Oct. 5, 1965 R. S. BROWN 3,210,717

SAFETY CONNECTOR PLUG

Filed June 14, 1965

FIG. 1

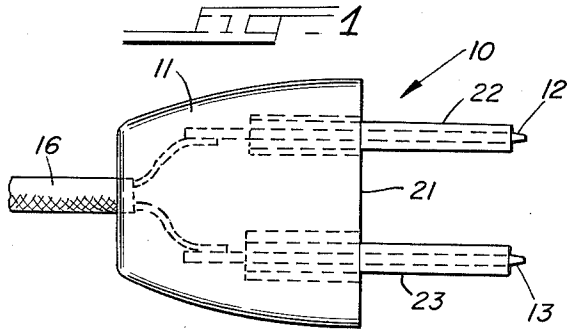


FIG. 2

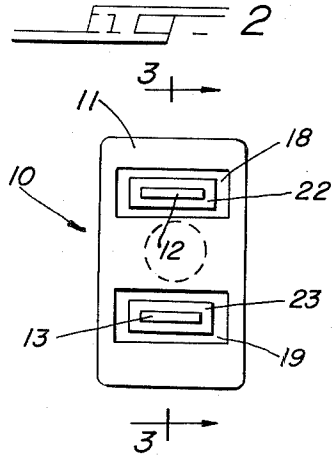


FIG. 3

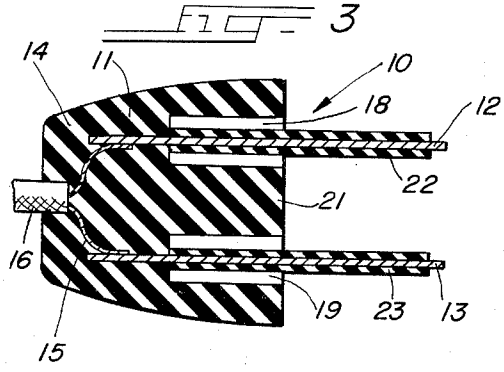


FIG. 4

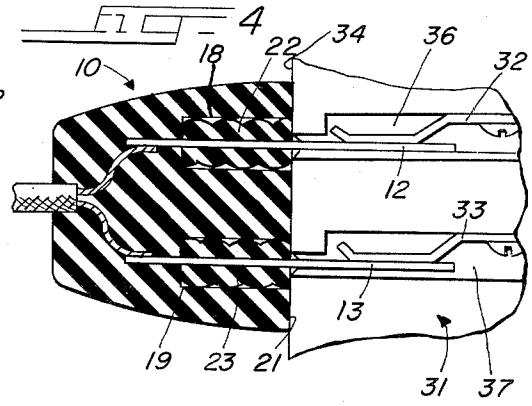
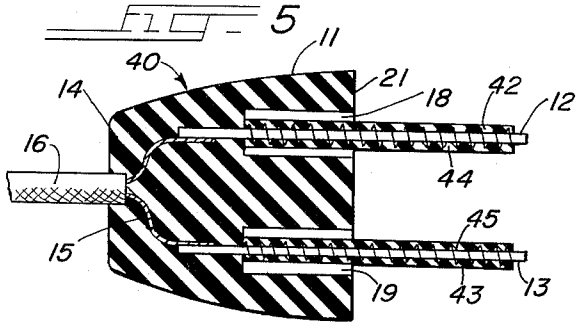


FIG. 5



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SAFETY CONNECTOR PLUG

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4 Claims. (Cl. 339—36)

This invention relates to a new and improved electrical connector plug of the kind commonly employed to connect lamps and various forms of electrical appliances to a power supply such as a conventional 50/60 cycle alternating current supply.

The ordinary connector plug employed for lamps and appliances in homes and offices presents a potential danger of electrical shock because the electrical connections to the connector prongs of the plug are completed, in the wall or other receptacle, before the prongs of the plug are fully inserted into the receptacle. If a power cord plug is carelessly inserted in a socket receptacle, so that there is a gap between the face of the plug and the face of the receptacle, subsequent contact with the prongs, in the space between the plug and the receptacle, can cause a substantial electrical shock. This danger is greatest in the home, particularly when small children are present. On the other hand, there can be substantial danger to adults as well, particularly when the plug connection must be completed at an inaccessible or awkward location. Furthermore, an inadvertent tug on the electrical cord may sometimes partly dislodge the connector plug from its receptacle, exposing the prongs and thereby making it possible to short-circuit the prongs and create a fire hazard.

The problems and dangers pertaining to conventional power cord plugs are well known and have been the subject of a number of developments intended specifically to eliminate or minimize those dangers. One form of safety device employed for this purpose is a receptacle in which the plug must be fully inserted and then turned through a substantial angle in order to complete the desired electrical connection. Receptacles of this kind are substantially more expensive than conventional direct plug-in receptacles. Moreover, they are subject to malfunction, particularly if excessive amounts of dust and dirt enter the rotating mechanism, as is likely with base receptacles located immediately adjacent a floor.

Another proposed solution to the dangers and difficulties of conventional power cord plug connectors has entailed the mounting of a cylindrical guard member of rubber or other resilient material on the connector plug, the guard member extending around the connector prongs of the plug. A guard of this kind, however, frequently interferes with insertion of the plug into a socket receptacle. This is especially true when the plug must be used at a relatively inaccessible location, since the prongs of the plug are concealed and it becomes quite difficult to align the plug accurately with a socket receptacle. Furthermore, with a device of this kind the sleeve is compressed between the face of the plug and the surface of the receptacle and it is difficult to tell just when the plug has been fully inserted and electrical connection is completed.

It is a principal object of the present invention, therefore, to provide a new and improved electrical safety connector plug, for use with a conventional electrical socket receptacle, that effectively and inherently eliminates short circuit and shock hazards normally present in such a device.

It is a further object to provide a new and improved electrical safety connector plug that affords positive protection against short-circuit and shock hazards yet is as easy to plug into a conventional socket receptacle as an ordinary unprotected plug connector.

It is another object of the invention to afford a fully protected electrical safety connector plug, adapted for use with a conventional socket receptacle, that permits a direct surface-to-surface fit between the plug and the receptacle so that there can be no mistake as to whether the plug is fully inserted in the receptacle.

A specific object of the invention is to provide a new and improved fully-protected safety connector plug that is comparable in cost of manufacture to conventional unprotected devices.

Accordingly, the invention relates to an electrical safety connector plug for use with an electrical receptacle of the kind having a plurality of spaced sockets for receiving electrically conductive connector prongs. A safety plug constructed in accordance with the invention comprises an electrical insulator body and a plurality of electrically conductive connector prongs projecting outwardly of one surface of the insulator body and having appropriate spacing for insertion into the sockets of an outlet receptacle. The insulator body of the plug is provided with at least one recess encompassing the base portions of the connector prongs; in the preferred construction, individual recesses are provided at the base of each prong. A corresponding plurality of relatively thin resilient compressible electrical insulator sleeves are provided, each being anchored in one of the insulator body recesses and each being disposed in encompassing relation to one of the connector prongs. When the connector plug is plugged into a receptacle, the insulator sleeves are compressed into the recess or recesses encompassing the base portions of the connector prongs so that the surface of the insulator body engages in flush face-to-face contact with the external surface of the socket receptacle.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what is now considered to be the best mode contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be made as desired by those skilled in the art without departing from the present invention.

In the drawings:

FIG. 1 is a side elevation view of an electrical safety connector plug constructed in accordance with one embodiment of the present invention;

FIG. 2 is an end elevation view of the connector plug of FIG. 1;

FIG. 3 is a sectional elevation view taken approximately along line 3—3 in FIG. 2;

FIG. 4 is a sectional elevation view similar to FIG. 3 but showing the connector plug engaged in operative position in a conventional electrical socket receptacle; and

FIG. 5 is a sectional elevation view, similar to FIG. 3, of a modification of the invention.

FIGS. 1–4 illustrate an electrical safety connector plug **10** constructed in accordance with one embodiment of the present invention. Connector plug **10** comprises an electrical insulator body **11** that may be molded of rubber or other elastomer material or may be fabricated from molded plastic or the like. Insulator body **11** is not necessarily constructed as a unitary molded member, although this is the preferred construction, but may be assembled from a plurality of individual insulator parts.

The safety connector plug **10** further comprises a pair of electrically conductive connector prongs **12** and **13**. Connector prongs **12** and **13** may be of conventional construction; thus, if desired, one of the prongs may be made slightly larger than the other to adapt the connector plug for use with polarized socket receptacles. Con-

nector prongs 12 and 13 are individually electrically connected to two conductors 14 and 15 respectively. Conductors 14 and 15 extend into a power cord 16 which may be connected to a lamp, power tool, appliance, or the like. The internal connections between conductors 14 and 15 and prongs 12 and 13 may be completed in accordance with conventional practice, the type of connection used not being critical to the present invention.

Unlike conventional connector plugs, the safety connector plug 10 is provided with two relatively deep recesses 18 and 19 in the front or receptacle-engaging surface 21 of the plug. As best seen in FIG. 3, connector prong 12 projects outwardly of the plug through the central portion of recess 18 so that the recess 18 encompasses the base portion of the connector prong. Similarly, recess 19 encompasses the base portion of a connector prong 13.

A first resilient compressible electrical insulator sleeve 22 is disposed in encompassing relation to connector prong 12. Sleeve 22, which is of generally tubular configuration and fits relatively closely about prong 12, is cemented or otherwise bonded to the bottom of the recess 18 in the connector plug body 11 so that the insulator sleeve is effectively anchored at the base of the connector prong. The point of anchorage may be at the bottom surface of recess 18; alternatively, the sleeve can be bonded to the surface of prong 12 itself within the recess, so long as the anchor point is near the bottom of the recess.

A similar resilient compressible insulator sleeve 23 is disposed in encompassing relation to connector prong 13. As before, sleeve 23 is anchored at the base of recess 19. The two insulator sleeves 22 and 23 preferably do not extend for the complete length of the connector prongs with which they are associated. Rather, the insulator sleeves are terminated just short of the free end of each of the connector prongs to facilitate insertion of the prongs into a receptacle, as described hereinafter. Sleeves 22 and 23 may be conveniently molded or otherwise formed from rubber or other elastomer material having adequate electrical insulating properties.

FIG. 4 illustrates the use of the safety connector plug 10. In this figure, plug 10 is shown inserted into the sockets 36 and 37, and completing electrical connections with the two terminals 32 and 33, of a conventional socket receptacle or like electrical outlet 31. The prongs 12 and 13 of the plug are shown engaged in intimate conductive contact with the terminals 32 and 33 of the receptacle; the electrical connection is the same as afforded by a conventional plug connector.

With plug 10 in its operative connecting position, as illustrated in FIG. 4, the two resilient sleeves 22 and 23 are compressed into recesses 18 and 19, respectively. The recesses are made large enough so that all of the elastomer or other resilient material constituting the two sleeves can be accepted in the recesses. As a consequence, the surface 21 of plug body 11 abuts directly against the external surface 34 of receptacle 31. Accordingly, there can be no question as to when plug 10 is fully inserted into receptacle 31 and good electrical connections established.

As plug 10 is withdrawn from receptacle 31, the resilient compressible sleeves 22 and 23 expand toward the initial uncompressed condition illustrated in FIGS. 1 and 3. During the entire time the plug is being withdrawn, the two conductive prongs 12 and 13 are insulated from external contact, eliminating any shock hazard or possibility of short-circuiting. In a conventional receptacle such as the outlet 13, the internal contacts 32 and 33 do not extend completely to the external surface 34. Accordingly, even though the tips of prongs 12 and 13 extend slightly beyond the ends of sleeves 22 and 23, there is no danger of electrical shock or short circuit.

The projecting tips of the connector prongs 12 and 13, which may be of the order of 1/16 inch in length or less, make it easier to insert the plug connector into an outlet receptacle. That is, the insulator sleeves, terminating just short of the tips of the connector prongs, do not interfere with the initial entrance of the prongs into the receptacle sockets 36 and 37. In use, plug 10 is as simple and convenient to connect with receptacle 31 as a conventional unprotected plug connector.

The utilization of individual sleeves 22 and 23 on the connector prongs 12 and 13 aids materially in convenience of use of the plug connector, particularly when the receptacle with which it must be used is in the inaccessible location, as behind some furniture or around a corner from the appliance with which the cord is connected. Thus, even if the plug can only be seen from the side and even if only a small portion of the prongs is visible, the user can always tell how the prongs are aligned and hence can orient the plug properly for insertion in an appropriate receptacle. It is thus apparent that, in use, the safety connector plug 10 offers all of the convenience and advantages of a conventional connector plug while at the same time affording positive protection against short circuit and shock hazards. Furthermore, the simple resilient compressible sleeves 22 and 23 and their mounting in the connector plug add only a minor increment to the overall cost of the plug so that the cost is comparable to conventional unprotected devices.

FIG. 5 illustrates a connector plug 40 that is generally similar to connector plug 10 but is modified slightly in its construction. Thus, plug 40 includes an insulator body 11. From the front face 21 of the insulator body, a pair of electrical conductive connector prongs 12 and 13 project in spaced alignment with each other for connection into the sockets of an appropriate receptacle. As before, suitable connections are afforded to the conductors 14 and 15 of a power cord 16.

As in the embodiment of FIGS. 1–4, the insulator body 11 is provided with individual recesses 18 and 19 encompassing the base portions of the conductive connector prongs 12 and 13. Two resilient compressible sleeves 42 and 43 are mounted upon prongs 12 and 13 respectively. These sleeves are anchored into the base portions of the recesses 18 and 19 so that the sleeves can be compressed into the recesses when the plug is inserted into an outlet receptacle. In this instance, however, additional resiliency is provided by incorporating individual helical coil springs 44 and 45 in the sleeves 42 and 43 respectively. The coil springs give added assurance that the sleeves will expand to cover the conductive prongs when the plug is removed from a receptacle and are utilized when the rubber or other insulator material from which the sleeves are fabricated is subject to relatively rapid aging and may tend to lose its resiliencey during the normal life of the power cord 16. In all other respects, safety connector plug 40 is essentially the same as plug 10.

Safety plugs 10 and 40, as illustrated, each include only two connector prongs and thus correspond to the most generally used type of electrical power connection for lamps, appliances, and the like. It will be recognized, however, that a third connector prong can be utilized and may be similarly protected for three-wire connections such as are frequently used with power tools and other appliances drawing relatively heavy currents. In a three-wire connector plug, where the third connector prong is used for a ground connection, the insulator sleeve may be omitted on the ground connection, provided insulator sleeves are used on both of the other connector prongs of the device. In any of these safety connector plugs, a single relatively large central recess may be utilized instead of the individual recesses 18 and 19; however, individual recesses are preferred in that they afford a more rigid insulator body.

Hence, while preferred embodiments of the invention have been described and illustrated, it is to be understood that they are capable of variation and modification.

I claim:

1. An electrical safety connector plug for use with an electrical receptacle of the kind having at least two spaced sockets for receiving electrically conductive connector prongs, said connector plug comprising:
an electrical insulator body;
at least two electrically conductive connector prongs projecting outwardly of one surface of said insulator body and spaced for insertion into the sockets of a receptacle;
said insulator body having at least one recess, encompassing the base portion of each of said connector prongs;
and at least two resilient compressible electrical insulator sleeves, equal in number to said connector prongs and each encompassing an individual one of said prongs, each such sleeve being compressed into the recess encompassing the base portion of its associated prong whenever said connector plug is plugged into a receptacle so that said one surface of said insulator body engages flush with the external surface of the receptacle.

2. An electrical safety connector plug for use with an electrical receptacle of the kind having a plurality of spaced sockets for receiving electrically conductive connector prongs, said connector plug comprising:
an electrical insulator body;
a corresponding plurality of electrically conductive connector prongs projecting outwardly of one surface of said insulator body and spaced for insertion into the sockets of a receptacle;
said insulator body having a corresponding plurality of recesses, each encompassing the base portion of one of said connector prongs;
and a corresponding plurality of relatively thin, tubular resilient compressible electrical insulator sleeves each encompassing one of said prongs and anchored in one of said insulator body recesses, each such sleeve being compressed into the recess encompassing the base portion of its associated prong whenever said connector plug is plugged into a receptacle so that said one surface of said insulator body engages flush with the external surface of the receptacle.

3. An electrical safety connector plug for use with an electrical receptacle of the kind having a plurality of spaced sockets for receiving electrically conductive connector prongs, said connector plug comprising:
an electrical insulator body;
a corresponding plurality of electrically conductive connector prongs projecting outwardly of one surface of said insulator body and spaced for insertion into the sockets of a receptacle;
said insulator body having a corresponding plurality of recesses in said one surface, each recess encompassing the base portion of each of said connector prongs;
and a corresponding plurality of resilient compressible electrical insulator sleeves, each encompassing one of said prongs and anchored at the base of said prong, each such sleeve being compressed into the recess encompassing the base portion of its associated prong whenever said connector plug is plugged into a receptacle so that said one surface of said insulator body engages flush with the external surface of the receptacle,
said sleeves terminating just short of the tip ends of their associated connector prongs to facilitate insertion of said prongs in said sockets.

4. An electrical safety connector plug for use with an electrical receptacle of the kind having at least two spaced sockets for receiving electrically conductive connector prongs, said connector plug comprising:
an electrical insulator body;
at least two electrically conductive connector prongs projecting outwardly of one surface of said insulator body and spaced for insertion into the sockets of a receptacle;
said insulator body having at least one recess, encompassing the base portion of each of said connector prongs;
and at least two resilient compressible electrical insulator sleeves, equal in number to said connector prongs and each encompassing an individual one of said prongs, each such sleeve being compressed into the recess encompassing the base portion of its associated prong whenever said connector is plugged into a receptacle so that said one surface of said insulator body engages flush with the external surface of the receptacle,
each sleeve comprising a helical compression spring molded into a tubular insulator sleeve.

References Cited by the Examiner

UNITED STATES PATENTS

2,226,148	12/40	Taylor	339—191
3,147,055	9/64	Rubens	339—36

FOREIGN PATENTS

205,626	1/09	Germany.

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