

Aug. 25, 1964

J. F. SHEARER ETAL

3,146,054

CONNECTOR WITH INDEXING MEANS

Filed May 3, 1961

3 Sheets-Sheet 1

FIG. 1

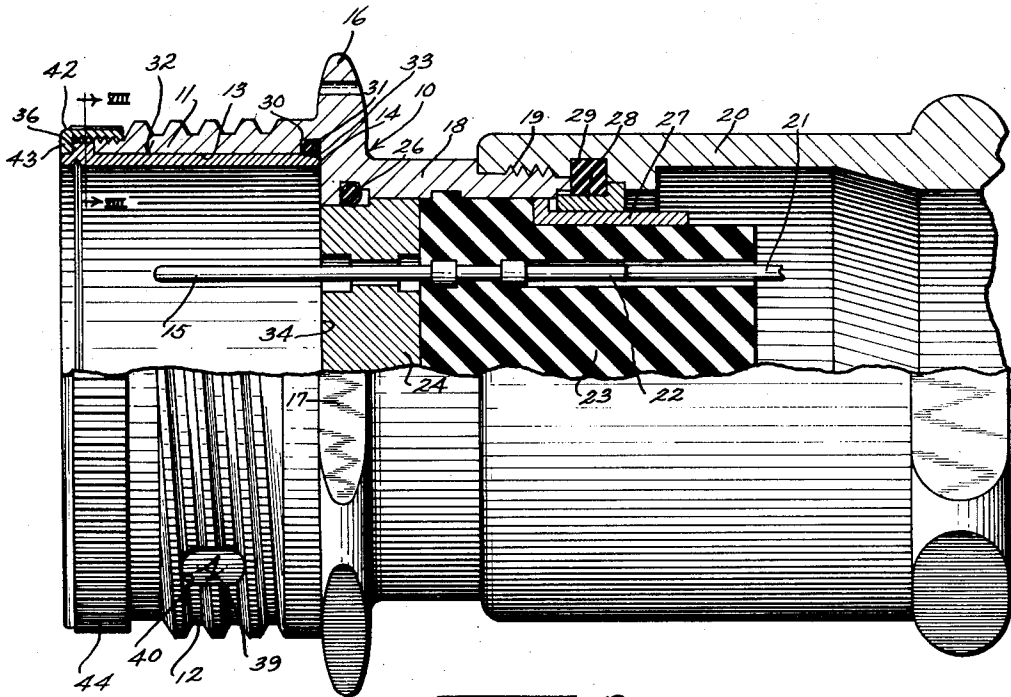
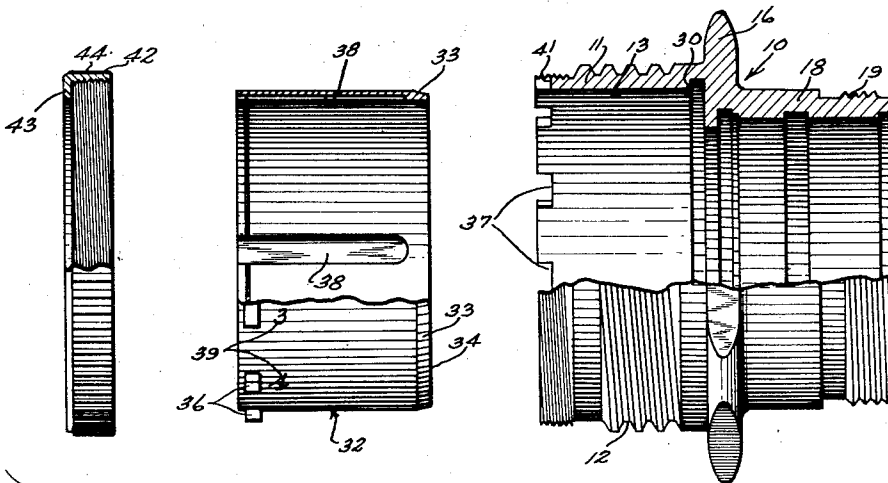


FIG. 3



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FIG. 2

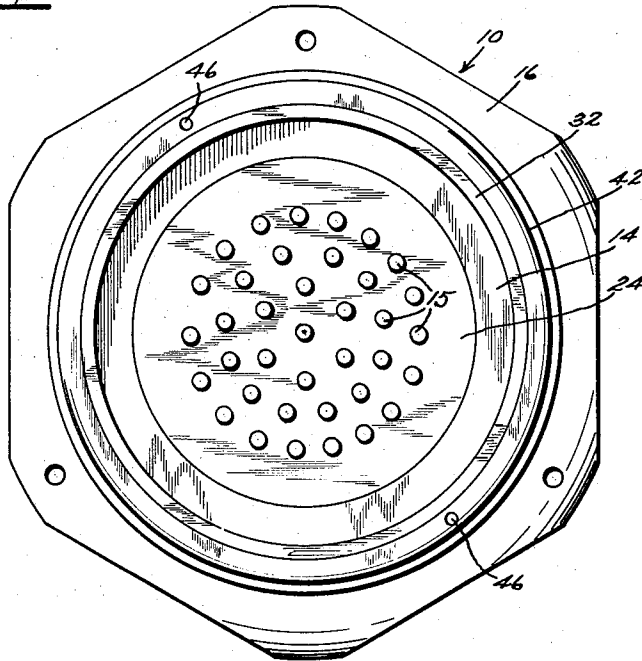


FIG. 4

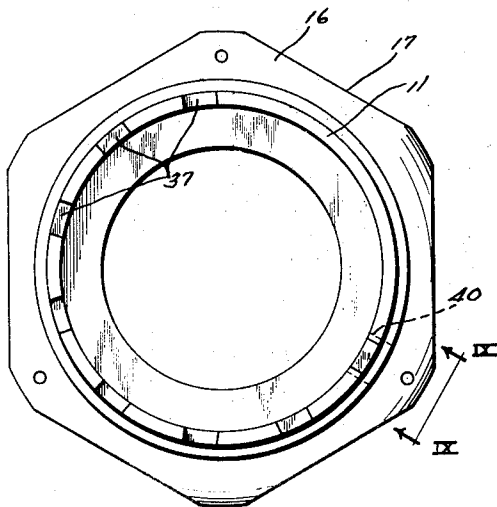
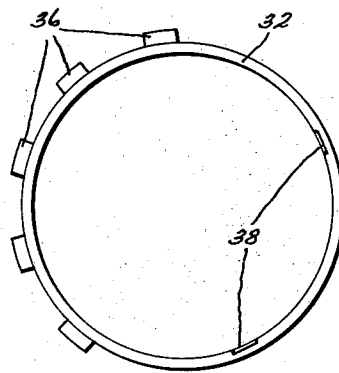


FIG. 5



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FIG. 6

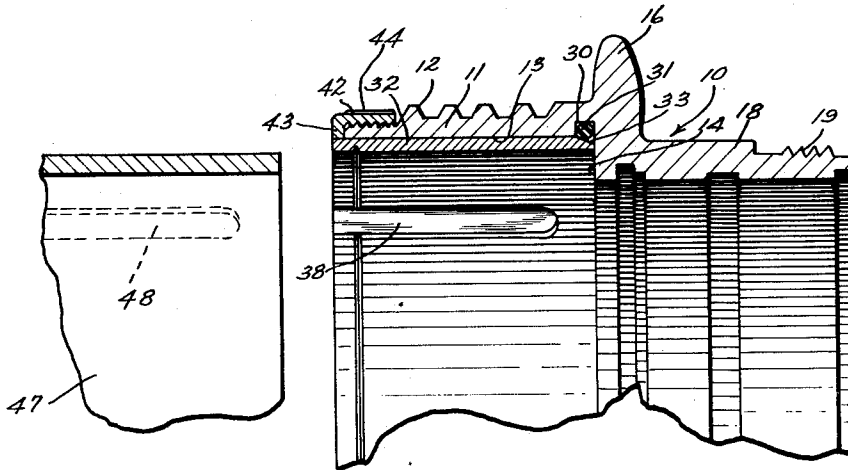


FIG. 7

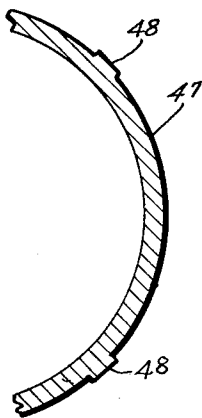


FIG. 8

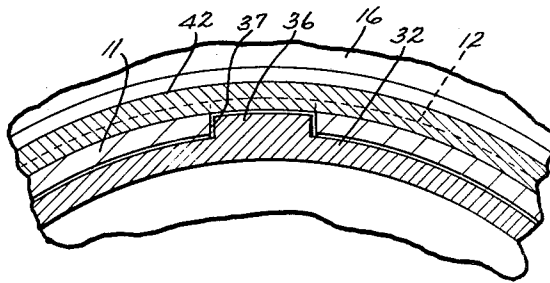
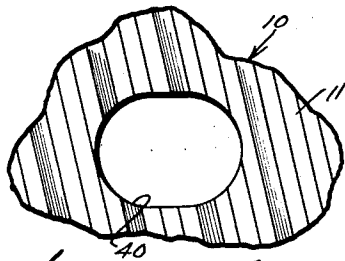


FIG. 9



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3,146,054

CONNECTOR WITH INDEXING MEANS

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 Filed May 3, 1961, Ser. No. 107,386
 5 Claims. (Cl. 339-113)

This application is a continuation-in-part of our co-pending application Serial No. 89,814, filed February 16, 1961, now Patent No. 3,097,905 issued July 16, 1963.

This invention relates generally to electrical connectors and more particularly relates to an indexable key device for use with connectors wherein identical plug and receptacle structures can be provided with multiple prealignments to insure proper mating relationship, however, the environmental integrity of the connector is maintained equal to that of a non-indexable connector.

In the connector art, it is standard practice to polarize the insulation and contact unit in a definite relationship with the keys which polarize the male shell and the female housing. This is generally accomplished by putting a key in the housing which matches a milled or molded keyway in the insulation. It is also standard practice to make the pin layout in such a manner that a multiplicity of keyways can be put in the insulation in such locations that similar units with different key locations cannot be plugged with any unit except the one for which it is intended. Heretofore, multiple different male and female constructions were required to afford keying arrangements so that each paired unit could be mounted in line with some assurance that each receptacle would only accept a properly keyed plug.

In accordance with the principles of the present invention, an indexable key device is provided wherein standard parts can be prealigned in multiple prealignments, thereby enabling parts to be constructed of identical characteristics and such parts can be stock piled and prealigned through the assembly relationship of the indexable key device.

Briefly described, there is a cylindrical shell portion of a receptacle with an indexing sleeve or polarization adapter insertable therein. The front end of the cylindrical portion has a plurality of slots or notches in appropriate position to engage tabs or lugs which project outwardly of the indexing sleeve or polarization adapter. The indexing sleeve is provided with depressed indicia means, while the cylindrical portion of the receptacle is provided with an opening in register with the indicia means, thereby to identify the key position location. The indexing sleeve is particularly characterized by internal key means for engaging the mating key means of a plug to be inserted into the receptacle. A lock nut is also provided engaging the end of the cylindrical portion and locking the indexing sleeve or polarization adapter in proper indexed assembly with the receptacle. To change key positions, the adapter is lifted until the lugs or tabs disengage the slots or notches and is rotated to a different selected position. The flange of the lock nut is provided with circumferentially spaced detent means for engaging the mating detent means of a special spanner wrench, thereby preventing disturbance of a selected prealignment by unauthorized personnel.

It is an object of the present invention to provide an indexable key connector for electrical connector apparatus.

Yet another object of the present invention is to provide a plug and receptacle type multicontact connector with an indexing sleeve internal to the receptacle shell and a locking nut external to the indexing sleeve.

Many other advantages, features and additional objects

of the present invention will become manifest to those versed in the art upon making reference to the detailed description which follows and the accompanying sheets of drawings in which a preferred structural embodiment of the present invention is illustrated by way of example.

On the drawings:

FIGURE 1 is an elevational view of a receptacle incorporating the indexing means of the present invention and with parts broken away and parts shown in cross-section.

FIGURE 2 is an end elevation of the receptacle of FIGURE 1.

FIGURE 3 is an exploded view showing from left to right the lock nut, the indexing sleeve and the receptacle of the present invention.

FIGURE 4 is an end elevational view of the receptacle part per se.

FIGURE 5 is an elevational view of the indexing sleeve or polarization adapter.

FIGURE 6 is a subassembly view showing of a receptacle with the indexing means of the present invention in assembled relationship and with a plug member about to be inserted into the receptacle.

FIGURE 7 is a fragmentary cross-sectional view to illustrate additional details of construction of the plug member.

FIGURE 8 is a fragmentary cross-sectional view taken on line VIII-VIII of FIGURE 1.

FIGURE 9 is a fragmentary cross-sectional view taken on line IX-IX of FIGURE 4.

As shown on the drawings:

Although the principles of the present invention are generally applicable to any plug and receptacle type multipin connector, the illustrative embodiment incorporating the principles of the present invention is shown in FIGURE 1 as comprising a receptacle 10 having an axially projecting cylindrical part 11 externally threaded as at 12 and having a cylindrical bore wall 13 terminating in a radial shoulder 14, thereby to surround a plurality of pin contacts 15 adapted to mate with the corresponding contacts of a plug member inserted therinto.

The cylindrical portion 11 terminates in a hexagonally shaped flange 16 having flats 17 adapted to be engaged by a tool and a rearwardly projecting axial extension 18 is provided which is threaded as at 19 for engagement with a housing part 20 through which extends conductor wires 21 adapted to be connected to the rear ends of the contact pins 15 as at 22. The contact pins 15 in this particular embodiment are retained in a carrier member made of resilient material shown at 23 which engages against a rigid disk member 24 assembled within the receptacle 10 and sealed by a sealing member 26.

The resilient carrier 23 is urged against the rigid disk 24 by means of a locking assembly which includes a locking sleeve 27 surrounding the carrier 23 and inner and outer ring members 28 and 29 which shoulder against the housing part 20, the axial extension 18 of the receptacle 10 and the locking sleeve 27.

The bore wall 13 is characterized by an annular recess 30 which receives an O ring sealing member 31.

In accordance with the principles of the present invention, there is inserted internally of the cylindrical wall 13 an indexing sleeve or polarization adapter shown generally at 32. The indexing sleeve 32 has a chamfered edge 33 at one end forming a sealing surface for engaging the O ring 31 and the end wall shown at 34 engages the radial wall 14 of the receptacle 10.

Adjacent the opposite end of the sleeve 32, there is provided a plurality of radially outwardly extending tabs or lugs 36 constituting a keying means for interengagement with mating keying means formed in the end of

the cylindrical portion 11 of the receptacle 10 and which mating keying means conveniently take the form of a plurality of circumferentially spaced grooves or notches 37.

By matching the keying means 36 and 37 it will be understood the indexing sleeve 32 can be assembled in different selected indexed positions within the receptacle 10.

The sleeve 32 is further characterized by longitudinal keying means which in this particular embodiment take the form of an internal groove 38. As shown in FIGURE 5 there are two internal grooves 38 formed in the sleeve 32 and five radially outwardly extending lugs 36. As shown in FIGURE 4, the cylindrical portion 11 of the receptacle 10 is formed with eight slots or notches 37. Accordingly, by providing a lesser number of lugs 36 than notches 37, multiple index positions may be provided.

On the peripheral surface of the indexing sleeve 32, there is formed a depressed indicia means, as shown at 39, consisting of a number opposite each respective lug 36 and in axially spaced relation therewith. The indicia means 39 register with an aperture 40 formed in the cylindrical portion 11 of the receptacle 10, thereby permitting the user to determine the proper index location upon viewing the indicia means through the opening 40.

In order to lock the indexing sleeve 32 in adjusted angular positions within the receptacle 10, locking means are provided. Formed immediately adjacent the end of the cylindrical portion 11 there is an external thread means 41 which may be of fine pitch and which is adapted to threadedly receive an internally threaded lock nut 42 having a radially inwardly extending flange 43. The lugs 36 are preferably spaced axially inwardly of the indexing sleeve 32 a sufficient distance to permit the flange 43 to be flush with the end of the sleeve and to abuttingly engage the lugs 36.

The outer peripheral portion of the lock nut 42 may be knurled as at 44 and the radial flange is provided with circumferentially spaced spanner wrench holes 46, thereby to facilitate locking of a selected indexed position which cannot be tampered with by unauthorized personnel.

As shown in FIGURES 6 and 7, a typical part of a plug member is illustrated including a plug shell 47 having formed on the peripheral surface thereof a longitudinally extending keying means which in this illustration of the invention comprises a lug or detent 48 each which mates with a corresponding one of the grooves 38 in the indexing sleeve 32.

It will be appreciated that as many different arrangements may be effected as there are mating keyways, thereby facilitating multiple arrangements with identically constructed parts while assuring that the connector parts may be mounted in line for current-continuing purposes with only the proper keyed relationship between the parts.

To change any selected indexing arrangement, the lock nut 42 is backed off of the threads 41 and the indexing sleeve or polarization adapter 32 is moved to withdraw the lugs 36 from the notches 37, whereupon a different angular position is selected. The sleeve 32 is then simply inserted into place and the lock nut 42 restored into locking position.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. An indexable key device for use with line connectors

comprising a connector shell, a polarization adapter and a lock nut, said connector shell having a bore formed therein and including a plurality of notches circumferentially spaced from one another at one end of the shell, said adapter comprising a sleeve insertable into said shell and including external key means engaging said notches in said shell at different angular alignments of said adapter relative to said shell, said adapter having internal groove means for engaging key means in a mating receptacle, said shell having an aperture formed therein and said adapter having an indicia on the peripheral surface thereof in register with said aperture to identify the relative angular alignment therebetween, and said lock nut being engageable with one end of said shell and engaging said adapter to lock the adapter in fixed position.

2. In a connector, a shell having a cylindrical part adapted to receive a mating connector shell in keyed assembly therewith, and a polarization adapter part comprising a sleeve inserted into said cylindrical part, said sleeve being longitudinally keyed internally for engaging the adjoining key means of the mating connector shell, said cylindrical part and said adapter part having angularly spaced interfitting lug and recess means formed therebetween to prealign the angular relationship of the connector shell.

3. In an indexable multi-contact plug and receptacle, a cylindrical part on said receptacle having a front edge formed with plural notches, an adapter sleeve having external lugs lesser in number than said notches and insertable into said cylindrical part in different selected angular alignments predetermined by the engagement of said lugs with said notches, and a plug insertable into said receptacle, said plug and said adapter sleeve having interfitting key means determining the polarization of the multiple contacts.

4. In a line connector, a receptacle having a cylindrical shell part formed with a circumferentially extending wall terminating in a radial shoulder, an annular recess in said wall adjacent said shoulder, an O ring sealing member in said recess, an indexing sleeve inserted into said shell part having its leading end portion engaging said radial shoulder and having its peripheral surface engaged by said O ring sealing member, said sleeve and said shell having interfitting detent means at the other end of said sleeve prealigning the indexing sleeve in selected angular indexed position, a lock nut threaded on said cylindrical part and retaining said sleeve in indexed assembly with said receptacle, calibrating means including an opening in said shell part and indicia means on said sleeve registerable with said opening to identify the key position location of said indexing sleeve, and internal key means in said indexing sleeve to receive a keyed plug member in proper mating relationship.

5. In a line connector as defined in claim 4, said indexing sleeve having a chamfered portion at its leading end forming a sealing surface for engaging said O ring.

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