

June 9, 1936.

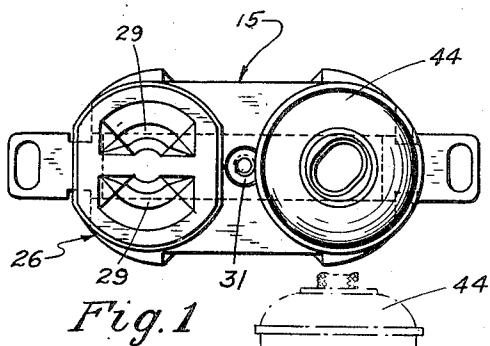
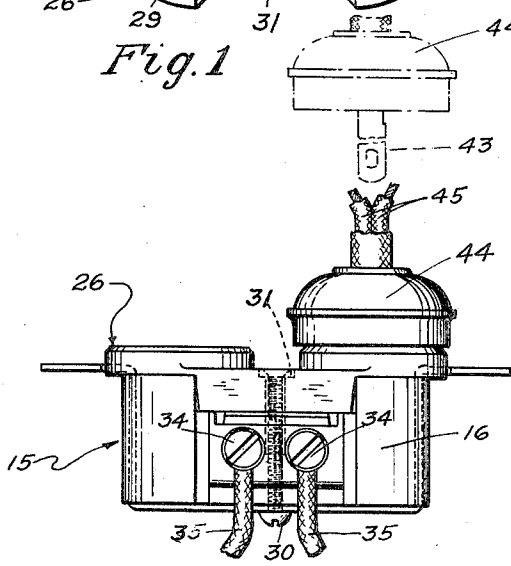
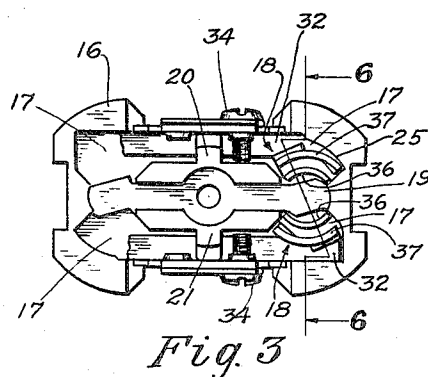
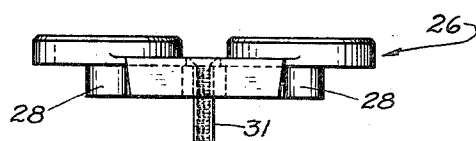
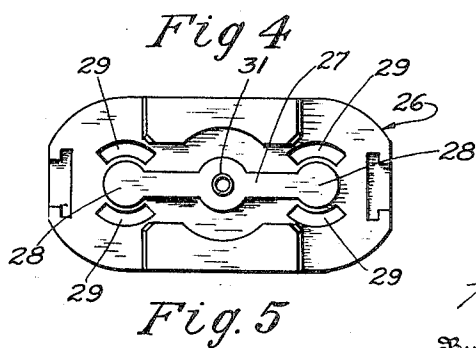
H. HUBBELL, JR

2,043,247

GRIPPING RECEPTACLE

Filed June 15, 1932

2 Sheets-Sheet 1



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GRIPPING RECEPTACLE

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2 Sheets-Sheet 2

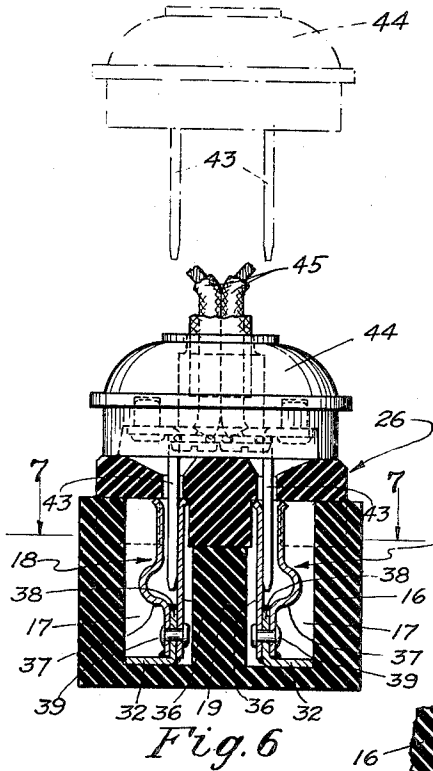


Fig. 6

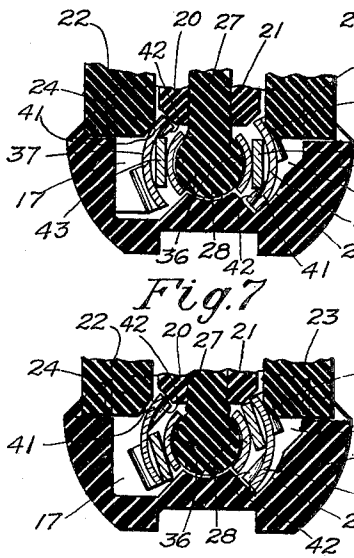


Fig. 7

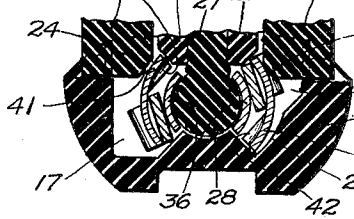


Fig. 8

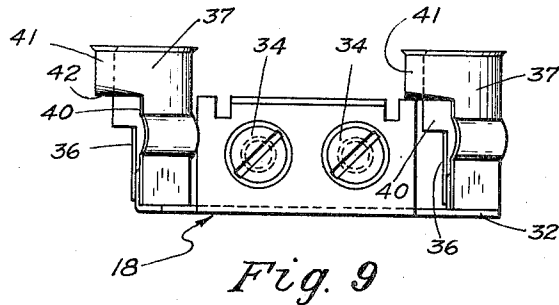


Fig. 9

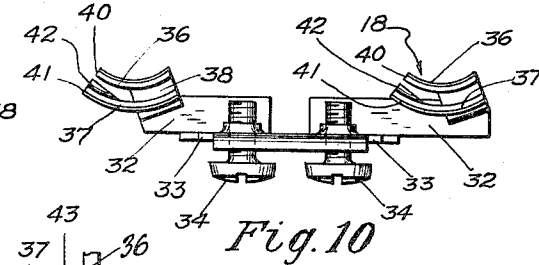


Fig. 10

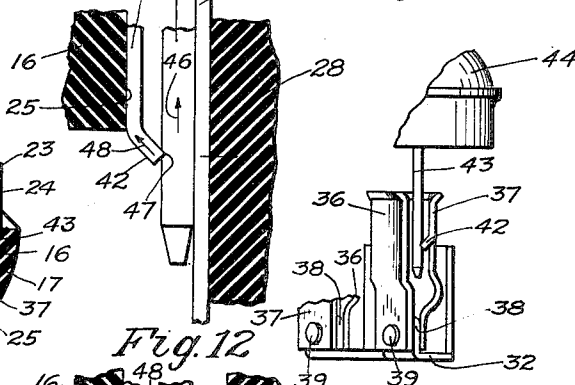


Fig. 11

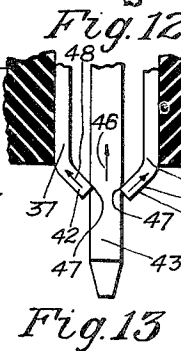


Fig. 12

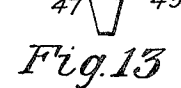


Fig. 13

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2,043,247

GRIPPING RECEPTACLE

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Application June 15, 1932, Serial No. 617,287

10 Claims. (Cl. 173—330)

This invention relates to new and useful improvements in electrical connectors such as are used for connecting the leads of electrical appliances to a source of power, and has for an object to provide an improved connector means adapted to receive any of the known standard contact blades or fingers of an attachment plug cap and engage said fingers in a manner to prevent casual or inadvertent separation of the cap from the connector means.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein a satisfactory embodiment of the invention is shown. However, it will be understood that the invention is not limited to the form or details disclosed, but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a top plan view of a duplex receptacle in accordance with the invention, an attachment plug cap being shown in place thereon;

Fig. 2 is a side elevational view of the device of Fig. 1;

Fig. 3 is a top plan view of the receptacle base, the cover section being omitted;

Fig. 4 is a side elevational view of the cover section of the receptacle;

Fig. 5 is a bottom plan view of the cover;

Fig. 6 is a sectional view on an enlarged scale through the receptacle and cover substantially on the plane of line 6—6 of Fig. 3 and showing a cap in place thereon;

Fig. 7 is a sectional view taken along the line 7—7 of Fig. 6, but showing the parts in locked position;

Fig. 8 is a view somewhat similar to Fig. 7 but showing the parts in unlocked position;

Fig. 9 is a side elevational view on an enlarged scale and showing a contact in accordance with the invention;

Fig. 10 is a top plan view of the contact of Fig. 9;

Fig. 11 is an end view of said contact and showing a contact blade or finger of an attachment plug cap associated therewith;

Fig. 12 is a more or less diagrammatic view on a greatly enlarged scale and illustrating the gripping action taking place between the contact fingers of a cap and the contact fingers of the connector member; and

Fig. 13 is a view somewhat similar to Fig. 12 but illustrating a modification.

In the accompanying drawings and in the following detailed description the invention is illustrated and described as applied to a stationary duplex receptacle. This is merely for the purpose of illustration and as the description proceeds it will become apparent that the invention is equally applicable to single receptacles, to plugs used in flexible connections, to current taps, and the like. Therefore, it will be understood that I do not limit myself to applying the invention to any particular form or type of connector.

Heretofore, electrical connectors including a body member and an attachment plug cap have been provided with means whereby the body and cap might be secured together against accidental separation and with their contacts in engagement. Such structures, however, have always required that the attachment plug cap be provided with a particular construction of contact fingers in order that the locking feature might be used and have not been capable of co-operating with the standard contact blades of an attachment plug cap to lock a cap and body together. According to the present invention an electrical connector, which may take the form of a plug, stationary receptacle, current tap or the like, is provided with means adapted to cooperate with any of the standard contact blades of an attachment cap or the like whereby to prevent accidental separation of said blades from the contacts of the connector or receptacle. Where the term standard cap is used in the specification and claims this is intended to mean a cap having two projecting contact blades parallel to each other of substantially rectangular cross section of substantially uniform width and thickness throughout at least the portions intended to engage the contacts of receptacles and connectors except for a transverse opening through them adjacent their free ends. In other words these are the connector caps having contact blades of the size, shape and arrangement which is standard electrical practice at the present day. The blades are parallel to each other, spaced on approximately one-half inch centers and are approximately one-fourth inch wide and one-sixteenth inch thick with a transverse opening adjacent their free ends.

Referring in detail to the drawings, at 15 is shown a connector in the form of a duplex receptacle and including a body 16 of insulating material provided with recesses 17 for the reception of contacts 18. Since the invention does not particularly relate to duplex receptacles, but one end of the receptacle of Fig. 3 is shown equipped with the contacts 18 although it will be under-

stood that in a completed duplex receptacle both end portions of the receptacle would be equipped with contacts.

The body 16 includes a longitudinally extending rib 19 and projecting upwardly at the sides of the intermediate portion of this rib are extensions 20 and 21 defining a channel at the upper side of the rib. Laterally of the extensions 20 and 21 cover 26 includes side wall portions 22 and 23 forming shoulders 24 for a purpose to be described. Also, the wall of the body defining the outer side of one of the recesses 17 is appreciably thickened to provide a shoulder 25 the purpose of which will later appear.

Body 16 further includes a cover member 26 formed of insulating material and shaped to fit the body and give a finished appearance thereto. This cover 26 is on its underside provided with a longitudinally extending rib 27 adapted to be received in the channel or space at the upper side of the rib 19 which channel or space is as above described defined by the extensions 20 and 21. At its ends the rib 27 of the cover is enlarged or formed with heads 28. Arcuate slots or openings 29 are provided in the cover 26 at opposite sides of the heads 28 and these slots are arranged to align with the recesses 17 in the body when the cover is assembled on the body. Any suitable means may be provided for securing the body and cover together and such means may take the form of a screw 30 passing through the body and threaded into an insert 31 in the cover.

The contact members 18 each include a base or strap member 32 having an upstanding portion 33 to which is connected a binding screw 34 connecting suitable leads 35 with the members. Additionally as here shown each contact member includes inner and outer contact elements 36 and 37 respectively the said contact elements being arranged substantially vertically and at their lower ends being secured by any suitable means, such as rivets for example, to an upstanding portion 38 of the strap or base member 32 as at 39. Additionally the parts may be soldered as shown. It is to be understood that the contact members 18 may be constructed otherwise than as here disclosed. For example, the members may be bent up from a suitable stamping and thus be formed all in one piece eliminating the riveting and soldering operation referred to.

It will be noted that the contact elements 36 and 37 are preferably transversely curved and are substantially concentric. The upper end portions of these contact elements are extended laterally whereby to provide a lateral extension 40 on each of the elements 36 and a lateral extension 41 on each of the elements 37. The lower edge portion of each lateral extension 41 is turned inwardly to provide a substantially wedge shaped portion or flange 42 the purpose of which will later be fully set forth.

By reference to Fig. 8 it will be noted that when the contact members are assembled in the body the lateral extension 41 of one of the outer elements 37 is disposed closely adjacent the shoulder 25 of the body and that the corresponding portion of the other contact member is disposed closely adjacent the shoulder 24 of the side wall portion 22 of the cover. Further it will be observed that the head 28 at one end of the rib 27 of the closure is disposed between the inner elements 36 of the contact members and in engagement with or closely adjacent said elements.

As before explained when the cover 26 is assembled on the body 16 the arcuate slots 29

through the cover are aligned with the recesses 17 in the body. These slots provide openings for the entrance for the contact fingers or blades 43 of an attachment plug cap 44 whereby said fingers may be moved into engagement with the contact members 18 on a relative longitudinal movement between the cap 44 and the connector 15. When the fingers 43 are passed through the slots 29 the said fingers enter between the contact elements 36 and 37 and engage each of them as best shown in Figs. 7 and 8. This engagement with each of the contact elements is insured by the spring action of the receptacle contacts.

It will be understood that the contact fingers or blades of the cap 44 may be of any or the usual standard construction and that these fingers may be brought into and out of engagement with the elements of the contact members by passing said blades through the slots or openings 29 in the cover 26. This is the usual method of connecting the contact fingers of a cap with the contacts of a receptacle, plug or the like and it will therefore be seen that this improved gripping connector may be used if desired in the ordinary way with the ordinary type of cap equipped with the standard contact fingers.

With the usual construction of connector the contact blades of a cap may be accidentally disconnected from the contacts of a receptacle, plug or the like on a pull being placed on the cord to an appliance. The structure of the present device provides means to prevent this casual or accidental separation of the connector 15 and the cap 44, it being but necessary after the fingers have been passed through the slots 29 to impart a relative turning movement between the connector and the cap 44 whereby to shift the contact fingers 43 of the cap from the positions in which they are shown in Fig. 8 to the positions in which they are shown in Fig. 7. This relative rotary movement causes the contact fingers to engage the tapered flanges 42 of the respective outer contact elements and particularly the sharp edges 47 of said flanges. This turning movement may cause these sharp edges to cut slightly into the contact fingers, but at any rate they are pressed tightly against them and if there is strain put on the cap tending to withdraw it from the receptacle the flanges 42 will have a wedging action against the fingers or blades and grip them harder. The greater the pull, the greater will be the gripping action up to a certain point and it may cause the sharp edge to cut deeper into the blade to give a greater holding effect. This is illustrated in Figs. 11 and 12. It will, however, not be sufficient to positively lock the cap contacts against withdrawal from the receptacle, as the gripping action is not sufficient to break the leads or to ordinarily pull them from their binding posts. It is intended to be merely sufficient to prevent accidental pulling of the cap blades from the receptacle under the usual casual strains on the cord, but to yield under unusually heavy strain so as not to break the leads or other elements.

The contact fingers 43 are usually formed of brass and are softer than the bronze contact members 18. As the fingers are rotated on relative turning movement between the cap and the connector the fingers ride on to the flanges 42 and the greater the relative turning movement between the connector and the cap the farther the fingers will ride onto said flanges. The edges of the flanges are thus pressed tightly against the contact blades. By comparison of Figs. 7

and 8 it will be noted that the lateral extensions 41 of the respective outer contacts are backed up by, or their outward movement is limited by supporting shoulders 24 and 25, and additional relative turning movement between the cap and connector results in the edges 47 of the flanges 42 gripping tightly the contact fingers 43, and may cause them to cut slightly into the surfaces of the fingers. Here it is to be noted that the head 28 on the rib 27 of the cover prevents yielding movement of the inner contact elements in directions toward one another or away from their respective outer contact elements and the contact fingers are therefore held firmly against the flanges 42.

After the cap 44 and the connector 15 have been given a relative turning movement as described, any ordinary accidental strain on the cord 45 from the cap will not result in the separation of the cap and connector. The strain will be resisted as diagrammatically illustrated in Fig. 12 wherein the arrow 46 indicates the direction in which such a strain would attempt to move the finger 43. Since the flange 42 of the outer contact element has tightly gripped the finger and its edge may have cut slightly into the finger as suggested at 47 it will be apparent that the finger may not be pulled longitudinally out of the connector by ordinary strains but will be bound or gripped by the flange 42 which will resist pulling out of the fingers and hold them against ordinary strains. The fingers will, however, pull away from the gripping fingers before the pull or strain becomes sufficient to break the leads or pull them away from the binding posts. The force of the pull will act on the flange 42 as suggested by the arrow 46 and it will be noted that this force tends to press the contact element either against the shoulder 25 or the shoulder 24 of the wall 22 as the case may be. In any event, the force of the pull is directly transmitted to a solid portion of the connector. Obviously, the finger or blade 43 may not move away from the flange 42 since the blade is held against movement in such a direction by the inner contact element 36 which in turn is held against movement by the head 28 against which it bears. The contact 43 is thus wedged and bound or gripped between the flange 42 and contact 36 by the pull on the finger 43.

From the foregoing description it will be understood that according to the present invention an attachment plug cap may be used with my improved connector either with or without gripping it. That is, if the connector and cap are connected by a simple relative longitudinal movement they may be separated by a similar movement. However, when they are given a relative rotary movement after being connected by the longitudinal movement the contacts of the connector grip the fingers of the cap and the parts are thus held together. In this condition the cap and connector may not be accidentally separated, but when they are to be separated it is only necessary that they be given a relative rotary movement in the opposite direction which movement will result in the contact fingers being carried out of engagement with the inturned flanges 42 of the contact members. The cap and connector may then be easily separated in the usual manner by a relative longitudinal movement as will be understood. It is pointed out that the contact fingers and the contact members remain in engagement during the relative rotary movements referred to and arcing is there-

by prevented. The backing up members 36 provide an extended contact surface on the receptacle contacts engaging the cap blade contacts 43 to provide good electrical contact, and therefore it is not necessary to rely solely on the relatively limited contact surface of the flanges 42 on the cap blades.

Attention is also directed to the fact that this gripping feature is obtained without a substantial increase in the cost of producing the connectors. The only additional material involved is the lateral extensions on the contact elements 36 and 37 and it is the flanges 42 of the latter that give the gripping effect. The device may be used with the ordinary type of attachment plug cap having the usual straight contact fingers so that no special construction of cap is necessary and the device may therefore be used with the caps at present on the market and yet give the desired gripping effect.

Fig. 13 suggests a slight modification wherein the inner contact elements 36 are provided with inturned flanges 49 corresponding with the inturned tapered flanges 42 of the element 37 whereby a strain tending to separate the cap and connector will be distributed to the two contact elements when the parts are in the gripping position since each element will include a flange which is capable of gripping the contact finger, on the parts, that is, the connector and cap, being given a relative rotary movement. The device suggested in Fig. 13 would involve the same operations as already described in connection with the other figures of the drawing and further description is therefore believed unnecessary.

Having thus set forth the nature of my invention, what I claim is:

1. In an electric connector, an insulating body having recesses therein and arcuate openings leading to said recesses, contact members in said recesses and including arcuate lateral portions substantially concentric with said openings, a standard cap having parallel straight contact fingers insertable through said openings into engagement with the contact members by a relative longitudinal movement between the body and cap, said lateral contact portions comprising gripping means within the body and mounted to grip said contact fingers to resist separation of the cap and body, and said gripping means mounted to become effective after longitudinal movement of the fingers into engagement with the contact members by a lateral shifting of said contact fingers into engagement with the lateral contact portions while continuously in engagement with the contact members.

2. In an electric connector, a body of insulating material having recesses therein and openings leading to said recesses, contact members in said recesses, a standard cap having parallel straight contact fingers insertable through said openings into engagement with the contact members by a relative longitudinal movement of the cap and body, said openings being of sufficient length to permit a lateral sliding movement of said fingers on the contact members by a relative turning movement of the cap and body and while said fingers are in their normal relations to each other, and gripping means on said contact members to grip said contact fingers to resist separation of the cap and body in a direction longitudinally of the fingers and mounted to become effective and ineffective by the relative lateral sliding movement of the contact members and

contact fingers on one another by said relative turning movements of the cap and body.

3. In an electric connector, a body of insulating material, spaced contacts in said body, said body having openings leading to said contacts and providing entrances for the straight parallel contact fingers of a standard cap, said openings in the body elongated to permit of a longitudinal movement of the contact fingers into the body and into engagement with the contacts therein and then a lateral movement relative to said contacts and while in engagement therewith, and at least one of said contacts within the body including means to engage and bite into a finger on said lateral movement and thereby secure the finger against longitudinal movement out of the body upon a strain being placed on the finger.

4. In an electric connector, an insulating body having recesses therein, contact members in said recesses, said body having openings leading to said recesses, a cap including standard parallel straight contact fingers insertable through said openings on relative longitudinal movement between said body and a cap, said contact members each having a laterally extending gripping portion to engage the fingers of the cap on relative turning movement of the cap and body after the fingers and contacts have been brought into engagement by a relative longitudinal movement of the cap and body and while constantly in engagement to grip the fingers and solely by said grip to secure the body and cap against separation by a pull tending to separate them in a direction longitudinally of said fingers.

5. In an electric connector, an insulating body member having recesses therein, contacts in said recesses, said body having openings leading to said recesses for the entrance of the parallel straight contact fingers of a standard cap and of a width to permit lateral movement of the fingers while in the openings, each of said contact members having an intumed portion to bite into a finger of said cap to thereby secure the cap and the body against casual separation and becoming effective by said lateral movement, and said body including portions engaging said contact members and supporting them against movement in a direction away from the fingers of the cap.

6. In an electric connector, an insulating body member having recesses therein, contact members in said recesses, said body having openings leading to said recesses for the entrance of the parallel straight contact fingers of a standard cap on relative longitudinal movement between said body and a cap, each of said contact members including a pair of spaced elements adapted to receive a contact finger of said cap between them and engage its opposite sides, said body including portions to prevent spreading apart of the elements of said contact members, and one of the elements of one of said members including gripping means to engage a contact finger of a standard cap on lateral movement of a contact finger of the cap between the elements of said contact member and thereby secure the body and a cap against accidental separation in a direction longitudinally of the finger.

7. In a device of the character described, an insulating body having recesses, a contact in each of said recesses and each including an arcuate portion, said body provided with arcuate slots leading to said contacts and substantially concentric therewith to permit of longitudinal movement of the fingers of a standard attachment plug cap including parallel straight contact fingers

into said recesses and then permit a lateral movement of said fingers relative to the body while in said recesses, a tapered flange on one of said contacts, said flange angularly disposed relative to said contact and extending crosswise of its recess, and said flange mounted to grip a contact finger of said attachment plug cap while its fingers are in said recesses to secure the body and cap against casual separation and becoming effective on said lateral movement.

8. In an electric connector, an insulating body having recesses therein, an insulating cover for said body and having openings leading to said recesses for the entrance of the parallel straight contact fingers of a standard cap and of a width to permit lateral movement of the fingers while in the openings, a contact member in each of said recesses, each of said contact members comprising a pair of spaced elements, means carried by said cover and disposed between said contact members and supporting one of the elements of each of them in a manner to prevent the supported elements moving away from their companion elements, said body including portions supporting the said companion elements of said members to prevent them moving away from the cover supported elements, each of said contact members having its elements mounted to receive a contact finger of the standard cap between them and engage its opposite sides, and one of said elements of each of said members including a gripping portion to grip a contact finger of the cap and solely by said grip to secure the body and cap against casual separation in a direction longitudinally of the finger, said gripping means being mounted to become effective and ineffective by lateral movements of the fingers.

9. In an electric connector, an insulating body having recesses therein, a contact in each of said recesses and each including an arcuate portion, an insulating cover for said body and having arcuate slots leading to said contacts and substantially concentric therewith to permit of longitudinal movement of the parallel straight contact fingers of a standard cap into said recesses and then permit a lateral movement of said fingers relative to the body while in said recesses, each of said contact members comprising a pair of spaced elements, means carried by said cover and disposed between said contact members and supporting one of the elements of each of them in a manner to prevent the supported elements moving away from their companion elements, said body including portions supporting said companion elements of said members to prevent them moving away from the cover supported elements, each of said contact members having its elements mounted to receive a contact finger of the standard cap between them and engage its opposite sides, and one of said elements of each of said members including a gripping portion to grip a contact finger of the cap on relative turning movement of the cap and body and solely by said grip secure the body and cap against casual separation in a direction longitudinally of the finger.

10. In an electric connector, an insulating body having recesses therein, a contact in each of said recesses and each including an arcuate portion, an insulating cover for said body and having arcuate slots leading to said contacts and substantially concentric therewith to permit of longitudinal movement of the parallel straight contact fingers of a standard cap into said recesses and then permit a lateral movement of said

5 fingers relative to the body while in said recesses, each of said contact members comprising a pair of spaced elements, means carried by said cover and disposed between said contact members and supporting one of the elements of each of them in a manner to prevent the supported elements moving away from their companion elements, said body including portions supporting said companion elements of said members to prevent them moving away from the cover supported elements, each of said contact members having its elements mounted to receive a contact finger of the standard cap between them and engage its opposite sides, a tapered flange on one of the elements of one of said contact members, said flange angularly disposed relative to the elements of said member and extending crosswise of its recess, 5 and said flange mounted to grip a contact finger of said cap on relative turning movement of the cap and body while said fingers are in said recesses to secure the cap and body against casual separation in a direction longitudinally of the fingers. 10

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