

United States Patent

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3,204,212 8/1965 Broder 339/14 P
 2,421,155 5/1947 Miller et al. 339/49 X
 2,906,986 9/1959 Schaefer 339/218 X
 2,973,501 2/1961 Mapelsden et al. 264/27 X
 3,093,434 6/1963 Francis 339/195

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[54] **DOUBLE INSULATED PLUG**
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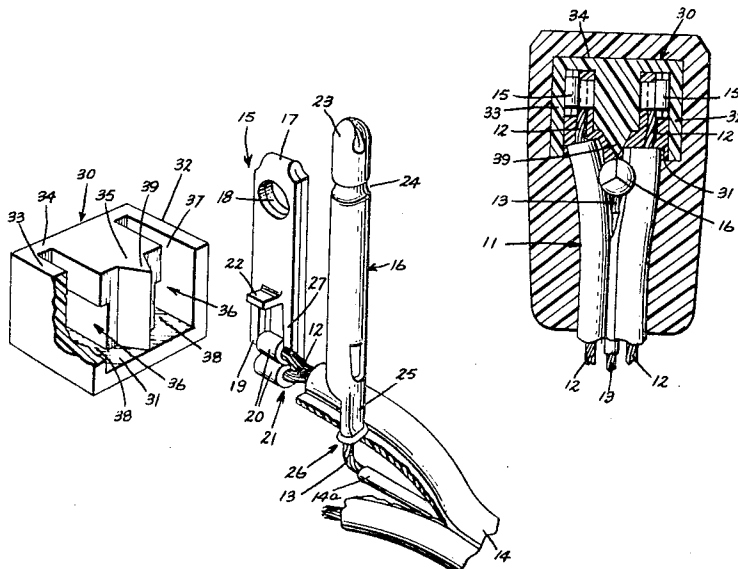
[50] Field of Search 339/14, 59
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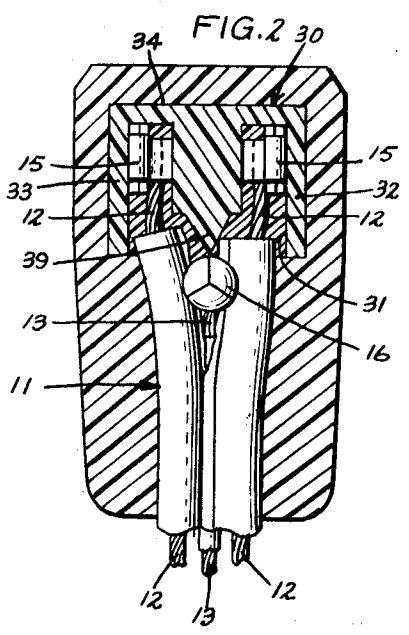
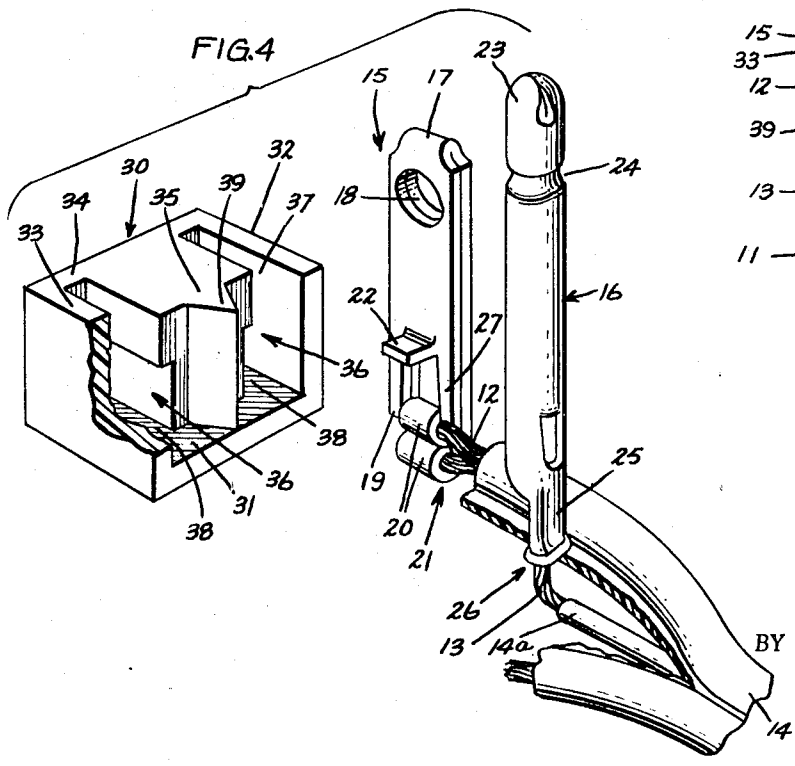
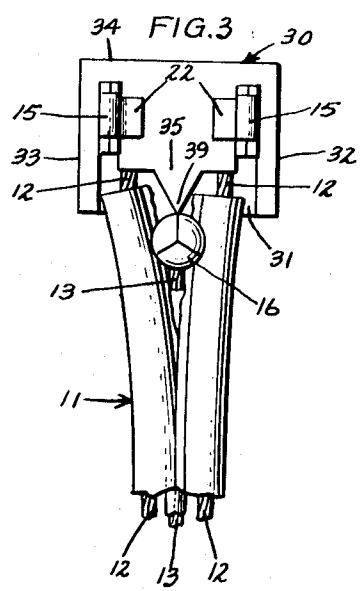
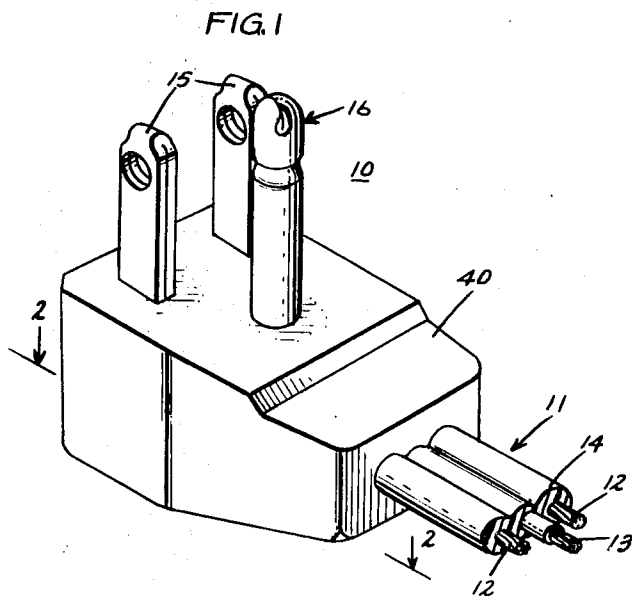
[56] **References Cited**

UNITED STATES PATENTS

2,923,912 2/1960 Benander 339/196 A

ABSTRACT: A double insulated plug includes a preformed housing of insulating material. The plug contacts and corresponding conductors of a cord are electrically and mechanically joined to form connections. The connections are received in the preformed insert in spaced-apart relationship with the insert substantially encasing the connections. A body of insulating material is molded around the insert and the connections.





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DOUBLE INSULATED PLUG

BACKGROUND OF THE INVENTION

The present invention relates generally to double insulated wiring devices such as plugs.

Wiring devices such as electrical connectors and plugs are very often made by molding a unitary body of insulating material around the connections between the terminal portions of the contacts and the bared ends of the associated conductors. With such wiring devices it is possible for a portion of one of the conductors to come to or very close to the surface of the device. Also a strand of one of the conductors could crossover and engage the other conductor or its associated contact. Either of these occurrences would make the wiring device unsuitable for use.

Applicant's prior U.S. Pats. Nos. 3,093,434 and 3,141,054 disclose molded wiring devices and a method of making them which overcome these disadvantages of the prior art. In accordance with these earlier disclosures, a first body of insulating material is molded about the connections, then a second body of insulating material is molded over the first body. In forming such plugs the contacts, with conductors attached, are placed in a first mold and the first body of insulating material is molded around the connections. This subassembly is then placed in a second mold and the second or outer body is molded around the first body.

The major portion of each contact must be kept clear of insulation material in order to perform its function of making electrical connections. Therefore, for each molding step the contacts are placed in recesses in the molds which fit very closely around the contact. This makes it a relatively tedious and time consuming job to mount the contacts in the mold, and having a double molding operation multiplies the number of times this must be done.

SUMMARY OF THE INVENTION

It is accordingly an object of the present invention to provide an improved wiring device of the double insulated type.

Another object of this invention is to provide such an improved wiring device utilizing a preformed insert of insulating material.

The present invention, in one embodiment thereof, provides a wiring device, for selectively connecting an electric cord to an electrical supply outlet, including a preformed insert of insulating material. A plurality of contacts, for selective connection to the outlet, are electrically and mechanically connected to a plurality of conductors of an electric cord to form a plurality of connections. The connections are positioned adjacent the insert with the insert covering those portions of the connections disposed toward the user when the contacts are connected to the outlet. A body of insulating material is molded around the insert and connections.

The above-mentioned and other features and objects of this invention, and the manner of attaining them, will become more apparent, and the invention itself will be more fully understood by reference to the following description, taken in conjunction with the accompanying drawing, wherein:

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an improved electrical plug incorporating one embodiment of the present invention;

FIG. 2 is a view taken along line 2—2 of FIG. 1;

FIG. 3 is a plan view showing the assembly of the preformed insert, contacts and cord of the plug of FIG. 1; and

FIG. 4 is an exploded, perspective view of the assembly of FIG. 3, the view being partly broken away and partly in section for purposes of illustration.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, there is shown a wiring device, more particularly in the exemplification a male plug 10, for connecting an electrical cord 11 to a suitable electrical

supply outlet, not shown. For purposes of illustration the cord 11 is shown as the well-known three-conductor ripcord type having a pair of power conductors 12 or a neutral or ground conductor 13. Each of the conductors 12 and 13 is formed from a number of individual strands or wires which are spirally wound together to form the separate conductors. The conductors are received in a jacket 14 of suitable insulating material which completely surrounds the three conductors and is scored or reduced in thickness between the conductors so that the jacket may be easily separated at its ends for attachment to suitable plugs or connectors. Since separation of jacket 14 will expose ground conductor 13, the ground conductor conventionally is formed with an auxiliary insulating jacket 14a.

The plug includes a pair of power contacts 15 and a ground contact 16. The two power contacts are identical in shape and each of them is of a one-piece strip construction, being made from a flat metal strip which is folded upon itself to form each of the contact blades 15. The outer portion 17 of each blade 15 is of a reduced width to assist in entering an associated contact and is provided with an opening 18 to receive the usual projection of a mating female receptacle. At its other or terminal end 19 one side of the blade is provided with folded over portions 20 which are bent around the bared end of the associated power conductor 12 to firmly engage the conductor and form a power connection 21 between the contact and the corresponding conductor. A tab 22 is bent outwardly from the contact 15 intermediate the opening 18 and the connection 21 for purposes which will be more fully explained here below.

The neutral or ground contact 16 may be formed from a single piece of metal which is bent upon itself into a generally cylindrical shape, with one end 23 then bent over into a generally semispherical shape for easy entry into an associated female connector. Back from the end 23 a ringlike indentation is formed for mating with a typical projection in the female conductor or receptacle. The other end of the contact 16 is folded inwardly as indicated at 25 so as to tightly engage the bared end of the ground conductor 13 and thus form ground connection 26. The forming of the neutral contact differently than the power contacts assures that the plug is placed in a mating female receptacle in proper orientation so that the contacts 15 and conductors 12 are connected to the power contacts of the female receptacle and the contact 16 and conductor 13 are connected to the ground contact of the female receptacle.

The plug 10 also includes a preformed insert of housing 30. The housing 30 may be formed from a suitable insulating material such as, for example, polyvinyl chloride, polystyrene or other suitable insulating material. Typically the housing 30 would be preformed by a multicavity injection molding machine with properly designed molds. The housing 30 includes a base or cover portion 31 with a pair of sidewalls 32 and 33 and an end wall 34 formed to extend away from the base or cover wall 31 along three of its peripheral edges. An intermediate wall or barrier 35 extends from the center of the cover portion 31 and joins the end wall 34. The barrier 35 is spaced between the sidewalls 32 and 33 so as to form a recess 36 between the barrier 35 and each of the sidewalls. Each of these recesses includes an outer portion 37 of a small width and an inner portion 38 of a larger width. Extending outwardly of these recesses, the barrier 35 includes a reduced width portion 39, which extends to the open edge of the cover 31.

As best seen in FIG. 3, in forming the plug of the exemplification each of the power contacts 15 is inserted in one of the recesses 36 so that the connection 21 is received in the larger width portion 38 and the adjacent leg 27 of the contact is received in the smaller width portion 37 of the recess. The tab 22 fits closely against the outer surface of the barrier 35. Thus each of the power contacts is received in a recess formed in the insert 30 with the insert substantially encasing the power connections. As indicated by FIG. 4, the conductors 12 and 13 are cut so that the bared end of ground conductor 13 is shorter than the bared end of the power conductors and thus the ground connection 26 is disposed adjacent portions of the

power conductors which are encased in suitable portions of the insulating jacket 14. When the power contacts 15 are inserted in the recesses 36, the reduced width portion 39 of the insert 30 engages the folded over end of the ground contact 16 so as to properly position it in substantially spaced relationship to the power contacts 15. Once the housing 30 and the contacts have been joined together a body 40 of suitable insulating material is molded around the housing and the adjacent portion of the cord 11 to form the external covering for the plug. This body 40 may be polyvinyl chloride, polystyrene or other suitable plastic material. In addition it may be either soft and supple providing a surface which is readily grippable or of a hard plastic material facilitating a very secure plug structure.

As best seen in FIG. 2, the molded material of body 40 flows closely around the power connections 21 and the neutral or ground connections 26 and fills those portions of the recesses 36 not already filled by the power connections 21 and the adjacent portions of the contacts 15 and power conductors 12.

It will be seen that, with this construction, the preformed insert or housing 31 provides a second barrier between the power connections 21 and any loose strands from these connections and those outer surfaces of the plug 10 which might be touched by a user or other person when the plug is connected to a mating female connector or receptacle, that is when the plug is "live." Also the barrier 35 provides an insulating insert between the two power connections 21 which effectively prevents strands from the conductors 12 from crossing over from one connection to the other to short the plug. In the particular plug illustrated sufficient physical distance is assured between the power connections 21 and the ground contact connection 26 as to effectively insure no strand crossover therebetween. Since the connection 26 is at ground potential, even when the plug is in use, it is not necessary to provide a recess similar to recesses 36 to receive this connection. However, in other contact arrangements, as where the neutral contact and its connection are disposed closer to the power contacts, a suitable recess may be provided in the housing to receive the ground connection.

It will be understood that the housing may be modified to provide the same advantages for a straight in plug as the exemplification housing provides for an angle plug. In that event the preformed housing or insert would be formed with recesses open at each end and closed on all their lateral sides so that

the contacts would extend out one end of the recesses and the insulated conductors would extend out of the other end of the recesses.

The plug formed in accordance with the present invention provides the advantages of double insulation, insuring that no individual wires will find their way to the other surface of the plug, and a physical barrier between the connections preventing crossover of wires from one connection to another. All of this is accomplished in a plug which requires only one molding operation.

While in accordance with the patent statutes there has been described what at present are considered to be the preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is applicant's intention in the following claims to cover all such equivalent variations as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A wiring device comprising: a preformed insert of insulating material, said insert including a base, a pair of sidewalls and an end wall extending from the base; an intermediate wall extending from said base and joined to said end wall; said intermediate wall being spaced from said sidewalls to form a recess between said intermediate wall and each of said sidewalls respectively; an electrical cord having a pair of power conductors; a pair of power contacts; each of said power contacts being mechanically and electrically connected to a corresponding one of said power conductors to form a pair of power connections; each of said power connections being received in a corresponding recess; and a body of insulating material molded around said insert and substantially fills said recesses around said power connections.

2. A wiring device as set forth in claim 1, wherein: said electrical cord also includes a ground conductor; a ground contact mechanically and electrically connected to said ground conductor to form a ground connection; said intermediate wall positions said ground connection in spaced relationship to said power connections; said body of insulating material extends around said ground connection.

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