

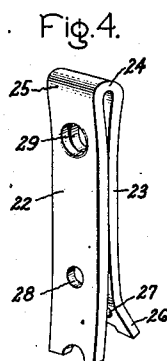
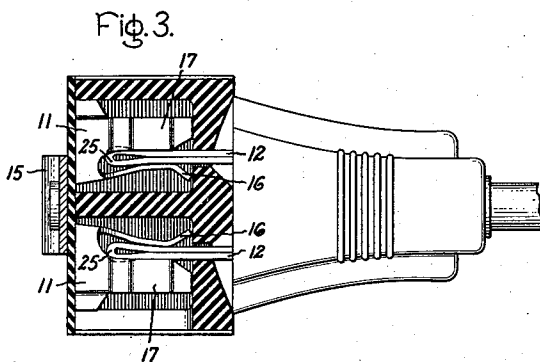
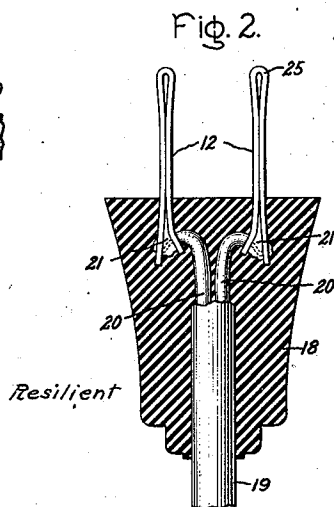
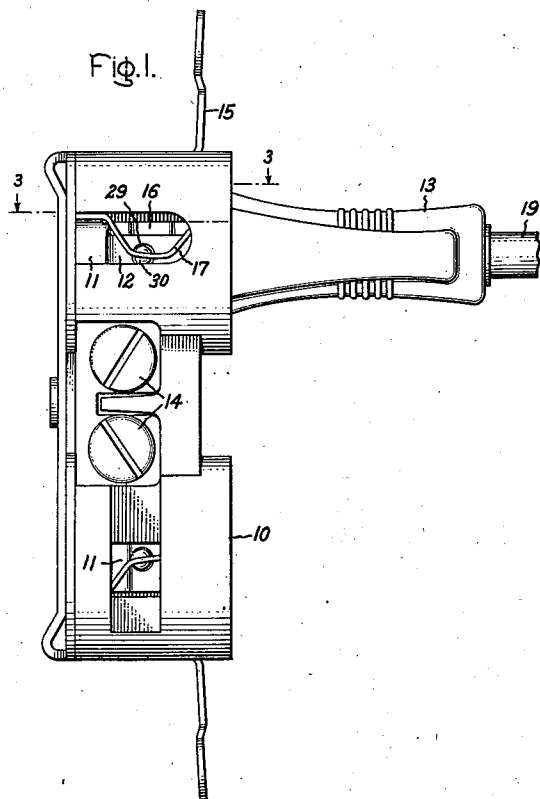
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M. G. HEISER

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ELECTRICAL CONNECTOR

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Inventor:
Myron G. Heiser,
by *Harry E. Dunham*
His Attorney.

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2,284,392

ELECTRICAL CONNECTOR

Myron G. Heiser, Devon, Conn., assignor to General Electric Company, a corporation of New York

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1 Claim. (Cl. 173—361)

My invention relates to electrical connectors and more particularly to plug connectors forming part of a cord set adapted to be plugged into a wall receptacle such as is customarily used in residence wiring systems.

It is an object of my invention to provide an improved form of plug connector or plug cap which is adapted to be inserted into any conventional receptacle or convenience outlet and which is so constructed and arranged that it is held in position in the outlet against inadvertent pulls on the cord so that it cannot accidentally drop out of contact therewith.

Another object of my invention is the provision of an improved form of plug connector provided with latching means which holds it in position in the receptacle.

Still another object of my invention is the provision of an improved plug connector which comprises relatively few parts and which may be easily assembled and manufactured at low cost.

In the accompanying drawing, Fig. 1 is a view of my plug connector mounted in position in a convenience outlet; Fig. 2 is a sectional view through the plug connector; Fig. 3 is a sectional view through the convenience outlet taken along the line 3—3 of Fig. 1; and Fig. 4 is a perspective view of one of the prongs of the connector.

Cord sets used with electrical appliances, such as vacuum cleaners, irons, etc., should be constructed so that the plug connector of the cord set may be readily inserted into a wall receptacle or convenience outlet and held therein against small pulls on the cord incident to normal use of the attached electrical appliance. It frequently happens, however, that such is not the case and that the plug connector is so loosely held by the receptacle that it may be easily disconnected therefrom even by very slight pulls on the cord and in some cases the condition may be so aggravated that the plug cap will simply fall out of the receptacle. In most cases this is due to defective contacts in the wall receptacle caused either by excessive wear or by bending of the contact blades. In order to overcome this defect, numerous attempts have been made to provide either the connector plug or the wall receptacle with locking means to hold them in contacting relationship. For example, in some instances the prongs of the plug connector have been formed as spaced spring members which when inserted into the receptacle are biased together to hold it in position by the action of the spring blades on the receptacle

contacts. In other cases, the contacts of the receptacle have been made of a special type so that they will grip and positively lock the prongs of a conventional plug connector in position. In still other cases, the wall receptacle has been provided with a locking member mounted on the face thereof which is clamped over the plug connector to hold it in position. There are several disadvantages in providing a locking arrangement for positively holding the connector plug in position on the wall receptacle. One disadvantage is that any strong inadvertent pulls on the cord set may damage the connection between the conductor and the plug connector. Another disadvantage is that the contacts of the receptacle may become so distorted or damaged that they cannot make adequate contact with a plug connector of the conventional type.

My invention overcomes the aforementioned deficiencies by providing a plug connector which may be readily inserted in any wall receptacle and of which the contact prongs are firmly held in position in engagement with any of the conventional forms of contact members mounted in such a receptacle. The interlocking action of the receptacle contacts and the plug prongs is such that these members will not become disengaged upon slight pulls on the cord set, such as are incident to normal use of the appliance, but upon a strong pull on the connector, such as is made when it is desired to disconnect the cord set, the plug prongs are readily releasable from the contacts of the wall receptacle. In this manner I provide a connector which is firmly held by the wall receptacle but which at the same time permits the cord set to be removed easily from connection with the receptacle. The connector prongs are so constructed and arranged that they will not distort or damage the contacts of the receptacle even though they give a locking action with the receptacle contacts.

Referring to the drawing, I have shown by way of example a wall receptacle or convenience outlet 10 provided with spaced contact members 11 adapted to cooperate with the spaced contact prongs 12 of a plug connector 13. The receptacle contacts 11 are provided with terminal screws 14 for connection with the conductors of the house wiring system, the receptacle being mounted in the wall box of such a system by a mounting strap 15. Each receptacle contact 11 is formed of sheet metal with two arms, one arm providing a flat bearing surface 16 and the other arm providing a similar bearing member at right angles thereto with its edge 17 coop-

erating with the bearing surface 16 to grip the connector prong of the plug. By forming the opening (not shown) in the face of the receptacle in the form of a T, the contacts described are adapted to receive plug connectors in which the contact prongs are spaced either with their flat sides in parallel or with their edges in alignment. The wall receptacle thus far described is of conventional form and forms no part of the present invention. It is illustrated simply to show the manner in which the prongs of the plug connector cooperate with the receptacle contacts. In some receptacles on the market only a single bearing surface, corresponding to the bearing surface 16 is utilized; in such cases the insulating wall of the receptacle guides the connector prongs into engagement with the receptacle contacts.

Turning now to the details of the plug connector, I have shown a body 18 of insulating material in which the connector prongs 12 are mounted. The body of the plug connector is preferably formed of molded resilient rubber in which the contact prongs are embedded but manifestly other insulating materials might be used, such as a molded plastic, in which case the body would be made in two or more parts assembled together around the contact prongs. An electric cord 19 is molded into the body of the connector, the conductors 20 of which are connected to the contact prongs in any suitable manner, such as by solder 21.

Each of the contact prongs 12 is formed of an elongated strip of relatively thin sheet metal which is bent back upon itself to form two parallel flat extensions or arms 22 and 23 which are in overlying contacting engagement with one another and which together provide sufficient thickness of metal to form the connector prong. In bending the sheet metal, at the point indicated at 24, the material is formed in a small loop which, in effect, bends the ends of the extensions 22 and 23 outwardly to form an enlarged or bulbous portion on the outer end of the connector prong. This enlarged end designated 25 is of a thickness slightly greater than that of the adjacent extensions 22 and 23 and together with the relatively narrow flat portion of the prong forms a means of holding the connector in position on the receptacle. In mounting the plug cap on the receptacle, the prongs are inserted into engagement with the receptacle contacts so that the enlarged ends snap past the bearing surfaces 16 into the spaces behind these surfaces, as shown by Figs. 1 and 3, latching the plug in position.

The loop 24 has an advantage in that there is no danger of fracturing or cracking the sheet metal at the point where it is bent back upon itself such as might be the case if the metal extensions were bent tightly together at the end of the prong. This means that the strength of the connector prong is greatly increased. Another advantage of my construction is that both of the inner ends of the extensions 22 and 23 are disposed within the body of the connector plug so that that portion of the connector prong which extends beyond the body of the plug presents a smooth flat surface for easy withdrawal from engagement with the receptacle contacts. Such would not be the case if one of the arms or extensions 23 were cut off short of the body of the plug connector. When the ends of the extensions are held within the insulating body there

is no danger of the extensions being bent apart to destroy the shape of the prong.

The inner end of the arm 23 is flared outwardly, as shown at 26, and provided with an opening 27 to receive the bared end of the conductor 20 to facilitate soldering to the prong. An opening 28 extends through the lower portion of at least one of the arms 22 and 23 and provides a recess to receive a portion of the molded material forming the body of the plug connector thereby forming a strong anchorage between the connector prongs and the body of the plug. At its outer end the connector prong is provided with an opening 29 which may extend through either one or both of the arms 22 and 23 which is adapted to engage with a projection 30 formed on the bearing surface 16 of the receptacle contact members, as shown by Fig. 1, to assist in holding the contact in position on the receptacle contacts. The opening 29 is placed in the flat portion of the prong at a point spaced inwardly from the enlarged or bulbous end 25 so that as it engages the projection 30 the enlarged end of the prong extends back of the bearing surface 16 to act as a holding means for the plug connector in the manner aforementioned.

My invention provides a plug connector which is extremely simple and which acts to latch itself in any conventional wall receptacle without the necessity of special receptacle contacts. It may be manufactured at relatively low cost inasmuch as the connector prongs are formed merely of sheet metal which is relatively inexpensive. By folding this sheet material back upon itself to form a connector prong of appropriate thickness, the sheet material is given sufficient strength and rigidity to enable it to function satisfactorily as a contact prong. Moreover, by bending the elongated strip of sheet material back upon itself an easy and simple method of forming the enlarged or bulbous end of the connector is provided for. The enlarged end 25 presents a perfectly smooth surface for insertion into the receptacle contact and is of the proper width such that it may readily snap past the bearing surfaces 16 and 17 to lock the prongs in engagement with the receptacle contacts. In this connection it should be noted that only the extreme outer ends 25 of the contact prongs are enlarged, whereas the main portion of the prongs are of standard width. This means that while the enlarged end of the contact prongs may snap past the bearing surfaces 16 and 17 of the receptacle contacts, these surfaces will immediately spring back into engagement with the body of the connector prong and since this body portion is of the same width as that of an ordinary standard prong, the receptacle contacts are not distorted or damaged such as might be the case if the connector prongs were formed of spring arms of increased thickness.

My connector is particularly useful on cord sets which are connected to electrical appliances such as vacuum cleaners, irons, etc., of which the cord set is subjected to slight pulls incident to use of the appliance. In such cases, the interlocking action of the enlarged ends of the connector prongs with the receptacle contacts effectively prevents the plug connector from being accidentally removed from the receptacle. At the same time this interlocking action is not sufficient to prevent easy removal of the plug connector when it is so desired nor is it of such strength to prevent separation of the connector and receptacle when a sufficiently hard pull on

the cord is given which might damage the connection of the electrical conductors with the prong contacts.

What I claim as new and desire to secure by Letters Patent of the United States is:

A plug connector for use with a receptacle having spaced contact members each formed with a bearing surface for making electrical contact with the connector comprising, in combination, a body of insulating material having connector prongs extending outwardly from the body in spaced parallel relationship, each prong comprising a rectangular strip of sheet metal looped back upon itself to form flat, parallel extensions in engagement with one another providing a flat rectangular prong of predetermined thickness for

cooperation with the bearing surface of a receptacle contact, the looped portion of the strip at the outer end of the prong being enlarged to provide a bulbous end of greater thickness than the rectangular portion of the prong for holding the prong in engagement with the receptacle contact, the portions of the strip forming the loop being inflexible so that the looped portion of the prong is snapped past the bearing surface without flexing to bring the flat rectangular portion in seated engagement with the bearing surface, the ends of the extensions opposite the looped portions being located within the body of insulating material.

MYRON G. HEISER.