Nov. 23, 1937. J. J. HARDY, JR 2,100,009

ELECTRICAL CONNECTER

Filed March 8, 1934

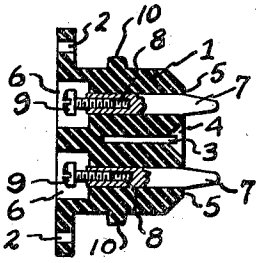


FIG. 1.

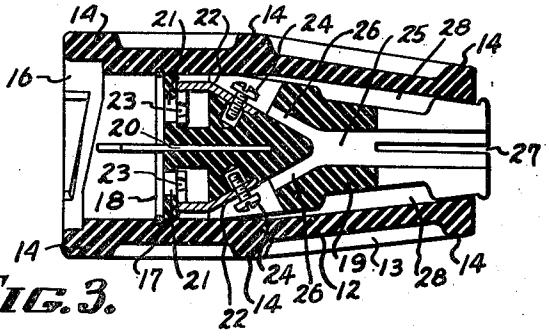


FIG. 3.

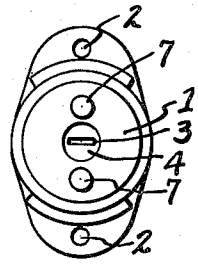


FIG. 2.

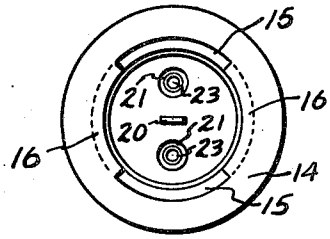


FIG. 4.

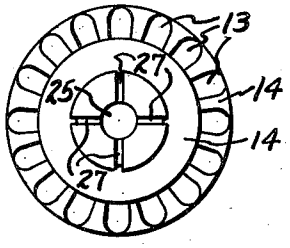


FIG. 5.

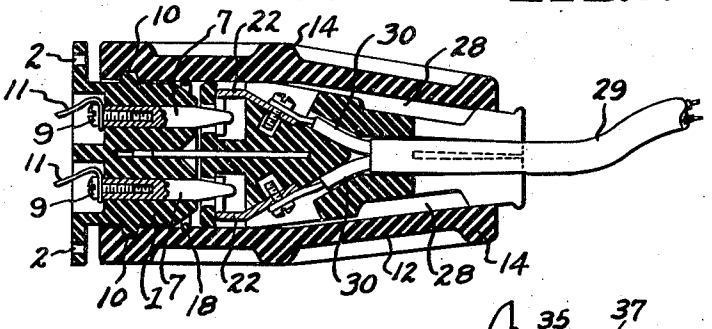


FIG. 6.

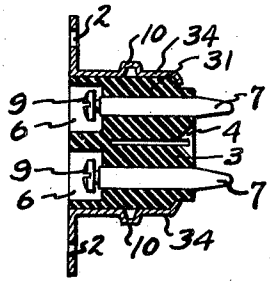


FIG. 8.

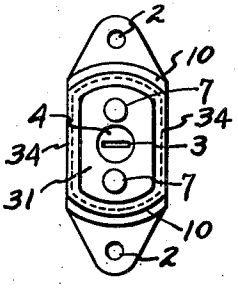


FIG. 9.

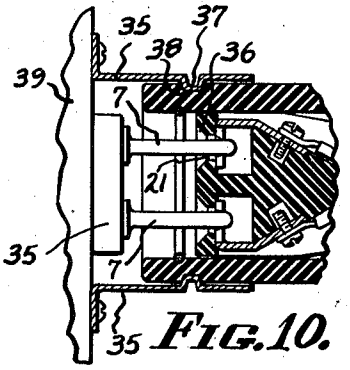


FIG. 10.

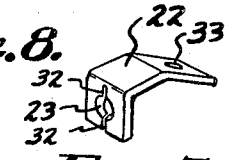


FIG. 7.

INVENTOR.

James J. Hardy Jr.

BY

Allen & Allen

ATTORNEYS.

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2,100,009

ELECTRICAL CONNECTER

James J. Hardy, Jr., Cincinnati, Ohio

Application March 8, 1934, Serial No. 714,643

10 Claims. (Cl. 173—328)

My invention relates to electrical connecters for heavy duty or home use. It is particularly well adapted for use with electric irons, toasters, coffee pots, waffle irons and the like, where according to the everyday experience of housewives, the electric cords have a very short useful life. It is a universal and deplorably bad habit, when removing an electric plug from its socket, to pull on the plug by means of the cord. This sort of usage has the detrimental effect, especially where the plug fits tightly in its socket, of fraying the insulation of the cord where it enters the plug, with resulting bad effects in the way of sparking, electric shocks, and short circuits with their attendant evils of blown fuses. My novel connecter consists of a male and a female member, which may be made of any suitable material, which cannot be disconnected by pulling on the plug or cord, and in which the cord at its point of entrance into the plug, is tightly gripped by the plug itself when the latter is locked in position. Coupled with this is the advantage that my plug may be positively connected or disconnected by simply giving it a quarter turn.

It is an object of my invention, therefore, to provide a connecter of the type described, having a male member and a female member, which may be coupled together by placing the one upon the other, and giving it a quarter turn, and which may be disconnected in like manner but which cannot be disconnected by pulling on the cord.

It is another object of my invention, to provide a connecter as described, which will grip the cord tightly at its point of entrance, when the connecter is coupled, and which will release this grip when the connecter is uncoupled.

Further, it is an object of my invention, to provide a connecter as described, which will be well ventilated, so that, after hours of ironing, it will be possible to remove the connecter manually without burning one's fingers.

It is a further object of my invention, to provide a connecter as described, which, when coupled, will make a very tight connection, thus eliminating arcing, and obviating interference with radio sets in the immediate vicinity.

Still further, it is an object of my invention, to provide a connecter as described, which will be easy to disconnect, in that, when the plug is given the aforementioned quarter turn, the contacts are actually forced from their sockets, so that threafter no force of any kind is required to remove the plug.

Another object of my invention is to provide such a connecter, which can not only be used in forthcoming devices, but which, by a slight modification, may be adapted to electric irons and the like which are now on the market, at very little expense.

Finally, it is an object of my invention to provide a connecter having the above enumerated advantages, which will be neat in appearance, simple of design, low in cost, and highly efficient in use.

These and other objects of my invention which will be pointed out hereinafter or will be apparent to one skilled in the art upon reading the specifications, I accomplish by that certain construction and arrangement of parts, of which I shall now describe a preferred embodiment. Reference is now made to the drawing which forms a part hereof, and in which—

Figure 1 is a sectional view of the male member.

Figure 2 is a plan view of the male member, as viewed from the right in Figure 1.

Figure 3 is a sectional view of the female member.

Figure 4 is an end view of the female member as viewed from the left in Figure 3.

Figure 5 is an end view of the female member as viewed from the right in Figure 3.

Figure 6 is a sectional view showing the male and female members coupled in operative connection.

Figure 7 is a detail view of one of the contacts of the female member.

Figure 8 is a sectional view of another form of male member.

Figure 9 is an end view of the same as viewed from the right in Figure 8.

Figure 10 is a sectional view showing minor changes of the female member necessary in order to adapt it to an existing appliance having a conventional male member.

Briefly in the practice of my invention, I provide a male member 1, which may be made of any suitable non-conductive material. This member is roughly cylindrical in form, and is provided with two ears at its base, drilled as at 2 for fastening purposes. In the center of the top of the member 1 is a slot 3 which is countersunk as at 4. The purpose of this slot will be described later. The cylindrical part of this member has two holes 5, which are counterbored from the rear as at 6. The conductive prongs 7, which form a drive fit within the holes 6, are tapered near their points, and are tapped as at 8 at their other ends to receive the terminal

screws 9. The cylindrical portion of this member 1 is provided with two quarter threads 10, which preferably have a pitch of one half inch, so that the quarter turn will advance the female member about an eighth of an inch. The upper edge of the cylindrical portion of member 1 is chamfered in order to facilitate coupling.

The female member is made from several distinct parts. The part indicated generally at 12 is a hollow shell, having the circumferential ribs 14 and the longitudinal ribs 13, and is roughly the shape of a truncated cone. The wider end of this member has an inside diameter sufficient to fit easily over the male member 1, and is provided with two internal quarter threads 16 to mesh with the threads 10 on the male member 1. The other two quarters of the circumference are of a diameter to permit the passage of the threads 10 without engagement. Near the wide end of this member and within the shell is an annular groove 17, into which the expansion ring 18 fits.

A member 19 also in the form of a truncated cone fits loosely within the member 12, and is inserted from the wide end of the latter before the expansion ring 18 is fitted in place. Fastened in the center of the wide end of the member 19 is a blade 20 having a pointed end, which, when the connecter is coupled, fits within the slot 3 of the male member. On either side of this blade are holes 21 through which the tapered prongs 7 of the male member pass. The female contacts 22, best shown in Figure 7, are drilled and tapered as at 23, the taper of these holes being the same as the taper of the prongs 7. A slot 32 is cut diametrically through these holes, so as to make them resilient in order to more perfectly grip the aforementioned prongs. A hole 33 is provided for the fastening screws 24. The member 19 is provided with appropriate recesses, in alignment with the holes 21, i. e. diametrically opposite, and with tapped holes to accommodate the fastening screws 24. The members 22 are mounted in the member 19 as shown in Figure 3. Conduit passages 26, cast in the member 19, lead from the two aforementioned recesses into a larger conduit 25 which leads to and opens into the small end of the member 19. Two slots 27 are cut at right angles to each other in the small end of this member and intersect the conduit 25. The periphery of the small end of the member 19 is tapered to fit exactly the inside of the small end of the member 12, when the former is forced toward the right as seen in Figure 3. A substantial portion of the length of the member 19 is of reduced diameter, so that when this member is assembled with the member 12, an annular space 28 is left, which serves as ventilating space and as a heat insulator for the member 12, so that the latter may be grasped manually after hours of ironing, without burning one's hand. The electrical connections to the male and female members are very simple, and are adequately illustrated in Figure 6.

The operation of my device is as follows: The female member is placed over the male member in such a way that the threads 10 pass through the spaces 15 without engagement. The blade 20 is of such a length that it contacts the countersink 4 before the threads come into mating position. A turn to the left or right will align the blade 20 with the slot 4, and then by a quarter turn in a clockwise direction, the threads 10 are caused to engage the threads 16 of the female, pulling the female toward the left as seen in Figure 6. Then the threads having come into engagement as above described, when the member 12 is drawn over the member 1, the tapered tips of the prongs 7 are introduced into the tapered holes 23 because they are automatically aligned by the alignment of the blade 20 and the slot 3. When the prongs 7 have so far entered the holes 23 that the fit is tight, further movement of the member 12 to the left causes the member 19 to be moved to the right relative thereto. As this takes place, the small end of the member 19 becomes wedged by the small end of the member 12. By these means, and by reason of the slots 27, the small end of the member 19 is contracted, thus firmly gripping the cord 29.

In uncoupling the connecter, the reverse of the above takes place. The first turning movement causes the member 12 to move toward the right, the member 19 remaining stationary because the prongs 7 are tightly wedged in the holes 23. As soon as the member 19 abuts against the ring 18, the member 19 is thenceforward required to move with the member 12. By these means the prongs 7 are forcefully withdrawn from the holes 23. An additional purpose of the blade 20 and the slot 3, is to relieve the torsional strain on the prongs 7 during the turning of the female member.

Figure 8 shows a male member which is generally very similar to the one shown in Figure 1, except that here the body 31 of the member is made of some brittle material such as porcelain. If the threads 10 were made of porcelain, the life of the plug would be greatly diminished on account of the brittle characteristics of this material. In order to avoid breakage, therefore, the body 31 of the plug is made smooth, i. e. without threads, and the body is encased in a metallic shell 34 having the threads crimped in it. This plug may be of the same shape as the one shown in Figure 1, or it may have flat sides as shown in Figure 9. The latter shape is frequently advantageous where it is desired to place the plug on a narrow base, as in the case of an electric iron. In either case, however, the upper circumference of the shell 34 is crimped inwardly to grip the chamfered upper circumference of the porcelain body. The shell is provided with the same fastening holes 2, and the body 31 and the prongs 7 are otherwise of exactly the same construction as in the plug shown in Figure 1.

Figure 10 shows how my novel plug may be adapted to a toaster, iron, or other electrical appliance 39, which is provided with the conventional prongs 7 mounted in an ordinary base 35. All that is necessary to convert this plug so that it may be used in conjunction with a female member according to my invention, and having all the advantages above described, is to fasten onto the appliance the member or members 35, having the internal quarter threads 37. The threads 37 may be borne by a flanged tube, or, if desired, each quarter thread may be borne individually by a member 35. The only modification necessary in the female member, is that the female quarter threads 15 are cut on the outside of the member 12 instead of on the inside.

It is to be understood that any materials mentioned hereinabove, have only been chosen for purposes of illustration, and are not to be deemed limitations upon my invention, and that different forms of my preferred embodiment may be made without departing from the spirit of my invention, the essentials of which are set forth in the claims that follow.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. An electric connecter comprising male and female members, one of said members having an external segmental thread and the other having an internal segmental thread, one of said members carrying a tapered inner contact carrying member having limited sliding, and free rotational movement within it.

2. In an electric connecter comprising male and female members, the female member being roughly of hollow frustro-conical shape and carrying at its large end an internal segmental thread, the male member carrying an external segmental thread to mate therewith, a contact carrying member of similar shape free to rotate within said female member and limited in its longitudinal motion in the direction of the large end by a retaining ring, and limited in its motion longitudinally in the other direction by the wedging action between the external and internal conical surfaces of the small ends of the members.

3. In an electric connecter comprising male and female members, the female member being roughly of hollow frustro-conical shape, a contact carrying member of similar shape bored longitudinally to provide a conduit for the electrical conductors and having its small end split longitudinally, rotatably carried within said female member, and limited in its longitudinal travel in the direction of its large end by a retaining ring, and limited in its travel in the other direction by the wedging action between the external and internal conical surfaces of the small ends of the members, said wedging action reducing the bore of the conduit at the small end.

4. In an electric connecter comprising male and female members, the female member being roughly of hollow frustro-conical shape, a contact carrying member of similar shape bored longitudinally to provide a conduit for the electrical conductors and having its small end split longitudinally, a substantial portion of its body being of reduced diameter so as to provide ventilating space between the two members, rotatably carried within said female member, and limited in its longitudinal travel in the direction of its large end by a retaining ring, and limited in its travel in the other direction by the wedging action between the external and internal conical surfaces of the small ends of the members, said wedging action reducing the bore of the conduit at the small end.

5. In an electric connecter comprising male and female members, the female member being roughly of hollow frustro-conical shape, a contact carrying member of similar shape bored longitudinally to provide a conduit for the electrical conductors and having its small end split longitudinally, rotatably carried within said female member, and limited in its longitudinal travel in the direction of its large end by a retaining ring, and limited in its travel in the other direction by the wedging action between the external and internal conical surfaces of the small ends of the members, electrical conductors passing through said conduit and connected to said contacts, said wedging action reducing the bore of the conduit at the small end whereby the said conductors are firmly gripped.

6. In an electric connecter comprising male and female members, said male member carrying tapered contact prongs, and said female member carrying contact members mounted in a rotatable member therein, and having split and tapered holes to mate with the said prongs, and mating segmental threads upon said members to force the said prongs into the said holes in coupling, and to extract the said prongs from the said holes in uncoupling.

7. A female member for an electrical connecter, comprising an outer shell roughly of the shape of a truncated cone, a contact carrying member which is also roughly shaped like a truncated cone and which has a limited longitudinal sliding movement within the said shell, contact members having tapered holes for the reception of male contacts mounted on said last mentioned member, a conductor conduit centrally and longitudinally located in said contact carrying member, the small end of the said last mentioned member being slotted so that the slots intersect the said conduit, whereby, as the said female member is forced upon a male member, the said contact carrying member is forced toward the small end of the said shell, reducing the diameter of the said conduit and thus gripping a conductor therein.

8. A female member for an electrical connecter, comprising an outer shell roughly of the shape of a truncated cone, similarly shaped inner contact carrying means having limited longitudinal and free rotational movement within said shell, said inner means having central longitudinal means for carrying and gripping a conductor substantially at its point of exit therefrom, by cooperation with said outer shell.

9. A female member for an electrical connecter, comprising an outer shell roughly of the shape of a truncated cone, similarly shaped inner contact carrying means having limited longitudinal and free rotational movement within said shell, said inner means having central longitudinal means for carrying and gripping a conductor substantially at its point of exit therefrom, by cooperation with said outer shell said female member having means for positively coupling and uncoupling a male member.

10. An electrical appliance having a male member for coupling with a female member according to claim 9, said male member comprising contact prongs, and being surrounded by a cylindrical shell affixed to said appliance, said shell bearing positive coupling means to mate with the coupling means on said female member.

JAMES J. HARDY, JR.