May 12, 1936. C. T. VON HOLTZ 2,040,113

RECEPTACLE FOR ATTACHMENT PLUG CAPS

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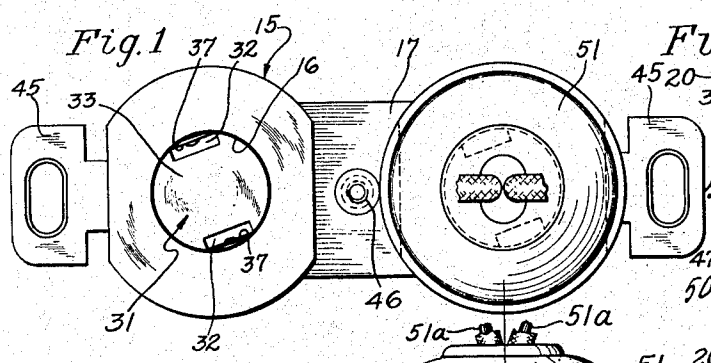

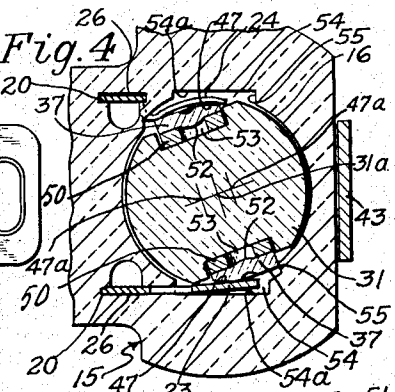

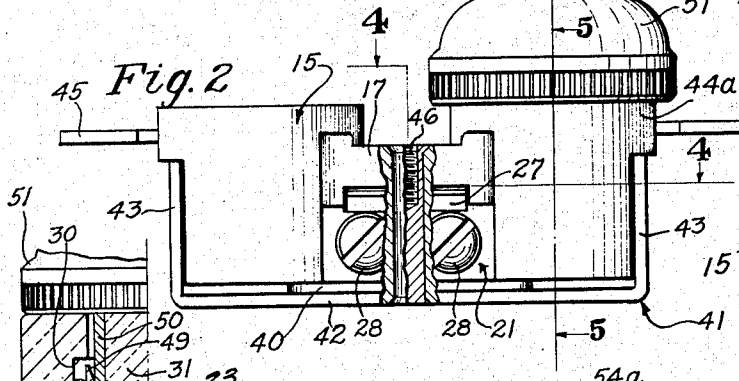

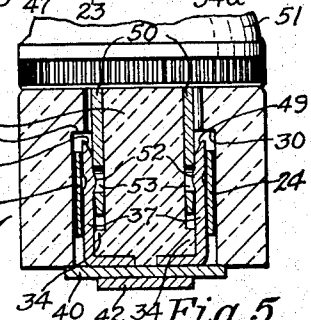

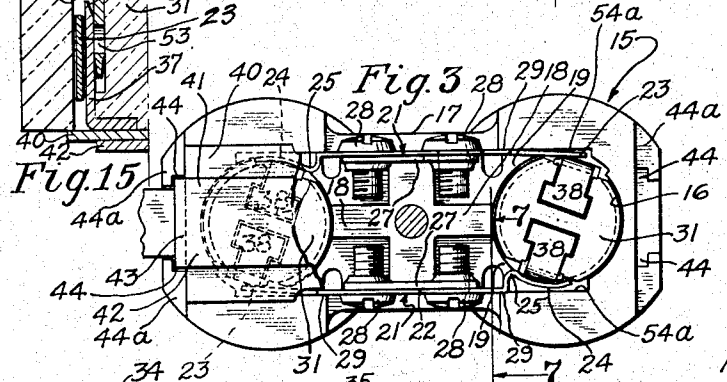

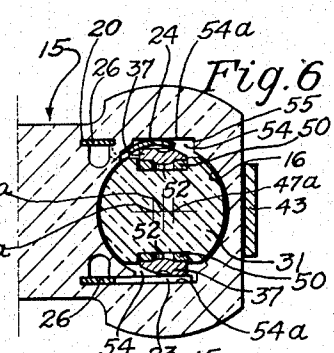

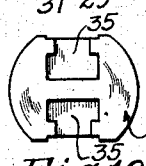

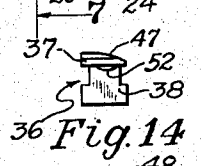

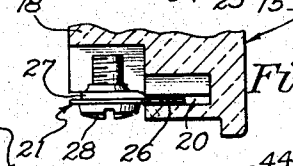

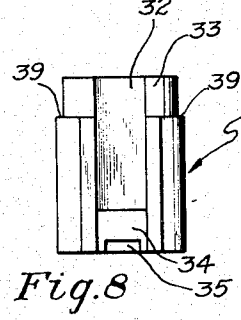

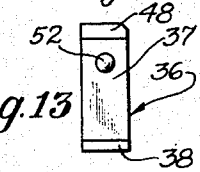

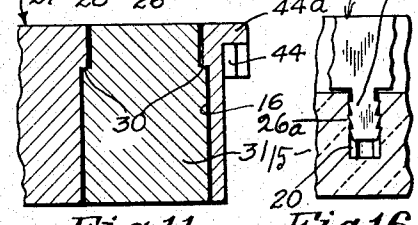

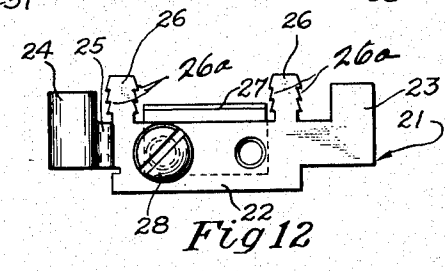

INVENTOR
Charles Theodore Von Holtz
BY
Foster & Davis
ATTORNEYS

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2,040,113

RECEPTACLE FOR ATTACHMENT PLUG CAPS

Charles Theodore Von Holtz, Bridgeport, Conn., assignor to Harvey Hubbell, Incorporated, Bridgeport, Conn., a corporation of Connecticut

Application November 25, 1933, Serial No. 699,765

17 Claims. (Cl. 173—330)

This invention relates to new and useful improvements in receptacles for attachment plug caps, and has for an object to provide a receptacle adapted to receive the blades of a standard attachment plug cap and to co-operate with said blades in the usual manner to close the circuit as soon as the blades are inserted in the receptacle, and including means whereby on the blades of a cap being inserted into the receptacle and the cap being given a partial turn the blades of the cap are clamped or locked to prevent casual withdrawal of the cap from the receptacle, and the cap is so secured with the blades in engagement with the contacts of the receptacle.

Another object is to provide a receptacle as stated and wherein a good electrical connection is maintained between the contacts of the receptacle and the contact blades of the attachment plug cap during such turning movement of the cap to prevent arcing and burning of the contacts.

Another object is to provide a receptacle including improved contacts and improved mounting means for such contacts.

An additional object is to provide a receptacle as stated and wherein on the blades of a cap being inserted into the receptacle and the cap given a partial turn means is forced against the blades of the cap to frictionally secure the cap against casual separation from the receptacle.

Yet another object is to provide a receptacle of the type indicated and wherein on the blades of a cap being inserted into the receptacle and the cap given a partial turn means is forced into the usual openings in the contact blades of the cap to secure the cap and receptacle together against casual separation.

The device comprises broadly providing a receptacle including a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and the plug the contact blades of a cap are to be received, said plug adapted to be turned by a cap having its blades received as stated, and means whereby as said plug is turned in one direction said contact members are forced against the blades of the cap to secure the cap and receptacle together against casual separation.

More specifically, the device comprises a receptacle including a body of insulating material, a plug in said body, a pair of contact members of which one is carried by said plug and the other by said body, said plug carried contact and plug adapted to receive a contact blade of a cap between them, said plug turnable in said body, one of said body and plug carried contacts including a cam surface, and said plug when the blades of a cap are in said body adapted to be turned relative to said body to cause the said cam face of one of said contact members to engage the other contact member and force the body carried contact against a wall of a body and force the plug carried contact against the cap blade received between it and the plug whereby to secure the cap against casual separation from the plug.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawing wherein a satisfactory embodiment of the invention is shown. However, it will be understood that the invention is not limited to the 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 drawing:

Fig. 1 is a top plan view showing a duplex receptacle constructed according to the present invention;

Fig. 2 is a side elevational view thereof, parts being broken away;

Fig. 3 is a bottom plan view thereof, parts being broken away;

Fig. 4 is a sectional view on a somewhat larger scale taken substantially along the line 4—4 of Fig. 2;

Fig. 5 is a sectional view on the same scale as Fig. 4 taken substantially along the line 5—5 of Fig. 2 and showing the body of the cap in elevation;

Fig. 6 is a view somewhat similar to Fig. 4 but showing the positions of the parts when a cap is secured or locked to the receptacle;

Fig. 7 is a detail section view taken substantially along the line 7—7 of Fig. 3;

Fig. 8 is a side elevational view of a plug forming part of the receptacle;

Fig. 9 is a top plan view of said plug;

Fig. 10 is a bottom plan view thereof;

Fig. 11 is a sectional view through a portion of the receptacle, the plug and contacts being omitted;

Fig. 12 is a side elevational view of a body carried contact member of the receptacle with one binding screw omitted;

Fig. 13 is a side elevational view of a plug carried contact member of the receptacle;

Fig. 14 is a top plan view of the contact of Fig. 13;

Fig. 15 is a section similar to one-half of Fig. 5 showing a slight modification; and

Fig. 16 is a detail section showing means for holding the contacts in the body.

In the accompanying drawing the invention is shown as applied to a duplex receptacle although as the description proceeds it will become evident that the invention is equally applicable to a single receptacle and to receptacles of various sizes and shapes. Referring in detail to the drawing, the

improved receptacle includes a body 15 of insulating material having a pair of spaced openings 16 therethrough, the said openings being duplicates of one another and both being provided since the body is that of a duplex receptacle.

The openings 16 are provided through enlarged end portions of the body and such end portions are connected by an intermediate or bridge portion 17 which at its lower side carries a portion 18 somewhat in the shape of a cross (see Fig. 3) and providing side entrances 19 to the openings 16. Adjacent each of said side entrances the bridge or connecting piece at its under side is provided with recesses 20 the purpose of which will later appear.

Similar contact members 21, one of which is shown alone in Fig. 12, one binding screw being omitted, are employed and each includes a body portion 22 and end contact portions 23 and 24 respectively, the former being bent slightly inwardly out of the plane of the body portion 22 and the latter being transversely curved and connected to the body portion by an inwardly offset portion 25. Inwardly of its end portions 23 and 24 the body of each contact member 21 carries a pair of finger portions 26 at one side of the body and the edges of these finger portions are provided with teeth 26a. Between the finger portions there is arranged a metal plate 27 having tapped openings therein through which are threaded the shanks of binding screws 28.

The contact members 21 are duplicates of one another and are of such length that while one of their end portions is disposed in one opening 16 their other end portion is disposed in the other opening 16. Members 21 are mounted by inserting their finger portions 26 into the slots or recesses 20 above referred to and their end contact portions are then disposed in the respective opening 16 in relation to the walls of such openings as clearly shown in Figs. 3 and 4. The fingers 26 of the contact members are slightly wider than the recesses 20 so that as the fingers are forced into the recesses the ends of the teeth 26a dig into the material of the body 15 as shown in Fig. 16 and effectively lock or secure the contacts against withdrawal from the recesses. The contact members adjacent said fingers, engage the walls of the body 15, as at the points 29, with the end contact portions 23 and 24 of the members in spaced relation to said walls of the body whereby said end contact portions may be flexed as will later appear. It will be noted the two contacts 21 are reversed with respect to each other so that the end portion 23 of one contact is at one side of an opening 16 and the portion 24 of the other contact is at the opposite side of the same opening 16.

Openings 16 are of greater diameter at their inner than at their forward or front ends whereby a limiting shoulder 30 is formed within each opening inwardly of its forward end. Arranged in each opening 16 is a plug 31 of insulating material and each plug comprises an elongated body of a diameter in one direction substantially equal to the diameter of the opening 16, the said body being flattened on its outer sides measured across its other diameter. In these flattened sides the plugs are provided with grooves 32 opening through the outer or forward end 33 of the plugs. Adjacent the inner ends of the plug a bridge piece 34 is provided across each of the grooves and in its inner end each plug is provided with a pair of T-shaped depressions 35 extending through the flattened sides of the plug.

Each plug 31 carries a pair of contact members 36 each including an arm or prong 37 and an angularly related T-shaped arm or head 38. These contact members 36 are disposed one at each side of the plug with their heads 38 arranged in the depressions 35 in the inner end of the plug and with their arms 37 arranged over the grooves or slots 32 in the sides of the plug. The contacts are capable of a slight rocking movement owing to their engagement with the bridge pieces 34 whereby the free end portions of the arms 37 of the contacts may be tilted into and out of the grooves 32. Plug 31 is of two diameters whereby it includes a shoulder 39 to engage with the shoulder 30 before referred to.

As above stated, the openings 16 extend entirely through the body 15 of the receptacle and in assembling the receptacle the contact members 21 are pushed into place as above explained. Next, the plugs 31 with the contact members 36 assembled on them are inserted into the openings 16 in the positions as best shown in Figs. 3 and 4 with the arms 37 of the contact members 36 engaging the contact portions 23 and 24 of a pair of the contact members 21. When the plugs are inserted the proper distance into the opening 16 the shoulders 39 of the plugs will engage the shoulders 30 in the opening and movement of the plugs outwardly through the front or forward end of the receptacle will be prevented.

A sheet or strip 40 of insulating material is disposed over the inner end of the receptacle and then a mounting strap 41 of any or the usual construction is applied. This strap 41 is substantially U-shaped and includes a connecting portion 42 disposed against the outer surface of the strip 40 and includes arms 43 disposed one at each side or end of the receptacle and entering into recesses 44 provided for their reception in the lower walls of the overhanging portions 44a of the body 15. These recesses lock the end portions of the yoke or strap 42 against movement outwardly away from the body 15. The end portions of these arms are turned outwardly to provide attaching ears 45 by means of which the receptacle may be mounted in an outlet box. The intermediate portion 42 of the mounting strap 41 carries a rivet 46 extending through the body 15 and at its upper or outer end threaded as at 46 for the reception of the shank of a screw used to secure in place a flush or wall face plate (not shown).

It will be noted that on its outer surface beginning at one longitudinal edge each of the arms 37 of the contact members 36 are curved or beveled to provide a cam surface 47 and that the free end of each of said arms is tapered or cut away on its inner side as at 49. The cam surface 47 may be an arc struck from a center 47a offset to one side of the center on axis 31a of the plug 31. When the parts are all assembled the contact blades 50 of an attachment plug cap 51 may be inserted through the outer open ends of the grooves 32, the said blades occupying the grooves and forcing the arms 37 of contact members 36 outwardly with respect to the grooves. The outer or forward ends of the plugs 31 are arranged flush or substantially flush with the outer or forward surface of the enlarged portions of the body 15.

Since the ends of the arms 37 are beveled as at 49 it is apparent that the contact blades 50 may be easily inserted into the grooves 32 between the plug and the said arms 37. Lead wires of the house wiring system are attached to a

pair of the binding screws 28 at opposite sides of the body 15 and the other pair of binding screws may be connected by means of leads with another receptacle or the like. The contact members 36 through their arms 37 are always in engagement with the contact portions 23 and 24 of the contact member 21 and therefore when the blades 50 are inserted into the grooves 32 they engage live contacts. This engagement results from the fact that the contact portions 23 and 24 are resilient and normally tend to move inwardly to press against the arms 37 and so serve to press said arms 37 against the contact blades 50. The blades of the cap may normally be inserted and removed in the usual manner when the plug 31 is in the position of Figs. 1, 3, and 4, as in this position the spring contact portions 23 and 24 are spaced inwardly a short distance from the walls 54a of the body 15 so that they and the contacts 36 are free to yield outwardly as the blades 50 are inserted between the contacts 36 and the bottoms of the grooves 32.

When the contact blades 50 have been inserted into the receptacle as above described the cap 51 may be secured to the receptacle if desired. To accomplish this it is but necessary to give the cap a slight rotary movement to the right or clockwise as viewed in Fig. 4 or to the left or counter clockwise as viewed in Fig. 3, and such movement will shift the plug and contact members carried by it from the positions in which they are shown in Figs. 3 and 4 to that in which they are shown in Fig. 6. In Figs. 3 and 4 it will be noted that the contact portions 23 and 24 of contact members 21 are spaced from the adjacent walls 54a of the opening 16 and it will be noted that such contact portions are in engagement with the inclined or cam surfaces 47 of the contact members 36.

On turning of the plug 31 its contact members 36 are shifted and their cam surfaces ride against the end portions 23 and 24 of contact members 21 and force such portions against the adjacent walls 54a of the opening 16 in the manner clearly shown in Fig. 6. The arms 37 of the contact members 36 are thus forced or clamped against the inserted contact blades 50 and if desired each of these arms may be provided with an inwardly pressed lug 52 which when the parts are shifted into the positions in which they are shown in Fig. 6, will extend into the usual openings 53 provided in the contact blades.

Since the contact end portions 23 and 24 may not yield outwardly any farther the arms 37 of the contact members 36 are held in firm engagement with the contact blades 50 and the lugs 52 are held in the openings 53 in such blades. Therefore, the blades may not be easily pulled out of the receptacle and the receptacle and cap are held or locked against casual separation. On the cap being given a turning movement in a reverse direction the parts are returned to normal position and the cap may be removed and applied in the usual manner. Within the body the opening 16 at opposite sides is cut laterally to provide recesses 54 receiving the different contact members.

If it is not desired that the blades 50 be locked in the receptacle but merely be held by increased friction then the lugs 52 may be omitted from the contacts 36 as shown in Fig. 15. With this arrangement the contacts are clamped when the plug 31 is turned to the position of Fig. 6 but are not positively locked. That is, they are clamped and held by increased friction so that they are much more firmly held and it is more difficult to withdraw them from the receptacle than normally, but if there is an excessive pull on the lead wires 51a connected to the cap then the blades 50 may be pulled from the receptacle without breaking the leads or other parts.

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 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. These 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.

From the foregoing description it will be appreciated that the improved receptacle is adapted for use in the usual manner with the usual or standard attachment plug cap. If desired, the cap may be inserted and removed without locking or securing the cap to the receptacle and therefore the device used in the usual manner, and if desired, by a slight turning movement of the cap after it is applied it may be secured to the receptacle against casual separation. Just as soon as the blades of the cap engage the arms 37 of the contact members 36 an electrical connection is established and this connection is unbroken during further insertion of the blades into the receptacle and is not broken by a turning of the cap so as to lock or secure it to the receptacle or by a turning movement to unlock the cap. Therefore, there will be no arcing within the receptacle such as would occur should the electrical connection with the contact blades be made or broken during turning movement of the cap to locking or released position.

It will also be noted that the device includes only relatively few parts each of which may be strongly constructed and that the contact members 21 and 36 may be easily and quickly assembled in the body and on the plug respectively and the plug may be easily assembled in the body. The plug is held against movement through the forward end of the body by engagement of its shoulders 39 with the shoulders 30 within the opening 16 and the insulating strip 40 together with the strap 41 serve to prevent movement of the plugs and the contact members carried by them through the rear end of the body. To lock or secure the cap to the body the cap is turned until the contacts bind against one another. If desired, a coil spring may be wound about a post on the body and have one of its ends secured to each of said plugs 31 or some other suitable means may be provided to automatically retain them in normal position when the cap blades are removed therefrom.

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

1. In a receptacle, a body of insulating material, contacts in said body to be engaged by the straight parallel contact blades of a standard attachment plug cap, and means whereby on the blades of a standard cap being inserted into said receptacle in their normal parallel relation and said cap given a partial turn without moving the

blades from their normal positions, means is forced against one of the blades of the cap to frictionally secure the cap to the receptacle.

2. In a receptacle, a body of insulating material, contacts in said body to be engaged by the straight parallel contact blades of a standard attachment plug cap having openings therein, and means whereby on the blades of a standard cap being inserted into said receptacle in their normal parallel relation and said cap given a partial turn without moving the blades from their normal positions means is forced into the opening in one of the blades of the cap to secure the cap to the receptacle.

3. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and said plug the blades of an attachment plug cap are adapted to be received with said blades in engagement with said contact members, said plug adapted to be turned by the turning of a cap having its blades in the receptacle as stated, and means whereby as said plug is turned in one direction its contact members are forced against the blades of the cap to secure the cap and receptacle together.

4. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and said plug the blades of an attachment plug cap are to be received with said blades in engagement with said contact members, a lug on one of said contact members, said plug adapted to be turned by the turning of a cap having its blades received in said receptacle as stated, and means whereby as said plug is turned the lug carrying contact member is held against movement away from the cap contact blade with which it is in engagement and said lug is held in an opening in said blade to secure the cap and receptacle together against casual separation.

5. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and said plug the blades of an attachment plug cap are to be received with said blades in engagement with said contact members, a pair of contact members in said body and in engagement with said contact members carried by the plug, one of said pairs of contact members having cam surfaces, said plug adapted to be turned in said body by turning of a cap having its contact blades received as stated, and said cam surfaces of one of said pairs of contact members adapted to coact with the other pair of contact members on the turning of said plug whereby to force the plug carried contact members into tight frictional engagement with the contact blades of the cap.

6. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and said plug the blades of an attachment plug cap are adapted to be received with said blades in engagement with the contact members, a lug on one of said contact members, a pair of contact members in said body and in engagement with said contact members carried by the plug, one of said pair of contact members having cam surfaces, said plug adapted to be turned in said body by turning of a cap having its contact blades received as stated, and said cam surfaces of one of said pair of contact members adapted to coact with the other pair of contact members on the turning of said plug whereby to force the plug carried contact members against the contact blades of the cap with the said lug on one of the plug carried contact members located in an opening in one of the contact blades of the cap.

7. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, a pair of contact members carried by said plug and between which and said plug the blades of an attachment plug cap are to be received with said blades in engagement with said contact members, said plug adapted to be turned by the turning of a cap having its blades in the receptacle as stated and while said contact blades are in engagement with said contact members, and means whereby as said plug is turned in one direction its contact members are forced against the blades of the cap to secure the cap and receptacle together.

8. A receptacle including a body of insulating material, a plug of insulating material in said body, a pair of engaging contact members of which one is carried by said plug and the other by said body, said plug and contact member carried thereby adapted to receive a contact blade of an attachment plug cap between them with the blade and contact member in engagement, said plug turnable in said body, one of said body and plug carried contact members including a cam surface, and said plug when a cap is plugged into the body and turned adapted to turn with said cap and cause the cam face of one of said contact members to ride against the other thereof and force the body carried contact member against a wall of the body and force the plug carried contact member against the cap blade received between it and the plug whereby to secure the cap and receptacle together against casual separation.

9. A receptacle including a body of insulating material, a plug of insulating material in said body, a pair of contact members carried by said body, a pair of contact members carried by said plug and engaging the contact members of the body, said plug and contact members carried thereby adapted to receive the contact blades of an attachment plug cap between them with the blades and contact members in engagement, said plug turnable in said body without disengaging any of said contacts, one of said pairs of contacts including cam surfaces, and said plug when a cap is plugged into the body and turned adapted to turn with said cap and cause the cam faces of one of said pairs of contact members to ride against the other contact members and thereby force the body carried contact members against walls of the body and force the plug carried contact members against the cap blades whereby to secure the cap and receptacle together against casual separation.

10. A receptacle including a body of insulating material, a plug of insulating material in said body, a pair of spring contact members carried by said body, a pair of contact members carried by said plug and engaging the contact members of the body, said plug and contact members carried thereby adapted to receive the contact blades of an attachment plug cap between them with the blades and contact members in engagement, said plug turnable in said body without disengaging any of said contacts, one of said pairs of contacts including cam surfaces, and

said plug when a cap is plugged into the body and turned adapted to turn with said cap and cause the cam faces of one of said pairs of contact members to ride against the other contact members and thereby force the spring body carried contact members against the wall of the body and force the plug carried contact members against the cap blades whereby to secure the cap and receptacle together against casual separation.

11. A receptacle including a body of insulating material, a plug of insulating material in said body, a pair of engaging contact members of which one is carried by said plug and the other by said body, said plug and contact member carried thereby adapted to receive a contact blade of an attachment plug cap between them with the blade and contact member in engagement, said plug turnable in said body, said plug carried contact member including a lug, one of said body and plug carried contact members including a cam surface, and said plug when a cap is plugged into the body and turned adapted to turn with said cap and cause the cam face of one of said contact members to ride against the other thereof and force the body carried contact member against a wall of the body and hold the plug carried member against movement away plug carried contact member against movement away from the cap blade with the lug of said member in an opening in said blade whereby to secure the cap and receptacle together against casual separation.

12. In a receptacle, a body of insulating material, said body having an opening therethrough of two diameters whereby a shoulder is formed, a pair of contact members carried by said body and entering said opening, a plug of insulating material in said opening and having a shoulder engaging the first mentioned shoulder, means across one end of said body and maintaining the shoulder of the plug in engagement with the shoulder of the body whereby the plug may not be casually withdrawn from the body, said plug rotatable in said opening, a pair of contact members carried by said plug and engaging the body carried contact members, said plug carried contact members and said plug adapted to receive the contact blades of a cap between them, and means whereby on turning of said plug while the blades of a cap are so received the body and plug carried contact members wedge against one another and the plug carried contact members are forced against the contact blades of the cap to secure the cap and receptacle together against casual separation.

13. In a receptacle, a body of insulating material, said body having an opening therethrough of two diameters whereby a shoulder is formed, a pair of contact members carried by said body and entering said opening, a plug of insulating material in said opening and having a shoulder engaging the first mentioned shoulder, means across one end of said body and maintaining the shoulder of the plug in engagement with the shoulder of the body whereby the plug may not be casually withdrawn from the body, said plug rotatable in said opening, a pair of contact members carried by said plug and engaging the body carried contact members, said plug carried contact members and said plug adapted to receive the contact blades of a cap between them, and means whereby on turning of said plug while the blades of a cap are so received the plug carried contact members are forced against the contact blades of the cap to secure the cap and receptacle together against casual separation.

14. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, said plug having a pair of grooves in its outer side walls and a pair of T-shaped depressions in its lower end wall communicating with said grooves, contact members carried by said plug, each of said contact members including a portion over-lying one of said grooves and an angularly disposed T-shaped end portion disposed in one of said T-shaped recesses, said plug adapted to have the blades of an attachment plug cap inserted into said grooves beneath and in engagement with said contact members, a pair of contact members in said body and in engagement with said plug carried contact members, said plug adapted to be turned in said body by turning of a cap having its blades received in said grooves, and means whereby as said plug is thus turned the plug carried contacts are forced against the blades of the attachment plug cap to secure the cap and receptacle together against casual separation.

15. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body, said plug having a pair of grooves in its outer side walls, contact members carried by said plug, each of said contact members including a portion over-lying one of said grooves, said plug adapted to have the blades of an attachment plug cap inserted into said grooves beneath and in engagement with said contact members, a pair of contact members in said body and in engagement with said plug carried contact members, said plug adapted to be turned in said body by turning of a cap having its blades received in said grooves, and means whereby as said plug is turned the plug carried contacts are forced against the blades of the attachment plug cap to secure the cap and receptacle together against casual separation.

16. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body and having a pair of spaced openings to receive the blades of an attachment plug cap, a pair of contacts carried by said plug, said plug adapted to be turned relative to the body by the turning of a cap having its blades in said openings, and means whereby as said plug is turned in one direction its contacts are forced against the blades of the cap to secure the cap and receptacle together.

17. In a receptacle, a body of insulating material, a plug of insulating material in and turnable relative to said body and having a pair of spaced openings to receive the blades of an attachment plug cap, a pair of contacts carried by said plug, a lug on one of said contacts, said plug adapted to be turned relative to the body by the turning of a cap having its blades in said openings, and means whereby as said plug is turned in one direction its contacts are forced against the blades of the cap and said lug is held in an opening in one of the blades to secure the cap and receptacle together against casual separation.

CHARLES THEODORE VON HOLTZ.