May 29, 1956 M. ANDIS 2,748,362

QUICK DETACHABLE ELECTRICAL CONNECTION

Filed Aug. 19, 1950 2 Sheets-Sheet 1

Fig. 2.

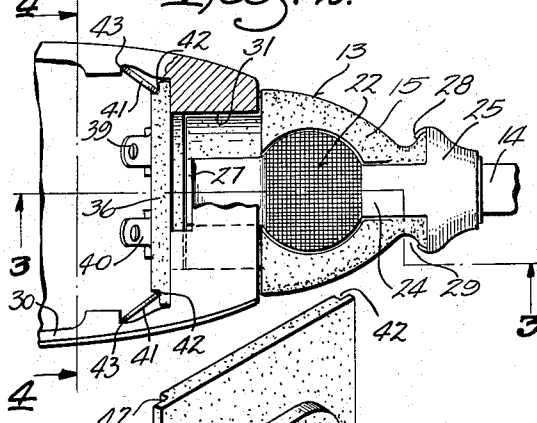
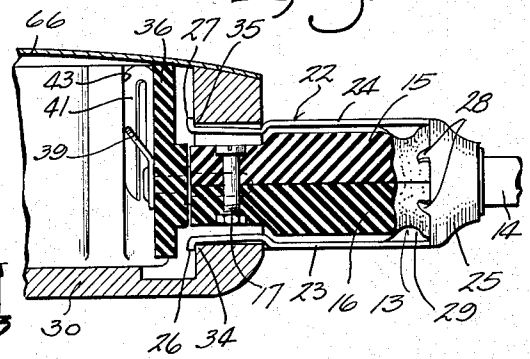
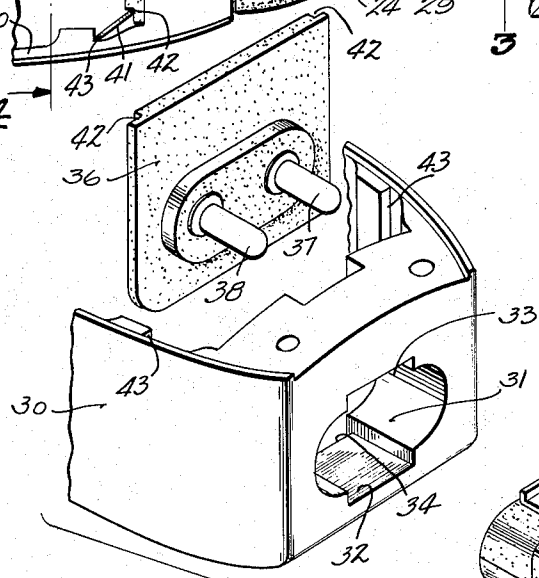


Fig. 3





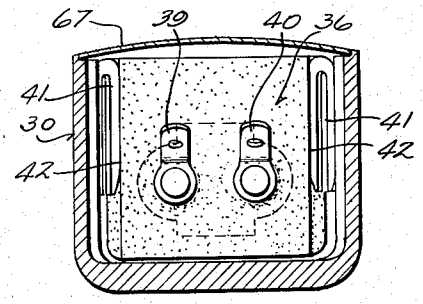


Fig. 4

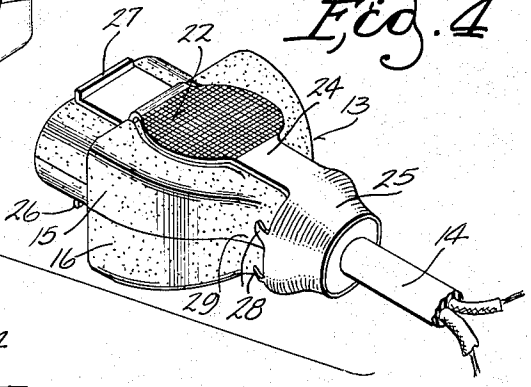


Fig. 1

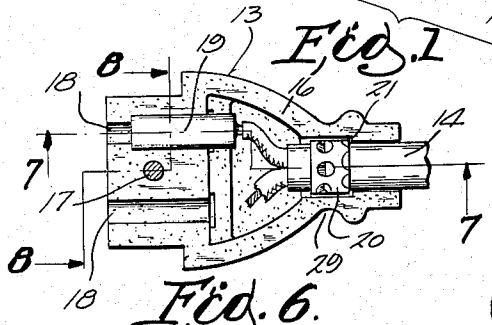


Fig. 6.

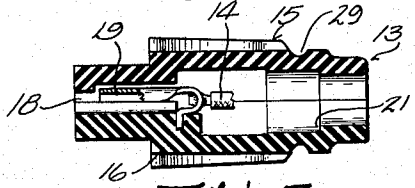


Fig. 7

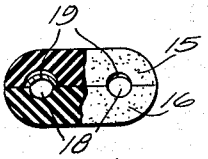


Fig. 8.

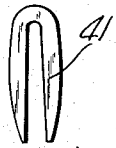


Fig. 5.

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QUICK DETACHABLE ELECTRICAL CONNECTION

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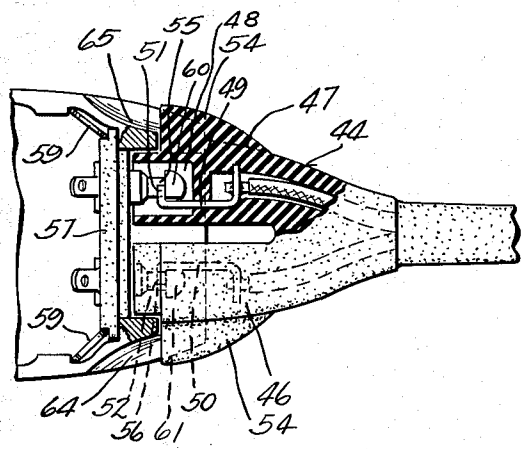


Fig. 10

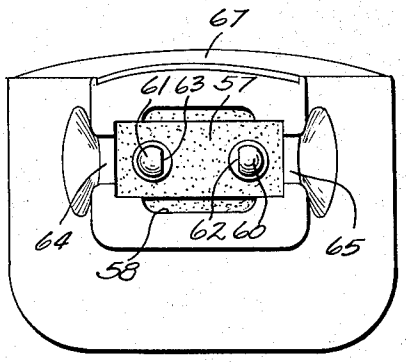


Fig. 11

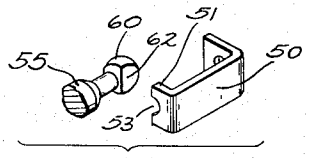


Fig. 12

Fig. 9

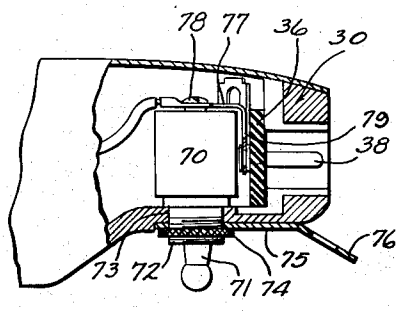


Fig. 13

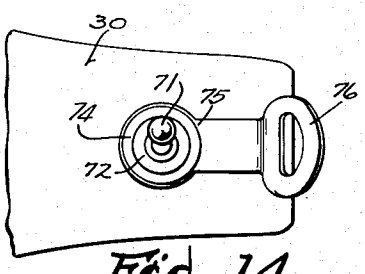


Fig. 14

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QUICK DETACHABLE ELECTRICAL CONNECTION

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Application August 19, 1950, Serial No. 180,445

22 Claims. (Cl. 339—75)

This invention relates to a quick detachable electrical connection, and it is particularly concerned with novel means for effecting engagement between a plug on a conductor cord and the contact pins or posts on an electrical device.

Various electrical appliances as shavers, clippers, and the like, receive their power through a conductor cord which is connected to a source of current and to the appliance. In many cases the cord is provided with a plug (more properly termed a "receptacle") at the end thereof, whereby it may, for convenience, be readily connected to and disconnected from the device receiving its power through the cord. A normal practice is to provide the cord with a fitting of the character which frictionally engages a pair of contact posts on the electrical device. However, with continued usage, this frictional engagement tends to become weak, and the plug often falls away from the device at times when such disconnection is not desired.

This difficulty is pronounced with electric shavers and hair clippers. In connecting these tools to a current source, it is customary to use a small rubber plug having a pair of split-sleeve inserts therein which slip over and frictionally engage a pair of contact posts fixed at the base of the shaver or clipper. There is nothing in the construction of this plug to anchor it positively in place, and since cords are removed from devices of this category with considerable frequency, as when sterilizing a clipper or shaver, for example, the contact elements of a plug becomes so worn or fatigued that the plug slips off whenever the clipper or shaver is handled. If the frictional engagement is so tight as to resist accidental release, it offers difficulty in the manipulation required of it in daily use.

It is an object of this invention to provide an improved detachable electrical connection having means for mechanical interaction operating independently of frictional connection. A further and more particular object is to provide a quickly detachable electrical connection having positive but readily releasable interlocking engagement between its mated parts. Another object is to provide a connection of this type including a plug which may be inserted or removed only by exerting pressure against a resilient element associated with or part of the plug. Still another object is to provide an electrical device incorporating contact posts mounted on a member which may readily be removed or replaced in the device, thereby facilitating assembly and servicing of the device.

Other objects of my invention will become apparent from a consideration of the following description and the appended claims, together with the accompanying drawings wherein:

Figure 1 is a view in perspective illustrating, in disassembled relationship, the major components of an electrical connection embodying the features of the present invention.

Figure 2 is a top plan view showing the elements of Figure 1 in an assembled relationship, the housing on the

portion of the electrical device shown being partly broken away and illustrated in section.

Figure 3 is a sectional view taken along the line 3—3 in Figure 2.

Figure 4 is a sectional view taken along the line 4—4 in Figure 2.

Figure 5 is an elevational view of a wedge employed in assembling the connection.

Figure 6 is a plan view of the inner surface of one of the half members comprising the plug, or receptacle, and showing the ends of the conductor cord connected to contact elements in the plug.

Figure 7 is a sectional view taken along the lines 7—7 in Figure 6.

Figure 8 is a sectional view taken along the lines 8—8 in Figure 6.

Figure 9 is a view in perspective illustrating the major components of a modified form of electrical connection embodying the features of the present invention.

Figure 10 is a top plan view, partially in section, of the connection shown in Figure 9, the elements being here viewed in an assembled relationship.

Figure 11 is a rear elevational view of the electrical device, portions of which are shown in Figures 9 and 10.

Figure 12 is a view in perspective of one of the contact pins on the electrical device illustrated in Figures 9–11, and showing a contact element in the plug which engages the said pin.

Figure 13 is a fragmentary side elevation of the rear end of a hair clipper, or similar appliance embodying my quick demountable receptacle plug plate and showing a switch assembly construction therewith, part of the appliance being broken away to show certain parts in vertical section.

Figure 14 is a plan view of the exterior of the construction shown in Figure 13.

Referring more in detail to the drawings, wherein like elements bear like reference numerals:

In the form of connection illustrated in Figures 1 through 8, there is shown a receptacle 13 attached at the end of a conductor cord 14. This receptacle is made up of two half members 15 and 16 held together by a bolt 17 and by a clip described below. Each half element of the receptacle is provided in the usual manner with grooves 18 wherein are fitted half-round contact elements shown at 19, and each said element is secured mechanically and electrically to an end of one of the pair of wires carried by the conductor cord 14. A collar 20 is crimped about the cord 14 and engages a shoulder 21 within the assembled receptacle to prevent removal of the cord (Figure 6).

A resilient, U-shaped clip 22 (Figure 1) having legs 23 and 24, and a central collar-like portion 25, is fitted about the body of the receptacle 13, the legs of the clip being positioned adjacent, but slightly spaced from the flattened sides of the receptacle, as best illustrated in Figure 3. The free ends of the clip legs 23 and 24 lie adjacent the extreme end of the receptacle 13 and are provided with outwardly directed lips or hooks 26 and 27 which act as latches when the receptacle 13 engages the shaver or other electrical device in the manner described below. Fingers 28 are provided on the central portion 25 of the clip. They may be deformed or bent inwardly against the surface of an annular groove 29 on the receptacle to prevent the clip from becoming disengaged therefrom.

The electric device, a rear portion of which is shown in Figures 1–4, has a housing or wall 30 which is provided with a socket 31 arranged to receive the receptacle 13 on cord 14. This socket is provided with offset channels 32 and 33 which terminate in shoulders 34 and 35 where the socket is inwardly recessed. The lips 26 and 27 en-

gage with the shoulders 34 and 35 when the receptacle 13 is fully inserted in the socket.

Mounted on a fiber insulating panel 36 are contact posts 37 and 38, and tabs 39 and 40, arranged to be connected to the wires leading to the motor of the device, are secured to the inner ends of these posts. In assembling the structure, the panel 36 is positioned against the base of the socket 31 so that the pins 37 and 38 protrude axially through the socket. Figure 1 shows the rear portion of the body 30 with a side thereof removed and with the panel 36 in a position ready to be inserted. Spring wedges 41, of the type illustrated in Figure 5, seat between a shoulder 42 provided along each side margin of the panel, and an adjacent shoulder 43 on the inner wall surface of the clipper, as best illustrated in Figure 2, to hold the panel in place. When the panel 36 is in place, the posts 37 and 38 are enclosed within the walls of socket 31 where they are fully protected in case the device is dropped or otherwise struck.

This mounting of the contact posts 37 and 38 is an important feature of my invention and provides a structure which is particularly well adapted for easy assembly and repair. The tabs 39 and 30, for example, may be secured to the wires (not shown) within the device before the panel 36 is emplaced, and likewise, servicing is facilitated when the panel can be quickly removed, as in the manner here provided.

It will be apparent that the receptacle 13 may readily be inserted in the socket 31 when the resilient legs 23 and 24 of clip 22 are depressed by the hand, and when the receptacle reaches its innermost position within the socket, pressure on the clip is released and lip, or latch, portions 26 and 27 of the clip assume a position against shoulders 34 and 35 in the socket, thereby effecting releasable positive engagement between the mating receptacle elements 19 and contact posts 37 and 38. Release of the receptacle may be effected at any time merely by pressing inwardly against the clip legs 23 and 24 with the hand while pulling the receptacle out of its socket in the electrical device.

In Figures 9 through 12, I have illustrated a modified form of quick detachable connection wherein resilient means are also employed to lock the receptacle in place in the socket. The receptacle, or plug, here illustrated at 44 is made up of rubber or other resilient material, one end thereof being attached to a conductor cord 45, while the other end of the plug is bifurcated to form normally divergent shanks 46 and 47. In the preferred embodiment of my invention, these shanks are set approximately at an angle of 15° to one another when in an unstressed condition, and each is provided with an axial opening 48 in which contact elements 49 and 50 are set, preferably by being held in place by the natural resilience of the rubber receptacle molded to receive them. The inner end of each of these contact elements is joined to one of the two wires forming the conductor cord 45, while the extended end of each element is bent outwardly to form a hook, or flange 51 and 52, which act as latch elements to maintain the receptacle within its socket, as hereinafter described. Each flange is in turn provided with a half-round notch 53, as seen in Figure 12. When the receptacle is molded it is provided with lateral wings 54 which the operator may readily grasp when he presses together the shanks 46 and 47 of the receptacle to insert the latter in its socket within the electrical device.

In this form of invention, conductor posts 55 and 56 are set in a fiber insulating panel 57 secured at the base of a socket 58 in the rear of an electric clipper by means of wedges 59 which are comparable to the wedges 41. The conductor posts 55 and 56 are provided at their free end with enlarged head portions 60 and 61, the adjacent edges of the head portions being flattened to form surfaces 62 and 63 which are continuous at their center with the adjacent neck portions of the respective posts. In this modified form of device, the side walls of the socket 58 are relieved at 64 and 65 to accommodate the wings 54 on the receptacle when the latter is placed within the socket 58. Wire mounting tabs 39 and 40 are mounted behind panel 57 at the other end of the posts 55 and 56. Thus this provides a structure which is readily assembled and serviced.

To insert the receptacle 44 within the socket 58, pressure is exerted by the hand against the wings 54 to compress the shanks 46 and 47 against one another. With its shanks so compressed, the receptacle 44 readily passes into the socket, posts 55 and 56 then enter the openings 48 in the shanks and slidably overlap the contact elements 49 and 50 set therein. Once the receptacle 44 has reached its most advanced position within the socket 58, pressure against the shanks is released, and the half-round notches 53 in the latch portions 51 and 52 of the contact elements 49 and 50 engage about the necks of the posts 55 and 56, and behind the head portions 60 and 61 thereon, thereby releasably locking the receptacle in the socket. Since portions of the enlarged heads in the posts have been removed, the outer surfaces of the contact elements 49 and 50 lie against the flattened surfaces 62 and 63 and against the neck portions of the contact posts. They are then in good electrical connection with the contact elements 49 and 50 and the posts 55 and 56. When the receptacle 44 is to be removed, the wings on the plug are again pressed inwardly and the plug is withdrawn from its socket.

It will be observed that with both forms of connection described herein, the male connecting element, or electrical device proper, is provided with contact posts which are protectively housed within a socket at the base of the device. These posts are mounted on a panel which is readily removable when a cover plate 66 or 67 is removed from the device and the wedge clips 41 or 59 are pulled from their wedge positions.

Both receptacle forms illustrated incorporate resilient latching elements which, on being pressed together in the hand, permit the introduction of the receptacle into the device's socket for engagement with the contact posts. Releasable positive engagement between the mating parts is then effected merely by removing the pressure on the resilient latch elements. Conversely, release of each of the receptacles illustrated is effected by pressing the latching elements inwardly with the hand while separating the mating parts.

With both forms of apparatus, the receptacle effects the conventional frictional engagement with the contact posts on the electrical device; however, such frictional engagement is maintained in a positive manner as the latching elements on the receptacle are released and thereby secured within the socket.

Although the forms of my invention described above provide ready, controllable separability of the electrical appliance from its service cord 14 or 45, it is preferable under some conditions to provide a switch in the appliance itself. I have incorporated such a switch in combination with my improved construction as shown in Figs. 13 and 14 where it will be seen that the switch 70 has a conventional toggle handle 71 in threaded mounting tube 72 extending through an opening 73 in the body of the appliance 30. The usual lock nut 74 upon the mounting tube 72 holds the switch in position with respect to the body of the appliance 30 and instead of the usual washer under the nut 74 I provide a bracket 75 with an outstanding apertured ear 76 which may be used as a hanger to hang up the appliance when it is not in use.

Electrically the switch 70 is mounted in conjunction with panel 36 with an easily assemblable spring clip 77 extending between post 38 and a binding post 78 forming part of the switch mechanism. The connection between spring clip 77 and the post 38 at 79 may be any one of a number of frictional slip connections common in the electrical art. It will be apparent from the above description that the switch 70 is readily assemblable both me-

chanically and electrically with the body of the appliance **30** and with the electrical post connection **38**.

I claim:

1. The combination with an electrical device having a socketed body of an electrical connector receivable in the socket for electrical connection to the device, said connector comprising a plug and a cord coupled thereto, and a resilient clip forming a releasable mechanical connection between the connector and the body, said clip being anchored at one end to the connector where the cord is coupled to the plug and extending from said anchorage along the exterior of the plug and into said body socket, said anchorage comprising a resilient member biased to bow said clip away from the connector whereby on pressure toward the connector the clip is releasable from the body.

2. For use with an electrical device body socketed and shouldered for reception thereof, a connector provided with severable electrical connections to said body, said connector comprising a plug and cord coupled therewith, and having a U-shaped clip a curved bight portion secured about the end of the plug where the cord connects thereto and substantially parallel legs having end latches for releasable engagement with a shoulder of the body.

3. The connector of claim 2 where in the bight of the clip constitutes a resilient anchorage on which the legs are spaced resiliently from the connector and positioned to be collapsed thereagainst for release from said shoulder.

4. In a device of the character described, an electrical device having a body with an end wall and a socket in said end wall, a removable support for electrical connections removable against said end wall, said support being provided with electrical connections extending into said socket, said end wall being provided with a recess opening into said socket to form recessed shoulders, an electrical connector bodily receivable in the socket and provided with electrical connections mating with those on said support, said connector having resilient mechanical connections provided with latch-like projections engageable with said shoulders when said electrical connections mate whereby to positively couple said connections.

5. The device of claim 4 in which the resilient mechanical connections comprise a U-shaped clip having legs spaced from oppositely disposed portions of the body of the connector whereby upon clamping pressure to yield toward said body to release the latch-like projections from said shoulder for mechanical and electrical disconnection of said connector.

6. The device of claim 4 in which the connector is made in mated half-portions lying between said resilient members, said resilient mechanical connections being provided with a collar therebetween to surround the body and hold it in assembled relationship.

7. An electrical connector comprising a resilient body having divergent resilient shanks inwardly deformable toward each other, each of said shanks having an electrical contact element, outwardly faced for mechanical engagement with a complementary electric contact.

8. For use with an electrical appliance having spaced contact posts shaped for mechanical engagement with a connector, a connector having a bifurcated body with spaced resilient shanks each having an electrical contact equipment, said shanks being biased to be spaced wider apart than said posts, said contact elements being shaped for reception between the posts when the shanks are forced toward each other whereby upon return of the shanks to an outward position to engage said elements and said posts.

9. An electrical receptacle having a resiliently yieldable bifurcated portion, said portion having electrical sockets in the respective free ends thereof.

10. The receptacle of claim 9, wherein the respective sockets are provided with contact elements provided at their end nearest the mouth of said sockets with outwardly directed hooks.

11. The receptacle of claim 9 wherein the respective sockets are provided with contact elements provided at their end nearest the mouth of said sockets with outwardly directed, notched hooks.

12. In an electrical device having a hollow body socketed to receive a connector, a readily assemblable panel in said body to close the socket, said panel having inwardly and outwardly directed electrical posts and tabs, and a switch positioned in the body adjacent the panel, said switch having an electrical connection to the panel and an actuating handle extending through the body spaced from the socket.

13. An electrical device having a body socketed to receive a connector for mechanical and electrical engagement with posts in said socket, a panel having spaced posts headed for said engagement, and a compressible connector receivable in the socket when compressed, said body being relieved laterally of the socket to permit expansion of the connector, said connector having contact elements shaped for engagement with the posts in the outward movement of the elements.

14. The combination with a body having a socket, of a connector receivable in the socket for connection thereto, and resilient means on said connector comprising a releasable mechanical connection between the connector and the body, said means having a normal released position in which it engages the body, said means requiring deformation from said position to release said engagement, said means comprising resiliently deformable shanks and latch means carried by said shanks, said body being provided with complementary latch means in said socket for engagement by said shank latch means when the shanks are released from deformation.

15. The combination with a body having a socket, of a connector receivable in the socket for connection thereto, and resilient means on said connector comprising a releasable mechanical connection between the connector and the body, said means having a normal released position in which it engages the body, said means requiring deformation from said position to release said engagement, said connector being provided with contact elements and said body being provided with complementary contact elements, said body being provided with a removable plate on which said complementary contact elements are mounted, and with a way at the rear of the socket in which said plate is slidably receivable.

16. The device of claim 15 wherein said way comprises a shoulder formed on the body to define the rear of the socket and a shoulder spaced from said socket shoulder whereby said plate is slidably received between said shoulders, and a resilient wedge positioned between one shoulder and said plate to bias said plate against the other shoulder.

17. The device of claim 15 in further combination with a switch and a mounting in the body positioning the switch adjacent said panel, said panel and switch having slidably related contact elements engaged when the panel is slidably received in said way.

18. The combination with an electrical appliance body having an end wall of substantial thickness and a socket opening through said end wall, of a connector having a plug-in portion substantially co-extensive in length with the thickness of the end wall to be completely received within said socket, and a hand grip portion having a shoulder at its junction with the plug-in portion which abuts the end wall when the plug-in portion is seated within the socket, resilient coupling means between said body and said connector, said resilient coupling means having certain portions extending into the body socket and certain portions extending along the exposed surface of the hand grip portion of the connector, said exposed portions being yieldable under finger pressure to release the connection of said connector to said body.

19. The combination with an electrically operated ap-

pliance body having a socket, a body wall about said socket and an electric cord plug guided by said body socket wall for movement in said socket, said plug being provided with electric contact elements, of a panel provided at one side with electric contact elements complementary with those on said plug and at its other side with means for electrical connection to body contacts, a seat against which said panel is disposed with its electric contact elements aligned with the contact elements on the plug and in the path of plug advance as guided on said body socket wall, and means for resiliently holding said panel against said seat, said resilient means being releasable for removal of said panel with its contact elements from said seat independently of said body and body socket wall.

20. The device of claim 19 in which said resilient means comprises a spring clip, said body being provided with a shoulder spaced from said seat and against which shoulder said spring clip reacts in biasing said panel against said seat.

21. The device of claim 20 in which a contact element on said panel comprises a prong extending into said socket when the panel is seated, said body shoulder being laterally offset from the path of panel removal in a direction substantially aligned with the socket axis whereby to clear the prong from the body socket wall in the course of panel manipulation.

22. In a device of the character described, the combination with a body having an end wall with an internally walled socket, a plug receivable in said socket and guided along the internal wall thereof, a panel having a prong extending into said socket for electrical connection to said plug, a shoulder on said body spaced from said end wall, and a spring clip resiliently engaged between said shoulder and panel to bias said panel against said end wall, said shoulder being laterally offset from the path of panel manipulation in a direction substantially axially aligned with said socket whereby said prong will clear said internal wall in the course of said manipulation.

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