

United States Patent

Elkins

[15] 3,643,205

[45] Feb. 15, 1972

[54] **TELEPHONE HANDSET CONNECTOR**

[72] Inventor: Luejene Elkins, Chicago, Ill.

[73] Assignee: The Bunker-Ramo Corporation, Oak Brook, Ill.

[22] Filed: Oct. 13, 1969

[21] Appl. No.: 865,585

[52] U.S. Cl. 339/91 R, 179/100 R, 339/128

[51] Int. Cl. H01r 13/54

[58] Field of Search 339/91, 126, 128; 179/100

[56] **References Cited**

UNITED STATES PATENTS

2,499,825 3/1950 Havlicek 339/60
2,891,103 6/1959 Swengel 339/91

3,179,738 4/1965 DeLyon 339/91
3,444,329 5/1969 Krumreich 179/100

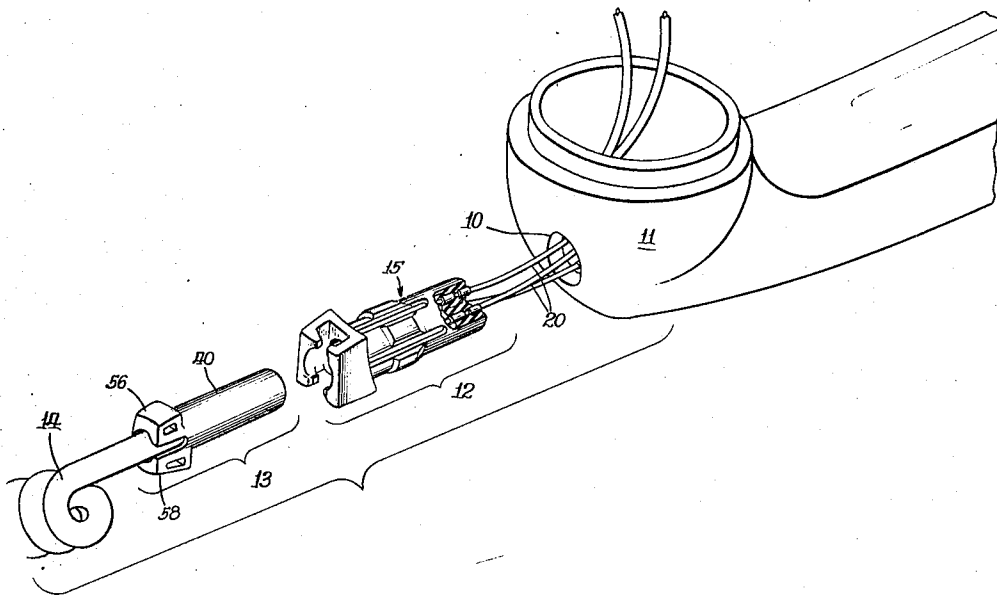
Primary Examiner—Joseph H. McGlynn

Attorney—Frederick M. Arbuckle

[57] **ABSTRACT**

A miniature electrical connector consisting of a receptacle which latches itself into a single opening through the housing of an electrical instrument (a telephone handset, for example) together with a plug designed to be self latching upon insertion into the receptacle yet capable of quick, easy removal therefrom by proper manipulation.

5 Claims, 8 Drawing Figures



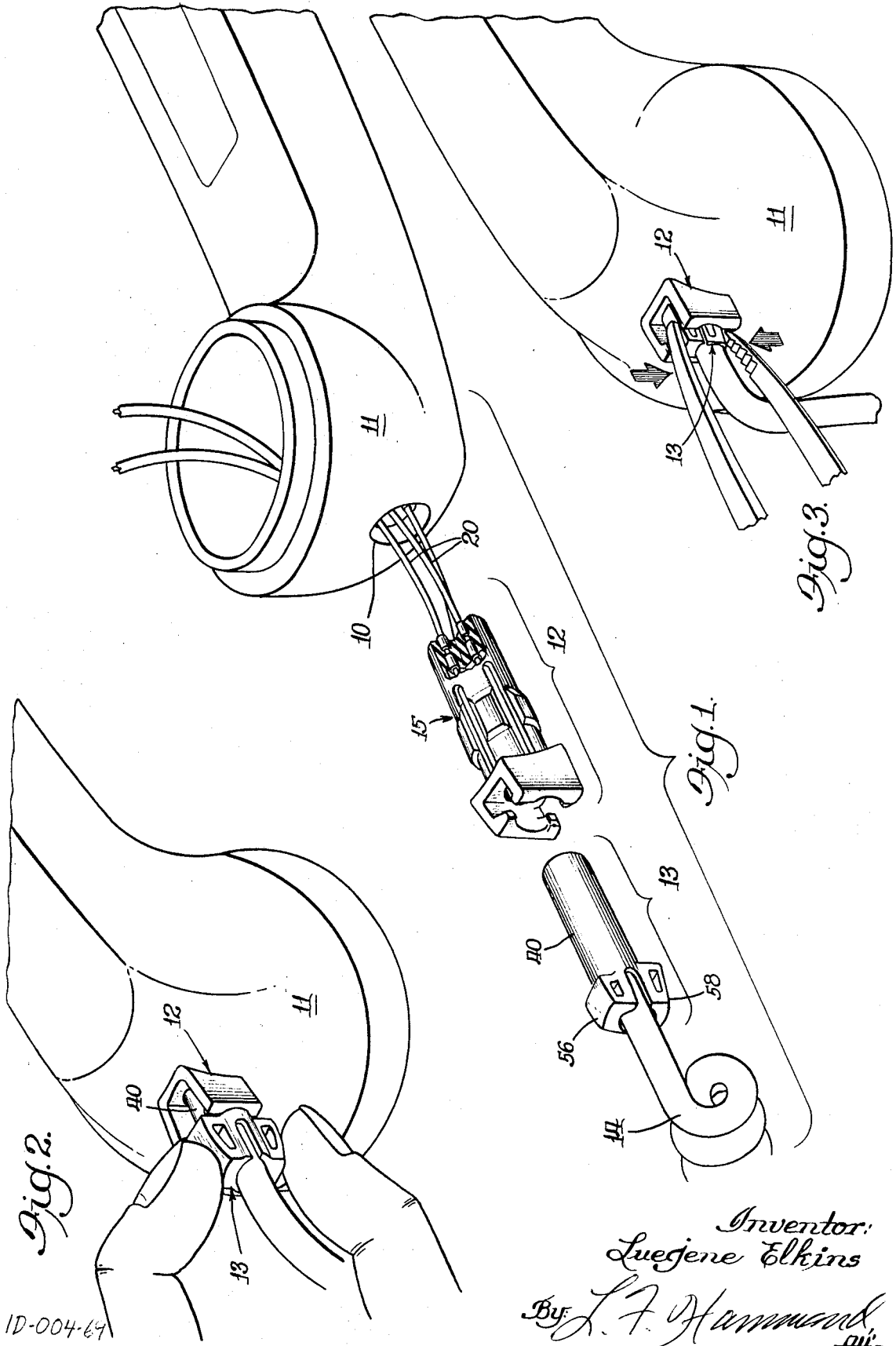


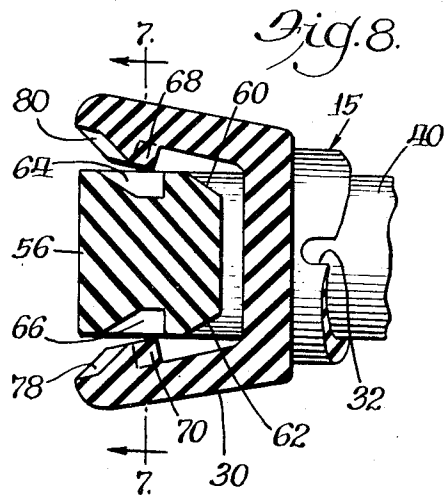
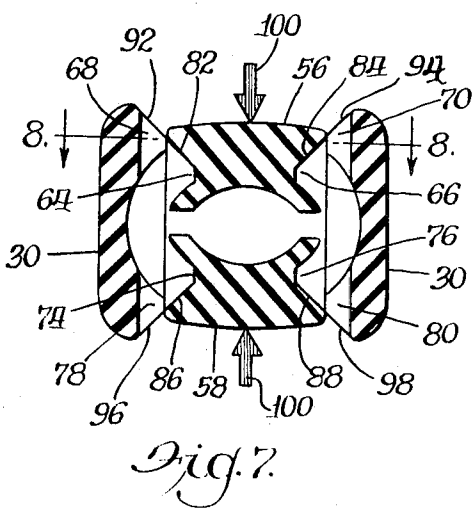
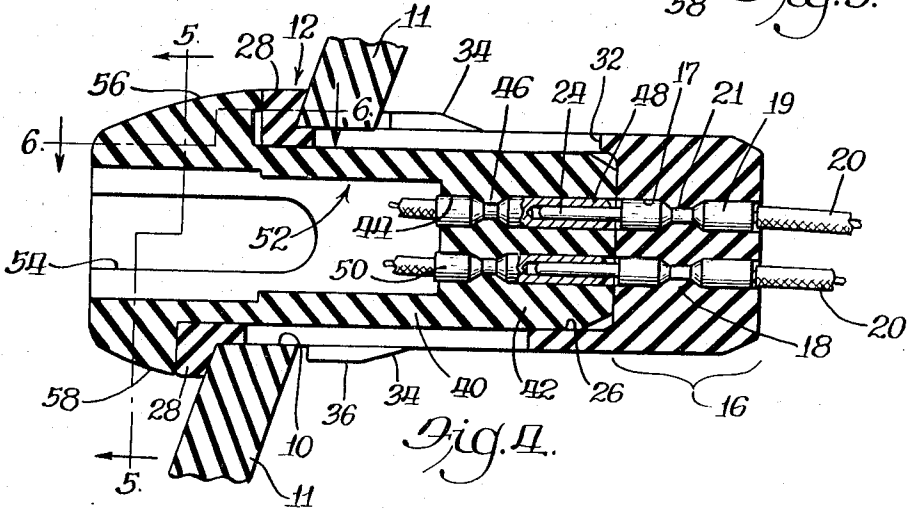
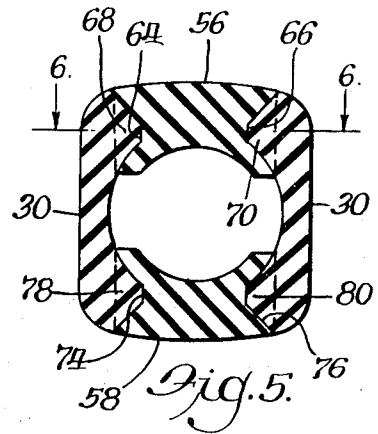
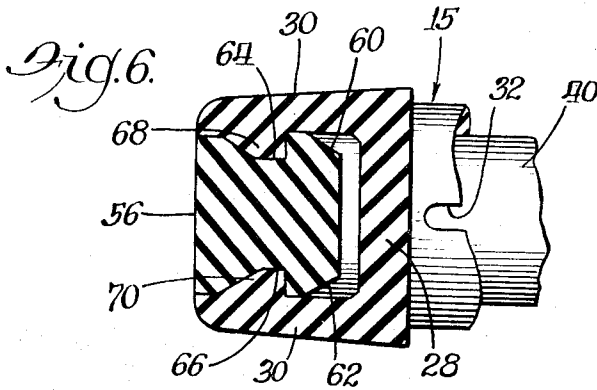
Fig. 2.

Fig. 1.

Fig. 3.

ID-004-69

Inventor:
Luegene Elkins
By *L. F. Hammond*
Att'y



Inventor:
Luegene Elkins

By L. F. Hammond
Atty.

TELEPHONE HANDSET CONNECTOR

OBJECT OF THE INVENTION

While it is among the general aims of the invention to provide a miniature connector that is unusually strong, rugged and dependable notwithstanding its compact size, a more specific object is to provide a connector plug and receptacle such that the entire connector may be mounted through a single aperture in the wall of an instrument case without the use of any screws, nuts, rivets or conventional securing devices; with the plug and receptacle and connector so designed that the plug is held securely in position under all normal circumstances of use so that it will not be dislodged or disconnected by accidental strains on the line cord, yet can be quickly disconnected and replaced if desired.

A further object is to provide a connector having the desirable features indicated above but nevertheless of extremely simple physical configuration, so that the housings of both the plug and the receptacle may consist of a single molded piece of plastic material, with the parts individually of such design as to minimize the need for any undercuts or secondary operations in the course of manufacture.

A still further object of course is to achieve the desirable results indicated above with a device which is inherently of such design that it may be mass-produced at relatively high speed so that the costs thereof may be kept down to an acceptable level.

A further object of the invention is to provide a miniature plug and receptacle suited for use on the telephone handset and so designed that the connector may be manually coupled without the use of tools but of such shape, design, and proportions that it is unlikely to be released by any ordinary manual manipulation, yet can easily be removed by the use of a simple tool such as a pair of tweezers or slender nose pliers.

The foregoing objects are accomplished in the present invention by provision of a miniature connector wherein both the receptacle and the plug carried therein include a tubular body of generally cylindrical shape, extending through an aperture in an instrument wall to an interior cavity therein; with both plug and receptacle having an enlarged "head" portion located exteriorly on the instrument housing and fitted together in such a way that both the plug and receptacle have two opposite parts relatively shiftable with respect to each other and so designed as to be capable of automatic interlocking to hold the plug in position under normal circumstances but permit easy release when desired.

A present preferred embodiment of this invention is illustrated in the drawings attached hereto and forming a part of this disclosure wherein:

FIG. 1 is a disassembled view of the connector plug and receptacle, showing the general relationship of these parts with an instrument housing; illustrated in this instance as being a telephone handset.

FIG. 2 is a perspective view of the connector plug being manually inserted into position in the receptacle, which is in turn received in an aperture provided therefor in the handset housing.

FIG. 3 is a perspective view similar to FIG. 2 but showing the preferred manner of uncoupling the connector plug from its receptacle by the use of tweezers or slender nose pliers.

FIG. 4 is an enlarged detail cross-sectional view through the connector assembly showing the plug and receptacle in the respective positions that they assume with respect to each other and with respect to the housing wall of the instrument in which the connector is installed.

FIG. 5 is a detail cross-sectional view of the exterior, or "head" portions of the plug and receptacle, the view being taken substantially on the plane of the line 5-5 of FIG. 4.

FIG. 6 is an enlarged detail sectional view showing the interlocking latching projections and recesses whereby the plug of the connector is retained in the receptacle, the view being taken substantially on the plane of the lines 6-6 of FIGS. 4 and 5.

FIG. 7 is an enlarged detail cross-sectional view similar to FIG. 5 but showing the positions that the parts assume when the plug is being uncoupled from the receptacle for removal therefrom: the view being taken substantially on the plane of the line 7-7 of FIG. 8.

FIG. 8 is an enlarged sectional view similar to FIG. 6 but with the parts in the position they assume during removal of the plug from the receptacle. In this view the parts are shown as they would appear on section line 8-8 of FIG. 7.

As previously mentioned, the present connector is particularly designed to be self-securing in a single aperture through the wall of an instrument housing. As illustrated in FIG. 1, this may be a telephone handset for example, wherein a circular aperture 10 is provided in the wall 11 of the instrument, to receive and secure the connector receptacle, generally designated 12. The plug, generally designated 13, is for removable insertion into the receptacle and it is contemplated that the plug will have permanently attached to it the usual flexible phone cord or cable 14, including the several insulated wires required for connection of the telephone instrument to outside equipment.

As best seen in FIGS. 1 and 4, the receptacle 12 consists of a generally tubular sleeve, preferably in a circular or cylindrical shape, and formed of some solid type of insulating material, yet preferably one that has a considerable degree of resiliency; such as nylon 6/10 for example. In any event the sleeve or cylindrical body portion 15 is provided with a thick solid bottom wall 16 having a number of apertures or contact cavities 17 extending therethrough, with internal shoulder portions 18 so arranged that a number (usually 4 to 6) of electrical contacts 19 having insulated conductors 20 attached thereto may be mounted in the bottom of the receptacle sleeve. In the preferred construction the individual contacts have reduced diameter portions 21 that will automatically interlock with the shoulders 18 when the contacts are forced into position, and the individual contacts are crimped or soldered to the conductors 20 prior to assembly. As shown, each contact has a pin portion 24 projecting into a cylindrical central cavity 26 of the receptacle from the bottom 16 thereof.

The other end of the receptacle sleeve 15 has an enlarged face flange 28 overlying the edges of the aperture 10 in the housing wall 11 of the handset so that inward movement of the assembly beyond the position shown in FIG. 4 is limited by the face-to-face engagement of this flange 28 with the outer surface of the housing. The face flange 28 of the receptacle is also provided with a pair of identical but opposite outwardly extending sidewalls 30 (FIG. 6) so that the flange 28 and the walls 30 coact to form what may be referred to as a three-sided "head" portion for purposes hereinafter described.

The generally cylindrical walls of the sleeve 15 of the receptacle are provided with a number of slots 32 (preferably four in number) so that these sidewalls have considerable flexibility and the segments of the sidewalls between these slots are provided with integral latching lugs each having an inclined cam surface 34 at the end toward the bottom of the sleeve with a shoulder portion 36 adjacent the inside of the wall 11 of the housing. These slots thus permit inward flexing of the receptacle sleeve 15 (when the plug 13 is not in position therein) so that when the sleeve of the receptacle is slipped through the aperture 10 in the instrument wall 11 it will be self-locking, since the cam surfaces 34 will flex the sidewalls inwardly as they pass through the aperture 10 and the locking shoulders 36 will thereafter prevent removal of the receptacle from the handset.

The plug portion 13 of the connector, best illustrated in FIGS. 1 and 4, also comprises a single, integral, molded piece of solid insulating material such as nylon 6/10 and also has a tubular sleeve 40 with a relatively thick bottom wall 42 having a plurality of contact cavities 44 therein, with each of the contact cavities having an internal shoulder 46, so that the narrow neck portions of the individual contact sleeves 48 are self-retaining after being forced into position in the cavities of the plug. The individual contact sleeves 48 are of course posi-

tioned and dimensioned to receive the pin portions 24 of the receptacle contacts 19 and are also provided with flexible insulated wire leads 50 crimped or soldered thereto prior to assembly and leading to the telephone cord 14 of the handset. The outward end of the plug 13 is, of course, provided with a deep, generally cylindrical cavity 52 in which anchoring means for the phone cord and leads 50 may be provided if desired, but these facilities are not shown since they form no part of the present invention.

The outermost (left) end of the plug is provided with one or more deep slots 54, however (best shown in FIG. 4) so that the "head" portion of the plug; (that is, the portion outside of the instrument housing and normally disposed between the sidewalls 30 of the receptacle) split into two opposed grip portions 56 and 58 (see also FIGS. 5 and 7). The grip portion 56 (FIGS. 5 and 6) has its leading corners beveled at 60 and 62 and has opposite sides recesses or notches 64 and 66 coacting with inwardly projecting latching lugs 68 and 70 on the walls 30. These are also beveled at the forward corners, so that when the plug is inserted into the receptacle the several bevels will act as cams, bearing against their correspondingly beveled surfaces and effective to spread the wall portions 30 of the receptacle enough so that their latching lugs 68-70 will snap into the corresponding recesses 64-66 of the plug and retain the plug against accidental removal from the receptacle. The opposite grip portion 58 of the plug is provided with similarly shaped recesses 74 and 76 (FIG. 7) which cooperate in the same way with the latching lugs 78 and 80 provided in the lower portion of the receptacle walls 30.

The recesses 64-66 and 74-76 are also provided with beveled surfaces 82, 84, 86 and 88 inclined in directions perpendicular to those heretofore described. These coact with similarly inclined cam surfaces 92, 94, 96 and 98 on the detent members 68, 70, 78 and 80 (FIG. 7) so that the plug may be quickly and easily released if desired. This is accomplished, according to the present invention, by gripping the outer end of the plug with a pair of tweezers or narrow nosed pliers, as illustrated in FIG. 3, to apply inward force to the opposite grip portions 56 and 58 of the plug, in the directions indicated by the arrows 100 in FIG. 7. As these opposite bifurcated portions of the plug move together the cam surfaces on the latching lugs and recesses coact with each other to spread the sidewalls 30 of the receptacle apart laterally, until they assume the position illustrated in FIGS. 7 and 8, whereupon the plug is entirely unlatched from the receptacle and may be easily withdrawn therefrom.

From the foregoing it should be apparent that the teachings of the present invention provide a very small, simple and economical type of connector which nevertheless has advantages in many respects. In the first place, the entire connector is held in position in the telephone instrument by the resilient action of the receptacle sleeve and its latching shoulders 36 which are flexed inwardly when the cam surfaces 34 are pressed through the aperture in the instrument wall, but thereafter engage the inside of the instrument cavity to prevent any reverse movement. The resiliency of the receptacle sleeve 15 is alone sufficient to provide quite adequate locking of the connector in the instrument, but it is further noted that when the relatively solid walled plug 13 is inserted therein it prevents any possibility of inward flexing of the locking members and thus provides additional assurance against accidental release.

With the receptacle in position as indicated above, the plug may be inserted simply by pushing it into the aperture of the receptacle at which time the cam surfaces 60-62 (FIG. 6) will spread the sidewalls 30-30 of the receptacle and allow the latching lugs to snap into and engage the receptacle recesses 64-66 and positively lock the plug against accidental displacement. Intentional release may be easily accomplished however, by squeezing the opposite grip portions 56-58 of the plug together; thereby spreading the sidewalls 30-30 of the receptacle head sufficiently so that the latches 68-70 and

78-80 are entirely disengaged. The plug may then be withdrawn by straight outward movement.

Having thus described the invention, I claim:

1. An electrical connector comprising a receptacle body having electrical contacts therein and having a recess adapted to receive a plug, said body having a pair of flexible extensions therefrom constituting normally parallel walls with opposed shoulders spaced apart at a distance less than will permit ingress of a human finger between them, cam surfaces extending from each of said walls toward the opposite wall, a plug member having electrical contacts and adapted to fit in said recess, and a bifurcated head on said plug member, adapted to pass between said flexible extensions by outward flexing thereof responsive to coaction between said head and said cam surfaces as said plug is inserted into said receptacle, said head having cavities therein receiving said cam surfaces when said plug is fully received by said receptacle, allowing said flexible extensions to return to the normal condition.

2. An electrical connector as defined in claim 1, having a further set of cam surfaces on each of said walls, inclined in directions perpendicular to the first mentioned cam surfaces, and coacting with said cavities in said head to flex said extensions outwardly when the bifurcated portions of said head are moved toward each other with the plug fully received in said receptacle, thus permitting withdrawal of the plug by tweezers or thin-nose pliers.

3. An electrical connector comprising a receptacle having a generally tubular sleeve portion for insertion through an aperture in a mounting wall, and having an enlarged head on the outer end of said sleeve to limit inward movement thereof with respect to said mounting wall, said sleeve having resilient wall portions capable of flexing inwardly, and latching devices on the exterior surfaces of said resilient wall portions for passage through said aperture by inward flexing of said wall portions, in combination with a plug received in the receptacle and fitting within said sleeve whereby upon insertion of said plug in said sleeve on said mounting wall, said plug extends beyond said mounting wall and latching devices and fits within said sleeve so closely as to prevent inward flexing of said wall portions to an extent which would release said latching devices from engagement with said mounting wall adjacent said aperture.

4. A connector as defined in claim 3 wherein said enlarged head has outwardly extending parallel wall portions defining a space therebetween conveniently accessible only to narrow tools such as the jaws of thin-nose pliers, and said plug has an outermost head portion normally disposed between said wall portions when said plug is fully received by said receptacle.

5. An electrical connector comprising a receptacle having a generally tubular sleeve portion adapted to be inserted through an aperture in a mounting wall, and having an enlarged head on the outer end of said sleeve to limit inward movement thereof with respect to said mounting wall, said head having outwardly extending parallel wall portions defining a space therebetween conveniently accessible only to narrow tools such as the jaws of thin-nose pliers, said sleeve having resilient wall portions capable of flexing inwardly, and latching devices on the exterior surfaces of said resilient wall portions adapted to pass through said aperture by inward flexing of said wall portions in combination with a plug adapted to be received in the receptacle and to fit within said sleeve so closely as to prevent inward flexing of said wall portions to an extent which would release said latching devices from engagement with said mounting wall adjacent said aperture, said plug having an outermost head portion normally disposed between said wall portions when said plug is fully received by said receptacle, said outermost head portion of the plug being bifurcated, and said parallel wall portions and said outermost head portion having coacting latch means which latch means is releasable by moving the bifurcated parts of said plug toward each other.

* * * * *