ELECTRIC PLUG RECEPTACLE

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6 Claims. (Cl. 200—51.09)

This invention relates to improvements in electric plug receptacles.

The main object of the present invention is the provision of an electric plug receptacle so designed that it is impossible for a child to receive a shock by inserting a metal object into it.

Another object is the provision of a receptacle having a contact arrangement which ensures a very firm and positive contact with the prongs of a plug which have been inserted into it.

Another object is the provision of a safety electrical receptacle of comparatively simple and inexpensive construction.

The electric plug receptacles now in common use include a pair of slots for receiving the prongs of an electric plug, these prongs engaging contacts in the receptacle in line with the slots thereof to make the desired electric connection. A large percentage of these receptacles are used in homes where they are usually located near the floor. This means that a young child can insert small flat articles into the slots, and if a child does this with a metal article, he receives an electric shock. As is well known, this is very dangerous.

With the present invention, a child may insert a metal object, such as a fingernail file, into a slot of the receptacle without having the chance of receiving a shock. In fact, even if he were to insert metal objects in both slots he would not normally receive a shock.

A plug receptacle according to the present invention includes a body having a pair of spaced parallel slots extending therethrough, a control arm mounted near the inner end of each slot and normally extending angularly across said slot end, a control movably mounted on the body near each slot co-operating with and spaced from the arm near the other slot, non-conducting means connecting each movable contact with its co-operating arm for movement therewith, and a fixed contact near and normally spaced from each movable contact. When the prongs of an electric plug are inserted in and moved through the slots, they engage the control arms and move them to shift the movable contacts into engagement with the fixed contacts.

An example of this invention is illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of a pair of receptacles mounted in a receptacle box.

Figure 2 is an enlarged cross section taken on the line 2—2 of Figure 1, without the electric plug in the receptacle.

Figure 3 is a view similar to Figure 2 showing a plug with its prongs in the receptacle.

Figure 4 is a longitudinal sectional view taken on the line 4—4 of Figure 1.

Figure 5 is a perspective view of the control arm and movable contact assembly shown in Figures 1 to 4, and

Figure 6 is a perspective view of an alternative form of control arm and movable contact assembly which may be used with the receptacle.

While Figures 1 to 4 and Figures 1 and 4 show what is known as a duplex receptacle, which is actually two receptacles side by side, it is to be understood that there may be only one receptacle or several receptacles in a unit. As the two illustrated receptacles are identical, one only will be described in detail.

Referring to Figures 1 to 5 of the drawings, 10 is a receptacle body which may be of any desired shape, but normally is round, as shown. In this duplex receptacle there are two of these bodies arranged side by side and connected by a web 11. The body is formed of a suitable non-conducting material, such as a hard plastic.

The body 10 has outer and inner ends 12 and 13, and a pair of spaced slots 15 and 16 extending through the body from the outer towards the inner end thereof, as clearly shown in Figures 2 and 3. These slots are long enough and spaced the right distance apart to receive the prongs 18 and 19 of a standard electric plug 20. In the illustrated form of the invention, a comparatively large excess 23 is formed in the inner end of the plug body and opens outwardly therefrom.

Contacts 25 and 26 are mounted on the body near the inner ends of the slots 15 and 16, respectively, and normally extend angularly across the adjacent ends of their slots. Movable contacts 30 and 31 are mounted on the body near slots 15 and 16 to co-operate with arms 26 and 25 respectively. For simplicity and ease of manufacture, arm 25 and contact 30 may be formed from a single piece of springy metal bent into a substantially-V-shape, the apex 33 of the V extending around a pin 34 in the body 10. A portion 35 of the body acts as a stop for contact 30. Similarly, arm 26 and contact 31 are formed from a single piece of springy metal bent into a V, the apex 38 of which extends around a pin 39 in the plug body. A portion 40 of said body acts as a stop for arm 31.

Suitable non-conducting means connect the movable contacts 30 and 31 in any suitable manner with their co-operating arms 26 and 25 for movement therewith, in a way of doing being illustrated in the drawings. In this duplex receptacle there are two of these bodies arranged side by side and connected by a web 11. The body is formed of a suitable non-conducting material, such as a hard plastic.

The body 10 has outer and inner ends 12 and 13, and a pair of spaced slots 15 and 16 extending through the body from the outer towards the inner end thereof, as clearly shown in Figures 2 and 3. These slots are long enough and spaced the right distance apart to receive the prongs 18 and 19 of a standard electric plug 20. In the illustrated form of the invention, a comparatively large excess 23 is formed in the inner end of the plug body and opens outwardly therefrom.

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The body 10 has outer and inner ends 12 and 13, and a pair of spaced slots 15 and 16 extending through the body from the outer towards the inner end thereof, as clearly shown in Figures 2 and 3. These slots are long enough and spaced the right distance apart to receive the prongs 18 and 19 of a standard electric plug 20. In the illustrated form of the invention, a comparatively large excess 23 is formed in the inner end of the plug body and opens outwardly therefrom.

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Suitable non-conducting means connect the movable contacts 30 and 31 in any suitable manner with their co-operating arms 26 and 25 for movement therewith, in a way of doing being illustrated in the drawings. A portion 43 of the metal forming contact 30 is bent back on itself and has a lug 44 projecting inwardly therefrom in line with the outer end of control arm 26, said arm end also having a lug 45 thereon. A connector 47 formed of suitable insulating material extends between and is connected at its ends to the aligned lugs 44 and 45. Similarly, the portion 48 of the metal forming movable contact 31 is bent back on itself, and has a lug 50 projecting inwardly therefrom in line with another lug 51 on the inner end of control arm 25. An insulating connector 53 extends between and is secured at its end to aligned lugs 50 and 51.

Fixed contacts 58 and 59 are mounted near and normally spaced from the movable contacts 30 and 31, respectively. In this example, the fixed contacts are mounted on a suitable base 62 formed of insulating material spaced a little from body 10. If desired, the base may be connected to the plug body by straps 65 and 66, preferably formed of insulating material. Contacts 58 and 59 are secured to base 62 and extend towards movable contacts 30 and 31, but the inner ends of the fixed contacts are normally spaced from the adjacent ends of the movable contacts.

With a duplex receptacle, contacts 58 and 59 may be made long enough to serve both receptacles, as clearly shown in Figure 4. The illustrated duplex receptacle is shown mounted in a receptacle box 70 in the customary manner. Connectors 72 and 73 extend outwardly from the plug bodies 10 and are secured to portions of the box by screws 74 and 75. When the device is in use, wires 76 and 79, see Figures 2 and 3, extend inwardly from the receptacle end to connect to contacts 58 and 59 by terminals 80 and 81. Normally movable contacts 30 and 31 are spaced from fixed contacts 58 and 59, as shown in Figure 2. When the prongs 18 and 19 of plugs 20 are inserted in slots 15 and 16, they engage control arms 25 and 26 and cause them to swing about the pins 34 and 39. A portion 43 of lug 35 on arm 25 draws contact 31 into engagement with contact 59. At the same time, movement of arm 26 draws
contact 30 against contact 58. This connects the plug prongs in the electric circuit which includes the fixed contacts. When control arm 25 moves, the metal forming it bends around pin 34 since contact 30 is against stop 35. At the same time, the metal forming contact 31 bends around pin 39. The same thing happens to arm contact 58. Therefore, it takes a reasonable amount of pressure to swing the control arms outwardly away from each other and the movable contacts towards each other.

If the child inserts a metal object in one of the receptacle slots, it will touch the control arm extending across the slot, but this will not result in a shock to the child since the movable contacts are normally out of engagement with the fixed contacts. Even if he is able to press hard enough to swing the arm and contact connected thereto sufficiently to bring the latter into engagement with the fixed contact, the insulating connector prevents him from receiving a shock. If the child inserts metal objects in the two slots, he would have to exert enough pressure to move at least one arm with its movable contact. Thus, with this receptacle, it is almost impossible for a child to be injured by an electrical shock.

The control arm and movable contact assembly of Figures 1 to 4 is clearly shown in Figure 5. It will be noted that a large notch 82 is formed in arm 25, lug 51 and connector 53 in order to permit the portion of the adjacent connector 47 and lug 45 to pass the arm without contact therewith. Similarly, lug 45 is formed with a large notch 84 to permit a portion of arm 25 to pass through without coming into contact with them. If desired, a portion 86 of insulating connector 47 may be folded over the notched edge of lug 45 to be sure that said lug does not touch arm 25 or lug 51.

Figure 6 illustrates an alternative form of control arm and movable contact assembly which may be used in place of the one shown in Figure 5. In this alternative, a control arm 25a and movable contact 30a are formed from a single V-shaped piece of springy metal, while control arm 26a and movable contact 31a are formed from another V-shaped piece of springy metal. When installed in the plug body 10, arm and contact 25a—30a fit around pin 34, and arm and contact 26a—31a fit around pin 39. A non-conducting connector 88 extends between arm 25a and contact 31a and is connected thereto in any convenient manner. This may be done by inserting the bent ends 89 and 90 of the connector under press-out portions 91 and 92 in the arm and contact, respectively. Another non-conducting connector 95 extends between arm 26a and contact 30a and is connected at its opposite ends thereto in the same manner as connector 88 is connected to its arm and contact. A notch 98 may be formed in arm 26a in order to permit connector 88 to pass thereby without contact therewith.

The assembly of Figure 6 functions in the same manner as that of Figure 5.

What I claim as my invention is:

1. In an electric plug receptacle, a body having outer and inner ends, a pair of spaced parallel slots extending through the body from the outer towards the inner end thereof, a conductor control arm mounted on the body near the inner end of each slot and normally extending angularly across said slot end, a contact movably mounted on the body near each slot electrically connected to the movable control arm extending with and spaced from the arm near the other slot, non-conducting means connecting each movable control with its co-operating arm for movement therewith, and a fixed contact near and normally spaced from each movable control, whereby when the prongs of an electric plug are inserted in and moved through the slots they engage the control arms and move them to shift the movable contacts respectively connected thereto into engagement with the fixed adjacent contacts so that each of the control arm touching it with the movable contact electrically connected thereto and the fixed contact engaging the latter form an electrical current path created by the movement of the other control arm.

2. An electric plug receptacle as claimed in claim 1 in which the control arm of each slot and the movable contact near said slot are formed of a single V-shaped piece of springy metal, the free end of said arm being connected to the movable contact of the other slot by the non-conducting means.

3. An electric plug receptacle as claimed in claim 2 in which the free end of each V-shaped piece of metal extends around a pin carried by the receptacle body.

4. In an electric plug receptacle, a body formed of non-conducting material having outer and inner ends, a pair of spaced parallel slots extending through the body from the outer towards the inner end thereof, a conductor control arm mounted on the body near the inner end of each slot and normally extending angularly across said slot end, a contact movably mounted on the body near each slot electrically connected to the arm near said slot and cooperating with and spaced from the arm near the other slot, said arms extending across their respective slots towards each other and the movable contacts extending away from each other, non-conducting means connecting each movable contact with its co-operating arm for movement therewith, and a fixed contact near and normally spaced from each movable contact, whereby when the prongs of an electric plug are inserted in and moved through the slots they engage the control arms and move them to shift the movable contacts respectively connected thereto into engagement with the fixed adjacent contacts so that each arm and the control arm touching it with the movable contact electrically connected thereto and the fixed contact engaging the latter form an electrical current path created by the movement of the other control arm.

5. An electric plug receptacle as claimed in claim 4 in which the non-conducting means are connectors extending from the ends of their control arms to their movable contacts, said connectors being substantially parallel.

6. In an electric plug receptacle, a body formed of non-conducting material having outer and inner ends, a large recess in the inner end of the body opening outwardly therefrom, a pair of spaced parallel slots extending through the body from the outer end, a conductor control arm mounted on the body in the recess thereof near the inner end of each slot and normally extending angularly across said slot end, a contact movably mounted on the body in the recess near each slot electrically connected to the arm near said slot and cooperating with and spaced from the arm near the other slot, said arms extending across their respective slots towards each other and the movable contacts extending away from each other, non-conducting means connecting each movable control with its co-operating arm for movement therewith, and a fixed contact near and normally spaced from each movable control, whereby when the prongs of an electric plug are inserted in and moved through the slots they engage the control arms and move them to shift the movable contacts respectively connected thereto into engagement with the fixed adjacent contacts so that each arm and the control arm touching it with the movable contact electrically connected thereto and the fixed contact engaging the latter form an electrical current path created by the movement of the other control arm.

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