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(54) Electrical connector module with multiple connector housings.

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Description

Background of the Invention

Terminal connecting blocks or modules are widely used in the telecommunications industry to inter-connect equipment and distribution lines, particularly in signal switching or distribution applications. Their primary function is the solderless connection of two or more wires.

Apart from their primary function, connecting modules of the kind the present invention is concerned with provide for a quick, mechanically secure and electrically sound connection. In addition, they provide for relatively simple and fast disconnection, as needed where frequent rewiring is necessary. Quick connection is provided by eliminating as much pre-connection and post-connection conditioning as possible. Stripping, bending or trimming operations should be unnecessary, such that connection may be accomplished with few movements. Mechanically secure and electrically sound connections are provided by interference, clamp or like connection methods in which the connection module exerts a positive grip on an installed wire conductor.

To provide a connecting module having such qualities, it is known to utilize a metal split cylinder having an axially extending narrow seam or slot. A wire is connected to the cylinder by moving it laterally of its axis into the slot so that the edges of the slot slice through the insulation and establish contact with the conductor with a positive gripping force as provided by the resilience of the cylinder cross section. It is also known to support a cylinder in an insulating housing of generally cylindrical shape with a rec tangular cross-section, in a coaxial orientation, to form a connector module. The housing is slotted along diagonally opposite corners and the cylinder aligned therein such that one corner slot is aligned with the wire receiving slot in the cylinder. Installation of a wire is accomplished by laying it to extend through the housing slots, over the cylinder, and using an impact tool to drive the wire down into the split cylinder, which preferably includes a cutting edge opposite the wire receiving slot to trim or sever the excess wire length. An installed wire is thus shielded from others by the housing such that shorting and interference problems are avoided. In actual practice, a plurality of housings are mounted to extend orthogonally from a planar member to form a multiple connector terminal connecting panel. An example of such a panel is disclosed in co-pending U.S. Patent Application Serial Number 321,107, to Vachhani, filed Nov. 31, 1981, and entitled "Electrical Connector Module."

Although the Vachhani panel provides for the quick and secure solderless cross connection of a large number of wires at a central location with relatively high density, it does have certain disadvantages. for one, assembly of the panel requires that individual modules be mounted one at a time, such that assembly is time consuming and correspondingly expensive. for another, the diagonal orientation of the wire slots together with the side by side orientation of the housings generally requires that wires be positioned and installed one at a time, such that a technician must continually switch between positioning and inserting operations. This has been recognized as time inefficient in the consecutive installation of large numbers of wires. Another undesireable aspect of the Vachhani module relates to stresses exerted on the split cylinder by the wire insertion tool. It has been found that due to the impact operation of the tool and the relatively pliable housing material used for the modules that the wire receiving cylinder was suspectible to connection threatening deformation during installation of a wire. In addition, the Vachhani tool needs to be oriented with respect to a housing for proper operation, which has been also recognized as undesireable. Finally, the tool includes moving parts and is thus relatively expensive.

USA 3147058 discloses an electrical connector which comprises a hollow cylindrical body having at least one open end. The body is provided with a plurality of vertically disposed insulation severing slots which extend longitudinally from the open end thereof downwardly in the peripheral wall of the body.

USA 4 283 105 discloses a circuit board which is provided with electrical terminals in the form of longitudinally slotted barrels.

USA 4 186 984 discloses a dielectric cover for a slotted barrel terminal which has a wire receiving slot for gripping and providing strain relief for one or more wires connected to the barrel terminal.

Summary of the Invention

The present invention provides an electrical connector panel and a tool for installing or inserting wires in the panel which alleviates or eliminates the above described disadvantages of the Vachhani apparatus. According to one aspect of the invention a plurality of metal split cylinders of the above described type are provided and mounted in a non-conductive housing to form a connector module. The housing is formed to support the split cylinders in a plurality of cylindrical subhousings formed in two rows, with each of the subhousings including slots on diametrically opposed sides with one of the subhousing slots coaxially extending

with the slot in the split cylinder, and with the subhousing slots aligned transversely to the rows. The subhousings in each row are laterally spaced apart to form a plurality of inter subhousing slots and the subhousings in different rows are laterally offset so that one slot of each subhousing is aligned with one of the inter subhousing slots. According to this aspect of the invention a plurality of wires to be installed may be laid side by side and parallel in the subhousing slots in one series of operations, and installed in another series of operations, eliminating the need to switch back and forth between wire placement and insertion operations where two or more wires are to be installed in the panel sequentially.

According to another aspect of the invention the module housing includes a snap mounting arrangement comprising one or more flexible bridges and shoulders disposed on the side of the housing and longitudinally spaced apart. The bridges include a bridge member spaced apart from the side of the housing and supported on opposite ends so that it may flex toward the housing when compressed. The panel member provided for supporting the housing includes an aperature sized to receive the housing with the aperature including one or more tabs positioned to engage the bridge or bridges and compress them inwardly as the housing is slid into the aperature, and to engage a transverse edge of the bridges when the housing is mounted. A shoulder is provided to stop the housing in the mounting position such that the housing is snapped into place and immovably retained by the shoulders on one side of the housing and the transverse edge of the bridges of the other. Thus, . the present invention provides for the mounting of a plurality of connectors to a panel simultaneously, as opposed to mounting single connector modules one at a time, thus resulting in substantial time savings in panel assembly.

According to yet another aspect of the invention the housing is constructed of a relatively rigid plastic non-conducting material, and a simple wire insertion or installation tool with no moving parts is provided to insert wires. The wire insertion tool includes a central post sized to fit inside the split cylinder and a cylindrical member coaxially extending around the post and sized to fit around the outside perimeter of the cylinder between the cylinder and the housing. A shoulder is provided on the tool and is axially displaced from the tip, the shoulder being of sufficient radius to engage the end transverse edges of a subhousing with the tip of the tool extending in and around the split cylinder mounted therein. Thus, wires to be installed may be laid across the top of the cylinder extending through the subhousing slots and pressed into the cylinder with the tool, which by virtue is its cylindrical configuration does not need to be oriented, and which does not include moving parts. Furthermore, the operation of the tool provides that the subhousing absorbs certain stresses from the tool as the wire is being inserted to avoid deformation of the split cylinder.

According to still another aspect of the invention the end portions of each subhousing cylinder are funnel shaped to facilitate insertion of the tool into the ends of the subhousings, and to guide the tool into proper axial orientation with the split cylinder. In addition, at least one slot of each subhousing includes arcuate axially extending lips on each side of the slot, with the width of the passageway formed between the lips being slightly less than the diameter of a wire to be installed, so that the lips provide a mechanical grip and strain relief for the wire during and after installation.

Thus, the present invention provides an electrical connector panel eliminating or alleviating the problems above-discussed with respect to the Vachhani apparatus. More specific details, aspects and salient features of the construction and operation of the invention are set forth in the ensuing drawing and specification.

Brief Description of the Drawing

FIGURE 1 is a perspective view of a connector module according to the present invention;

FIGURE 2 is a top plan view of the electrical connector module according to the present invention;

FIGURE 3 is a cross sectional view of the connector module according to the present invention taken along the lines 3-3 of Figure 1;

FIGURE 4 is a cross sectional view of a portion of the connector module according to the present invention taken along the lines 4-4 showing the installation tool according to the present invention inserted therein; and

FIGURE 5 is a cutaway perspective view of the installation tool according to the present invention; and

FIGURE 6 is a cross sectional view of the connector module of the present invention taken along the lines 6-6 of FIGURE 3.

Detailed Description of the Invention

The electrical connector apparatus of the present invention is provided for use in an access member such as the quick-cross connect panel or in a terminal block to electrically connect various electrical lead wires or circuits with certain other electrical lead wires or circuits. In actual practice,

the lead wires may be part of a communication circuit such as a telephone line or a data transmission circuit. Where the leads are telephone lines, the electrical connector module of the present invention is utilized to patch or cross-connect such lines to accommodate growth of telephone usage, changes in telephone number, relocation of users, etc.

Referring to FIGS. 1 and 2 an electrical connector module according to the present invention is illustrated, in perspective and plan views. Connector module 10 is mounted in a relatively flat panel member 11, in an aperature 12, of generally the same cross-section as connector module 10. Module 10 includes a housing 15 molded of a relatively rigid non-conductive plastic. Housing 15 includes a plurality of generally cylindrical subhousings 20, extending on either side from panel member 11 (see FIG. 3), each of which supports a centrally positioned split cylinder connector member 18. Each of subhousings 20 are formed to include funnel shaped end portions 17 as may be seen best with reference to FIGS. 3 and 4, to facilitate entry and alignment of an insertion tool, as will be described in more detail below. Although partially asymmetrical in certain detail, the module is identical on each side of the panel member with respect to the function and construction of the operative portions of subhousings 20.

With reference to FIGS. 3 and 4 it may be seen that connector member 18 includes a first end 30 including a collar 31, a wire engaging slot 33 and a wire trimming edge or blade 34. The other end of connector member 18 includes a pair of tine members 37 and 38 cut from the sidewalls of the cylinder, a wire engaging slot 39 and a further trimming blade 40. Each end of connector member 18 further includes wire guide sections 4l and 42 narrowing toward the respective slots 33 and 39, and a transverse cut 35 structurally isolating the cross sectional resilience of the opposite ends.

To accomodate the mounting of a connector member 18 in the cylindrical subhousing 20, the housing includes an annular retaining portion 50 extending inward from the sidewall of subhousing 20 and having a radius slightly smaller than that of connector member 18. A pair of diametrically opposed and longitudinally extending grooves 51 and 52, having a width slightly larger than that of tines 37 and 38 respectively, are provided in retaining portion 50. The mounting of connector member 18 may thus be accomplished by inserting the member tine-end first into the subhousing such that tines 37 and 38 are compressed as they pass through the upper portion of retaining portion 50, and snap into place in grooves 51 and 52. Connector member 18 is thus axially retained in place by shoulder member 31 on one side of retaining portion 50 and by tines 37 and 38 on the other side, which also provide rotational restriction. A connector is thus positioned in a subhousing 20 to provide functionally identical wire engaging slots on both ends, and both sides of panel member 11.

As may be seen best with reference to Figure 1, both ends of subhousings 20 include a pair of diametrically opposed axially extending slots 61 and 62 in the cylinder walls with one of the slots on each end aligned with one of slots 33 or 39 and the other slots on each end aligned with the recesses formed by trimming blades 34 or 40. Preferably, the subhousing slots and connector members slots coextend for a minimum of two or three diameters of the wire size to be connected, such that two or three wires may be connected to connector member 18 on either end thereof, as explained below. Further inter subhousing slots 63 are provided, coaxially extending with associated cylinder wall slots 61 or 62.

As shown best in FIG. 6, slots 61, 62 and 63 have generally the same width, which is slightly greater then the diameter of the wire to be installed, so as to not engage the wire during installation. Slots 61, however, are preferably formed to include relatively thin arcuate axially extending lips 55 and 56 along each opposite edge, with the width of the opening between the lips 55 and 56 being slightly less than the diameter of a wire to be installed, such that when a wire is inserted transverse to its axis it is gripped by the slot 61, thereby providing a mechanical strain relief for a wire. Although the invention is not limited to specific dimensions, it provides a slot (61, 62, 63) width of .045", an inter lip opening width of .025" , and a lip radius of .010" for .032" to .035" insulated wire. These relative ratios of dimensions have been found to permit wires to be relatively easily manually pulled or pressed in between the lips without undue force during preliminary placement, and to avoid deformation or weakening of the conductor during installation. Moreover, the arrangement provides that the wire may slide downward between the lips via the force applied by the insertion tool, which force is applied on only the portion of the wire lying inside the subhousing. It shall be noted that slots 61, 62 and 63 are identical for a particular end of a housing 15 so that all strain relief slots 61 are on a common side of the subhousings 20.

Housing 15 includes four flexible bridge members 70-73 and a pair of shoulders 74 and 75 to accommodate snap-in mounting of housing 15 in aperature 12 of panel 11. Reinforcement wedges 69 may be provided integral with housing 15 to add to the structural strength of the end subhousings. Each of bridges 70-73 is supported in a spaced apart relationship with the main body of housing 15

and includes a respective ramping portion 76-79, the cross section of which may be best seen in Figure 3. Four corresponding tab members 80-83 are provided on the panel member 11 to extend into aperature 12. Installation of housing 15 in panel 11 is thus accomplished by inserting the unshouldered end of housing 15 into aperature 12, such that ramps 76-79 engage the respective tabs 80-83 and compress the bridge members 70-73 as the housing 15 is pushed down into the aperature 12, with tabs 80-83 snapping over the top edge of the bridge members as shoulder members 74 and 75 engage panel member 11. Housing 15 is thus irremovably retained in a mounted position on panel member 11.

The tool provided for and the method for installing wires in a connector member 18 will now be explained with particular reference to FIGS. 3, 4 and 5. In Figure 5, the wire installing tool according to the present invention is shown in cutaway perspective view. The tool 90 includes a shaft 91 to be connected to a handle (not shown), for example a conventional screwdriver handle. The end of shaft 91 includes a tip portion 92 including a cylindrical member 93 having an outside diameter smaller than the inside diameter of the extent of a subhousing 20 surrounding the connector member 18, and an inside diameter slightly greater than the outside diameter of a connecting member 18. A center post or punch member 94 is concentrically disposed within cylindrical member 93, and has a radius slightly smaller than the inside diameter of the connector member 18. Punch member 94 includes a smaller diameter portion 100 which is spaced axially apart from the end of punch member 94 so that when the tool is fully inserted the smaller diameter portion is axially beyond the end of connector member 18. A bored aperature 101 is provided and extends from the inside of tool 90 to the outside of both sides of tip 92. The arrangement of smaller diameter portion 100 and aperature 101 facilitates the movement of plastic and metal residue produced by wire trimming up between members 94 and 95 out of aperature 101, so that the tool does not jam with residue. Member 93 further includes a shoulder 95 of generally the same outside diameter of a subhousing 20, such that when the tool is inserted into a subhousing the shoulder rests on the end edges thereof, and such that the tip 92 of the tool extends downwardly inside and around a connector member 18.

Installation of wires and connectors 18 may be accomplished using tool 90 as follows. As for example shown in Figure 1, a wire to be installed may be layed in slots 61, 62 and 63 (leftmost wire), and manually pulled down across the top of connecting member 18 (rightmost wire) with the excess wire extending outwardly from the slot adjacent the trimming blade 34 or 40, as determined by which end of housing 15 the wire is installed in. It will be noticed that for any given side of housing 15 that each connector member 18 is aligned with its wire receiving slot facing in the same direction such that wires to be installed are all layed in with the excess wire extending from the same face of the housing. As explained above, each of lipped slots 61 provide a wire restriction which is preferably slightly less wide than the out side diameter of the insulation on a wire to be installed. Thus, a wire may be manually positioned for insertion by pressing or pulling it into engagement with a slots 61 across the top of a connector member 18, and retained there until fully installed with tool 90. Once fully installed, the gripping force of the lipped slots 61 provide an effective strain relief so that if wires are pulled or bumped after installation the connection with the connector member 18 is not disturbed.

With a wire or wires properly positioned in slots 61, 62 and 63 of one or more subhousings, tool 90 is inserted into the end of a subhousing, as facilitated by the subhousings reatively large funnel shaped ends 17. As the tool 90 moves into the subhousing, the funnel shape aids in axially aligning the tool 90 with respect to the connecting member 18, so that the tool 90 engages the wire and pushes it into the wire receiving slot 33 or 34. The trimming blade 34 or 40 of a connector member 18 severs the excess length of wire and as the wire slides in the slot 33 or 34 such that the insulation of the wire is pierced by the inside edges of a respective 33 or 34 slot in order to make an intimate electrical contact and a mechanical connection with the connecting member 18, as illustrated in FIG. 2. The excess length of wire sheared off by cutting edge 34 or 40 may be easily removed manually. As explained above, trimming residue may travel up the inside of tip 92 of tool 90 and out aperature 101. Also, it shall be seen that tool 90 pushes the wire further into lipped slot 61 so that the wire extends substantially transversely from the subhousing when installed.

Thus, it shall be seen then that the above-described connector module, installation tool and method of installation provides that a plurality of wires may be secured in place for installation via the wire gripping slots in a single series of operations, and then fully installed in a series of installation operations such that switching back and forth between wire placement and installation with the wire installing tool is not required where two or more wires are sought to be installed sequentially. Also, it shall be seen that two or three wires may be installed in a given slot either sequentially or simultaneously. Moreover, it shall be seen that the installation tool of the present invention is com-

pletely symetrical such that the installation tool does not need to be oriented other than being axially aligned with a subhousing and connector member. Significant time savings in wire installation and savings in tool costs are thus accomplished. Still further, it shall be seen that construction of the housing 15 with a rigid plastic material in conjunctiоn with the operation of the installation tool results in the absorbtion by the housing of most of the force applied via the tool, such that deformation or damage to the connector members 18 is avoided. Last, but not least, it shall be seen that the connector module of the present invention may be easily mounted on a panel 11 in a snap in fashion.

Claims

1. Electrical connector apparatus (10) comprising:
   a plurality of metal split cylinder means (18) each including a slot (33) for receiving and engaging a insulated wire to form an electrical connection, characterized by
   a non-conductive housing (15) configured to provide a plurality of cylindrical subhousings (20) each for con-centrically supporting one of said split cylinder means (18), each of said subhousings including slots (61;62) on diametrically opposed sides with one of said subhousing slots coaxially extending with said split cylinder slot;
   said subhousings aligned in two rows with said subhousing slots aligned transversely to said rows, the subhousings in each row laterally spaced apart to form a plurality of inter subhousing slots (63) and the subhousings in different rows laterally offset so that one slot of each subhousing is aligned with one of said inter subhousing slots whereby wires to be connected may be laid side by side in said subhousing slots before being inserted in said split cylinders.

2. Electrical connector apparatus according to claim 1 wherein said aligned subhousing slots (61;62) and inter subhousing slots (63) form a complete wire receiving slot and further wherein each of said wire receiving slots include strain relief means (55;56) for retaining one of said insulated wires inserted within said wire receiving slot whereby wires laid in said wire receiving slots are gripped by said strain relief means.

3. Electrical connector apparatus according to claim 2 wherein said strain relief means comprises a pair of opposing lips (55;56) protruding into said one of said subhousing slots (61) coaxially extending with the wire engaging slot in said split cylinder means to pinch and grip the insulation of an inserted wire.

4. Electrical connector apparatus according to claim 1 wherein opposing surfaces of subhousings within a same row are generally parallel and transverse to said row with said opposing parallel surfaces defining said inter subhousing slots (63).

5. Apparatus according to any of the preceeding claims further comprising a panel for supporting said housing (15), said panel (11) having an aperture size to receive said housing (15) with said subhousings (20) generally normal to said aperture; said housing having a plurality of flexible bridge members (70-73) supported on said housing and spaced therefrom and aligned to oppose a plurality of tabs (80-83) protruding into said aperture and rigidly secured to said panel, said tabs sized to engage the surface of said bridge members as said housing is urged into said aperture and said tabs flexing said bridge members and said bridge members flexing back after said bridge members have passed said tab.

6. Apparatus according to any of the preceeding claims wherein the inside surfaces of the ends of said subhousings are funnel shaped so that the insertion and alignment of an insertion tool is facilitated.

7. A wire insertion tool for inserting a wire into an electrical connector apparatus characterized by a central post (94) sized to fit inside a split cylinder means (18) supported in a housing (15) arranged in said connector apparatus, a cylinder member (93) extending around said post (94) and sized to fit around the outside perimeter of said cylinder means (18) between the cylinder means (18) and the housing (15), and a shoulder (95) axially displaced from a free end of said central post (94), said shoulder (95) engaging an edge of an end of said housing (15), thereby pressing a wire laid across the top of said split cylinder means (18) axially into a co-axially extending slot (33) of said cylinder means (18).

Revendications

1. Appareil de connexion électrique (10) comprenant:

- une pluralité de moyens métalliques (18) cylindriques fendus ayant chacun une fente (33) pour l'engagement et la réception d'un fil isolé afin d'établir une connexion électrique, caractérisé par
- un boîtier (15) non conducteur configuré pour constituer une pluralité de sous-boîtiers cylindriques (20) pour porter chacun concentriquement l'un des moyens cylindriques fendus (18), chacun de ces sous-boîtiers ayant des fentes (61,62) sur des côtés diamètralement opposés avec l'une de ces fentes de sous-boîtier s'étendant coaxialement à ladite fente du cylindre fendu,
- ces sous-boîtiers alignés en deux rangées avec les fentes de sous-boîtier alignées en sens transversal à ces rangées, les sous-boîtiers étant espacés latéralement dans chaque rangée pour constituer une pluralité de fentes (63) entre-sous-boîtiers et les sous -boîtiers de rangées différentes étant décalés latéralement de sorte qu'une fente de chaque sous-boîtier est alignée avec l'une des fentes entre-sous-boîtiers si bien que des fils à raccorder peuvent être disposés côte à côte dans lesdites fentes de sous-boîtiers avant d'être introduits dans les cylindres fendus.

2. Appareil de connexion électrique selon la revendication 1 dans lequel les fentes alignées (61,62) de sous-boîtier et les fentes (63) entre-sous-boîtiers forment une fente totale de réception de fil,et dans lequel, en plus, chacune des fentes de réception de fil comprend un moyen (55, 56) de soulagement d'effort pour retenir l'un des fils isolés introduit dans la fente de réception de fil de sorte que les fils placés dans les fentes de réception de fil sont agrippés par ce moyen de soulagement d'effort.

3. Appareil de connexion électrique selon la revendication 2 dans lequel le moyen de soulagement d'effort comprend une paire de lèvres opposées (55,56) saillantes dans 1'une desdites fentes de sous-boîtier (61) s'étendant coaxialement à la fente pour l'engagement d'un fil dans le moyen cylindrique fendu pour pincer et agripper l'isolant d'un fil introduit.

4. Appareil de connexion électrique selon la revendication 1 dans lequel des surfaces opposées des sous-boîtiers d'une même rangée sont généralement parallèles et transversales à cette rangée avec lesdites surfaces opposées parallèles définissant lesdites fentes (63) entre-sous-boîtiers.

5. Appareil selon l'une quelconque des revendications précédentes comprenant en plus un panneau pour porter ledit boîtier (15), ce panneau (11) ayant une ouverture dimensionnée pour recevoir ce boîtier (15) avec les sous-boîtiers (20) perpendiculaires dans l'ensemble à cette ouverture, ce boîtier ayant une pluralité d'éléments flexibles (70- 73) en dérivation portés par ce boîtier et espacés de celui-ci et alignés pour se trouver en opposition à une pluralité de pattes (80-83) saillantes dans cette ouverture et fermement fixées à ce panneau, ces pattes étant dimensionnées pour s'engager avec la surface desdits éléments en dérivation lorsque ce boîtier est poussé dans l'ouverture et les pattes faisant fléchir les éléments en dérivation et ces derniers fléchissant en retour quand ils ont passé au-delà des pattes.

6. Appareil selon l'une quelconque des revendications précédentes dans lequel les surfaces intérieures des extrémités des sous-boîtiers sont profilées en entonnoir de sorte que l'introduction et l'alignement d'un outil d'introduction est facilitée.

7. Outil d'introduction de fil pour introduire un fil dans un appareil de connexion électrique caractérisé par une tige centrale (94) dimensionnée pour s'ajuster à l'intérieur d'un moyen cylindrique fendu (18) tenu dans un boîtier (15) arrangé dans cet appareil de connexion, par un organe cylindrique (93) s'étendant autour de ladite tige (94) et dimensionné pour s'ajuster autour du périmètre extérieur de ce moyen cylindrique (18) entre celui-ci et le boîtier (15), et par un épaulement (95) déplacé en sens axial à partir d'une extrémité libre de la tige centrale (94), cet épaulement (95) venant en contact avec le bord d'une extrémité dudit boîtier (15), pressant de cette façon un fil posé en travers du sommet du moyen cylindrique fendu (18), en sens axial dans une fente (33) s'étendant coaxialement dudit moyen cylindrique (18).

Ansprüche

1. Elektrisches Verbindungsgerät (1Ø) mit:

einer Vielzahl von metallischen Spaltzylindergliedern (18), die einen Schlitz (33) zur Aufnahme eines und zum Eingriff mit einem isolierten Draht zur Bildung einer elektrischen Verbindung aufweist, gekennzeichnet durch

ein nichtleitendes Gehäuse (15), das aus-

gebildet ist, um eine Vielzahl von zylindrischen Subgehäusen (2Ø) vorzusehen, und zwar jedes für das zentrische Tragen eines der besagten Spaltzylinderglieder (18), wobei jedes der besagten Subgehäuse Schlitze (61, 62) auf den diametral entgegengesetzten Seiten aufweisen, wobei sich einer der besagten Subgehäuseschlitze koaxial mit besagtem Spaltzylinderschlitz erstreckt;

besagte Subgehäuse sind in zwei Reihen ausgerichtet, wobei besagte Subgehäuseschlitze quer zu besagten Reihen ausgerichtet sind, wobei die Subgehäuse in jeder Reihe seitlich im Abstand zueinander angeordnet sind, um eine Vielzahl von Zwischensubgehäuseschlitzen (63) zu bilden, wobei die Subgehäuse in den verschiedenen Reihen derart seitlich zueinander versetzt sind, daß ein Schlitz jedes Subgehäuses gegenüber einem der besagten Zwischensubgehäuseschlitze ausgerichtet ist, wodurch die zu verbindenden Drähte Seite an Seite in besagten Subgehäuseschlitzen einlegbar sind, bevor sie in besagten Spaltzylindern eingesetzt werden.

2. Elektrisches Verbindungsgerät nach Anspruch 1, bei dem besagte ausgerichtete Subgehäuseschlitze (61, 62) und Zwischensubgehäuseschlitze (63) einen vollständigen Drahtaufnahmeschlitz bilden und bei dem ferner jeder der besagten Drahtaufnahmeschlitze Spannungsentlastungsmittel (55, 56) zum Halten eines der besagten isolierten Drähte bildet, die innerhalb des besagten Drahtaufnahmeschlitzes eingesetzt sind, wodurch in den Drahtaufnahmeschlitzen eingelegte Drähte durch besagte Spannungsentlastungsmittel gefaßt sind.

3. Elektrisches Verbindungsgerät nach Anspruch 2, bei dem besagtes Spannungsentlastungsglied ein Paar von gegenüberstehenden Schneiden (55, 56) hat, die in besagten einen der besagten Subgehäuseschlitze (61) vorstehen, die sich koaxial zu dem Drahtaufnahmeschlitz in besagtem Spaltzylinderglied erstreckt, um die Isolation eines eingesetzten Drahtes einzuklemmen und zu fassen.

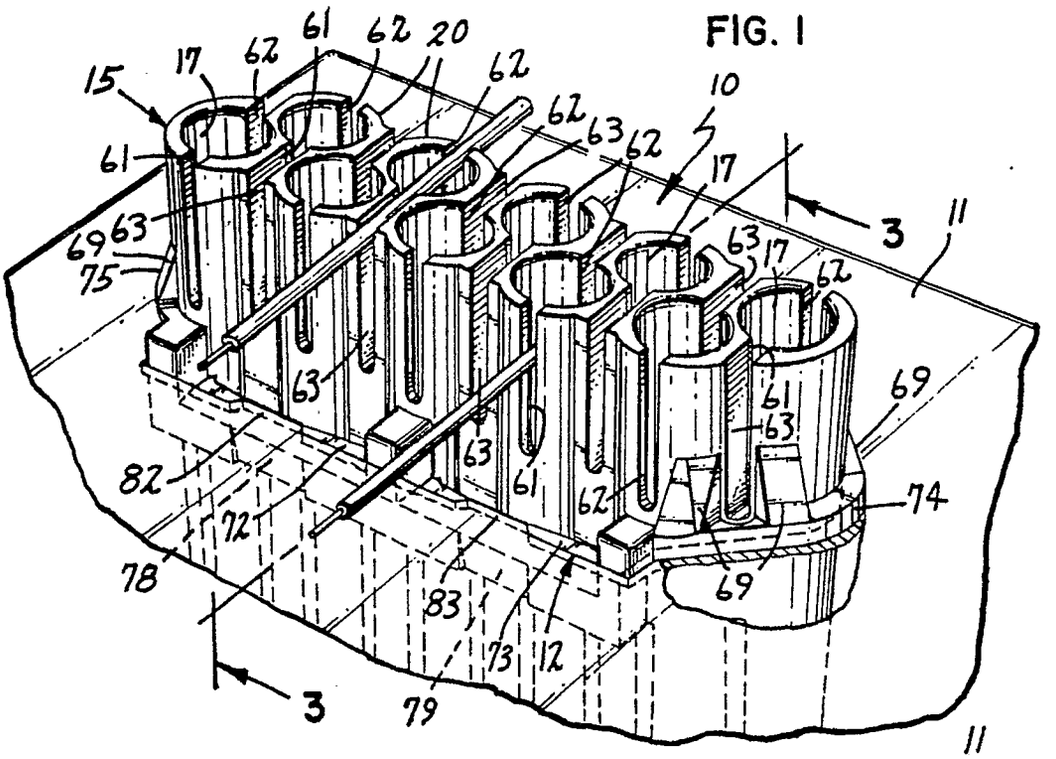
4. Elektrisches Verbindungsgerät nach Anspruch 1, bei dem gegenüberstehende Oberflächen der Subgehäuse innerhalb derselben Reihe sich generell parallel und quer zu besagter Reihe mit den besagten gegenüberstehenden parallelen Oberflächen erstrecken, die die besagten Zwischensubgehäuseschlitze (63) bilden.

5. Gerät nach einem der vorherigen Ansprüche mit einem Paneel zum Tragen des besagten Gehäuses (15), wobei besagtes Paneel (11) eine Öffnung der Größe hat, um besagtes Gehäuse (15) mit besagten Subgehäusen (2Ø) im wesentlichen senkrecht zu besagter Öffnung aufzunehmen; besagtes Gehäuse hat eine Vielzahl von flexiblen Brückengliedern (7Ø bis 73), die am besagten Gehäuse und im Abstand von diesem getragen und derart ausgerichtet sind, daß sie einer Vielzahl von Stegen (8Ø bis 83) gegenüberstehen, die in besagte öffnungen vorstehen und starr an besagtem Paneel befestigt sind, wobei die Stege derart bemessen sind, daß sie mit der Oberfläche besagter Brückenglieder in Eingriff kommen, wenn besagtes Gehäuse in besagte öffnung eingedrückt und besagte Stege besagte Brückenglieder verbiegen und besagte Brückenglieder zurückbiegen, nachdem besagte Brückenglieder die besagten Stege passiert haben.

6. Vorrichtung nach einem der vorhergehenden Ansprüche, bei dem die Innenoberfläche der Enden besagter Subgehäuse tunnelförmig ausgebildet sind, so daß das Einsetzen und das Ausrichten eines Einsetzwerkzeuges erleichtert ist.

7. Ein Drahteinsatzwerkzeug für das Einsetzen eines Drahtes in ein elektrisches Verbindungsgerät, gekennzeichnet durch einen zentralen Stift (94), der so bemessen ist, um in ein Spaltzylinderglied (18) zu passen, das in einem Gehäuse (15) getragen ist, welches in besagtem Verbindungsgerät angeordnet ist, durch ein Zylinderglied (93), das sich um besagten Stift (94) erstreckt und so bemessen ist, daß es um den Außenumfang besagten Zylindergliedes (18) zwischen dem Zylinderglied (18) und dem Gehäuse (15) paßt, und durch eine Schulter (95), die gegenüber dem freien Ende besagten zentralen Stiftes (94) versetzt ist, wobei besagte Schulter (95) an einer Kante eines Endes des besagten Gehäuses (15) anschlägt, wodurch ein quer über die Oberseite des besagten Spaltzylindergliedes (18) gelegter Draht axial in einen koaxial sich erstreckenden Schlitz (33) des besagten Zylindergliedes (18) gepreßt wird.

FIG. 1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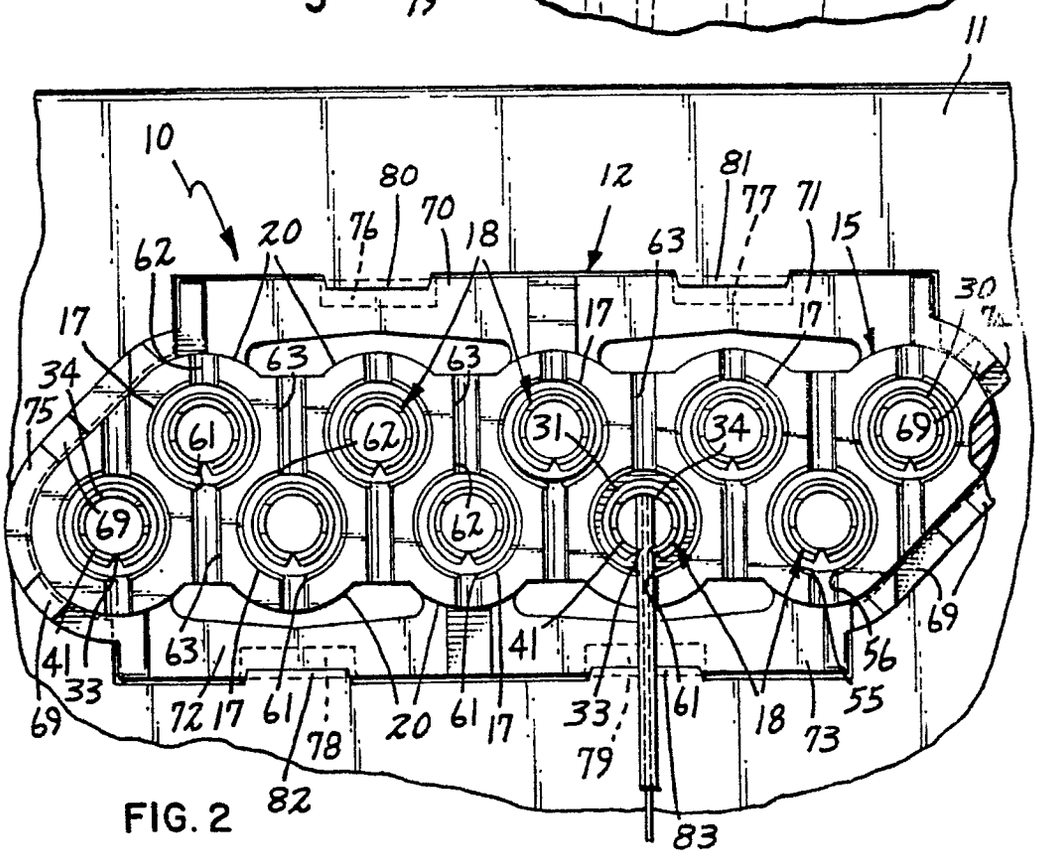
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FIG. 2

FIG. 3

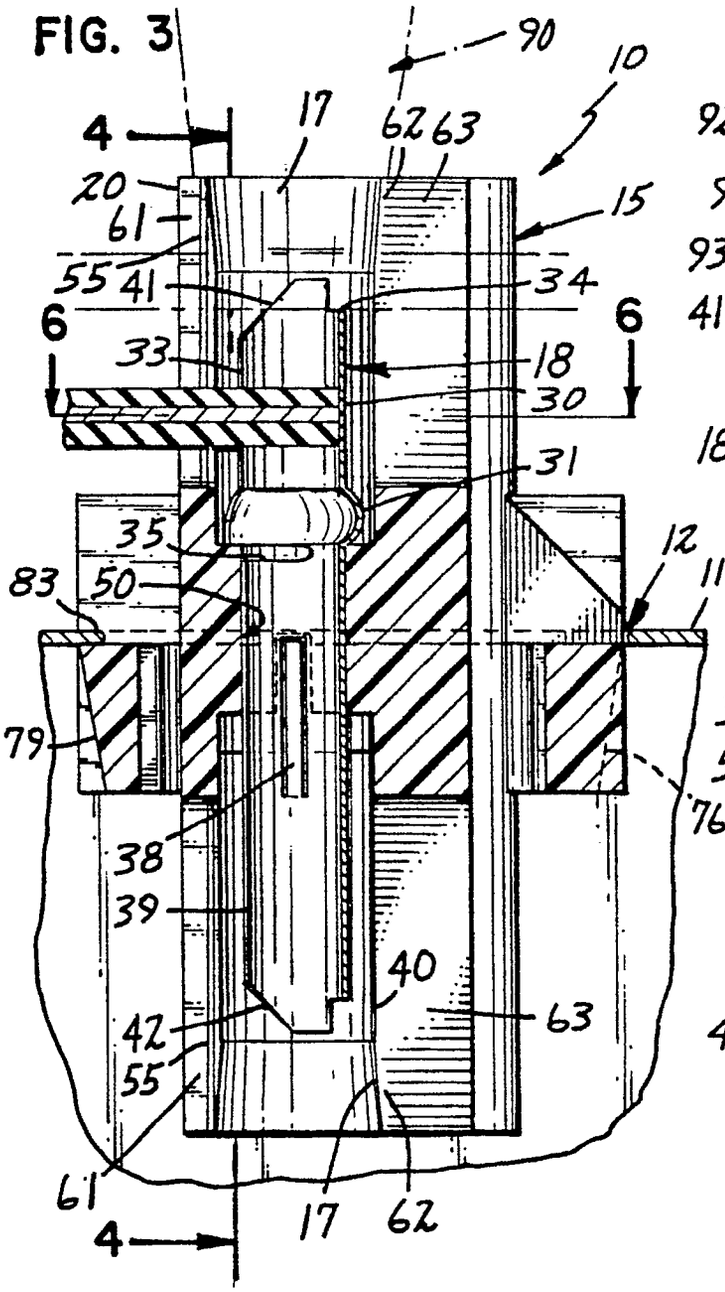
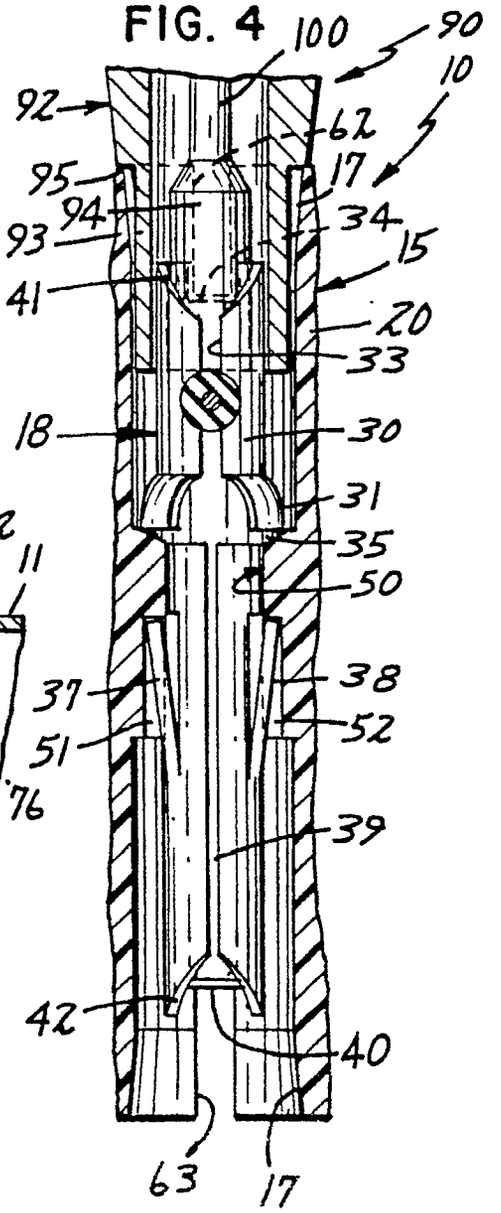


FIG. 4



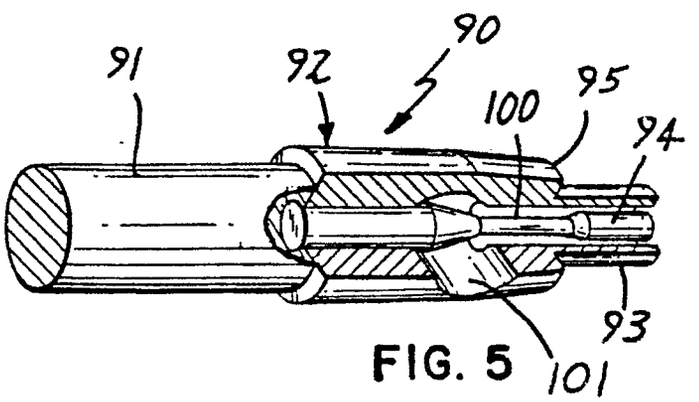


FIG. 5

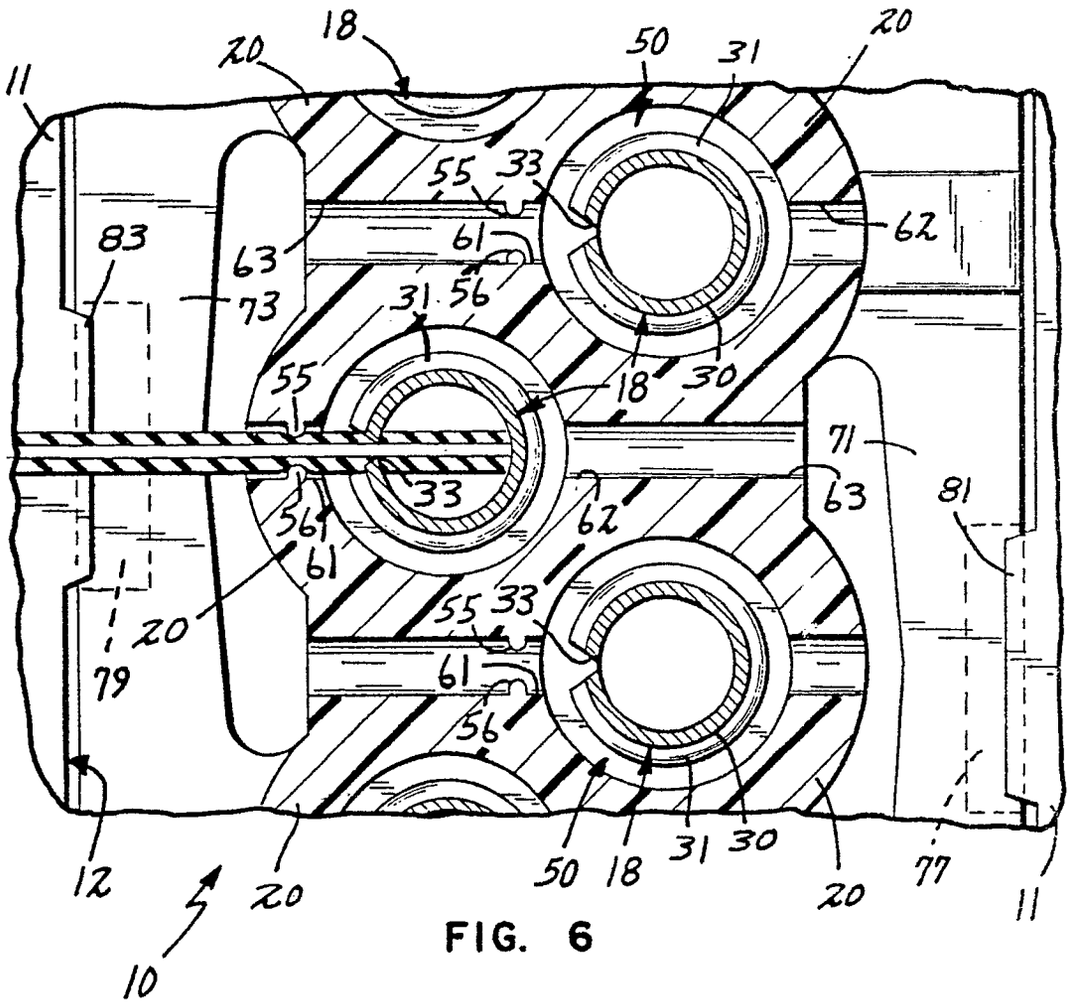

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FIG. 6