last extrusion and the expected size of the linkage part (20) is within an allowance.

Claims

1. An improved structure of stepped plug terminals, comprising a terminal body (10), linkage part (20), and a connector (30), wherein, the terminal body (10) is comprised of a front section and a neck (12), the linkage part (20) is located between the neck of the terminal body (10) and the connector (30); its feature is that, said terminal body (10), linkage part (20), and connector (30) are formed integrally through extrusion.
2. The device defined in Claim 1, wherein said terminal body (10), linkage part (20), and connector (30) can be cylindrical, prismatic, or flat.

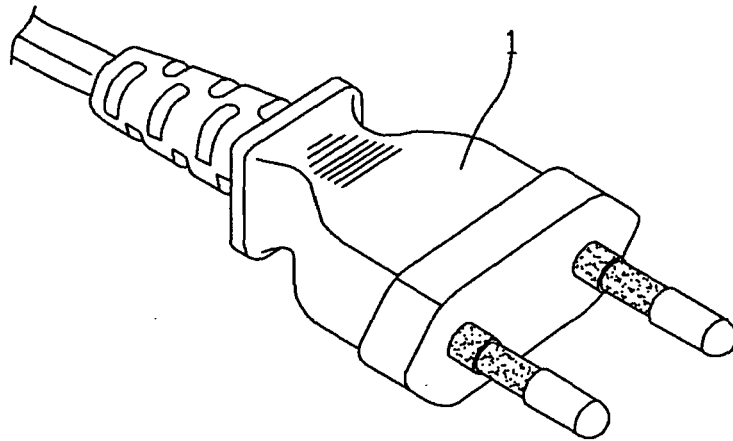


FIG. 1

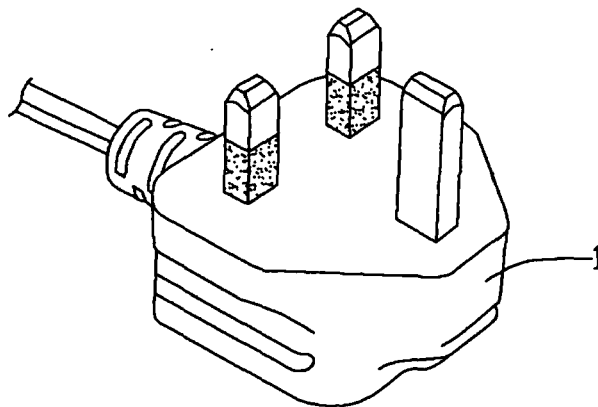


FIG. 2

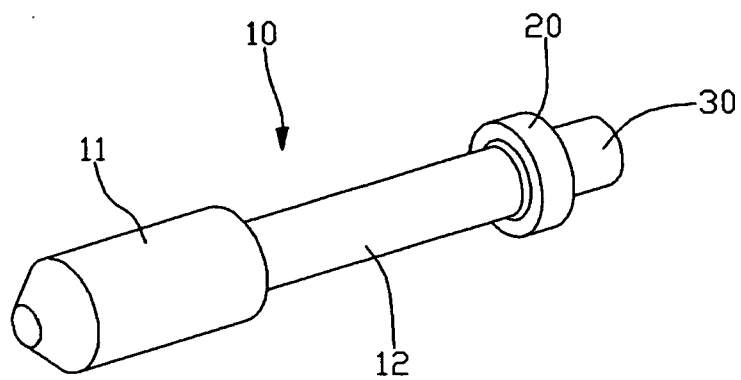


FIG. 3

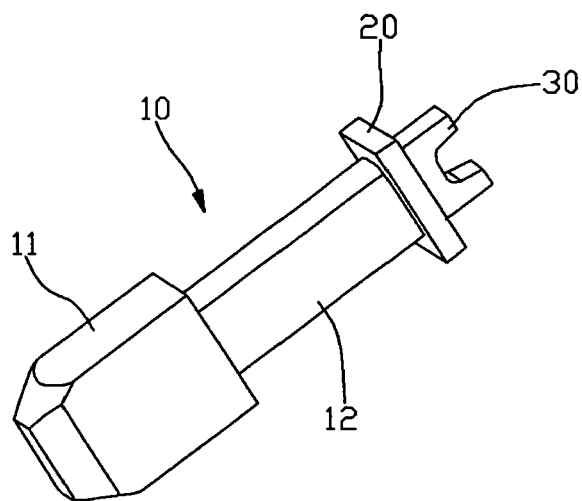


FIG. 4

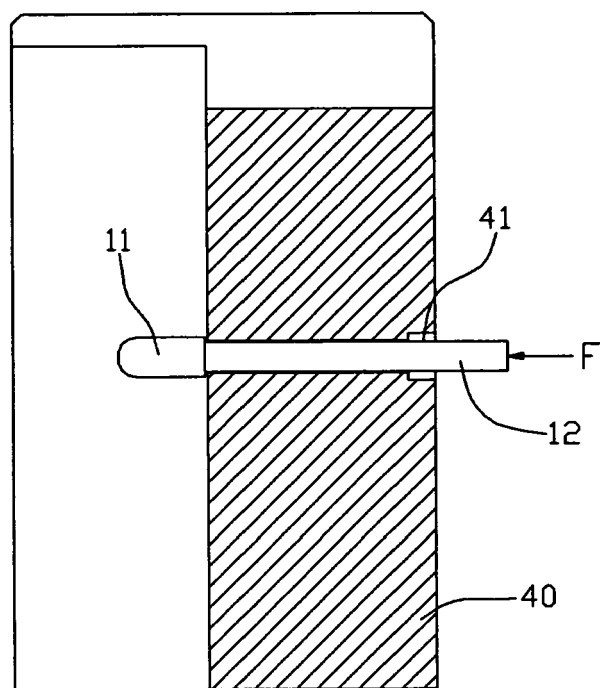


FIG. 5

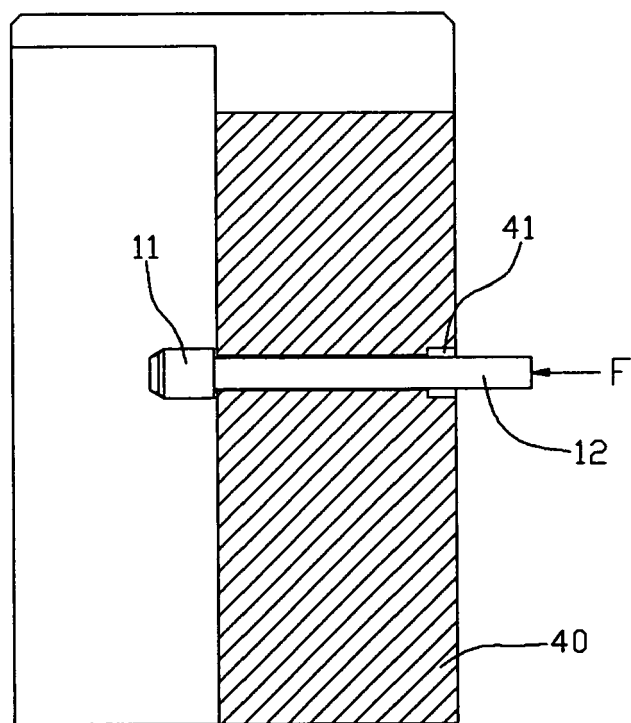


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 09 25 0606

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 331 696 A (FRIWO GERAETEBAU GMBH [DE]) 30 July 2003 (2003-07-30)	1,2	INV. H01R13/04
Y	* paragraph [0022]; claim 1; figures 1,2 * -----	3,4	H01R43/16
Y	GB 734 796 A (ALFRED KREIDLER) 10 August 1955 (1955-08-10) * page 2, lines 89-130 - page 3, lines 1-15; figures 1,4,5 * -----	3	
Y	US 2002/185027 A1 (DRAGER UDO [DE] ET AL) 12 December 2002 (2002-12-12) * paragraph [0004]; claims 3,5 * -----	4	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01R B21C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 28 January 2010	Examiner Vautrin, Florent
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 25 0606

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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28-01-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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GB 734796	A	10-08-1955	NONE	
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