

[54] **MAGNETIC SELF-ALIGNING
QUICK-DISCONNECT FOR A TELEPHONE
OR OTHER COMMUNICATIONS
EQUIPMENT**

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339/48, 339/65**

[51] Int. Cl. **H01I 11/30**

[58] Field of Search **339/12 R, 12 V, 12 L, 12 G,
339/64 R, 64 M, 65, 27, 46, 47 R, 47 C, 48,
222; 335/205, 285; 48/206 A**

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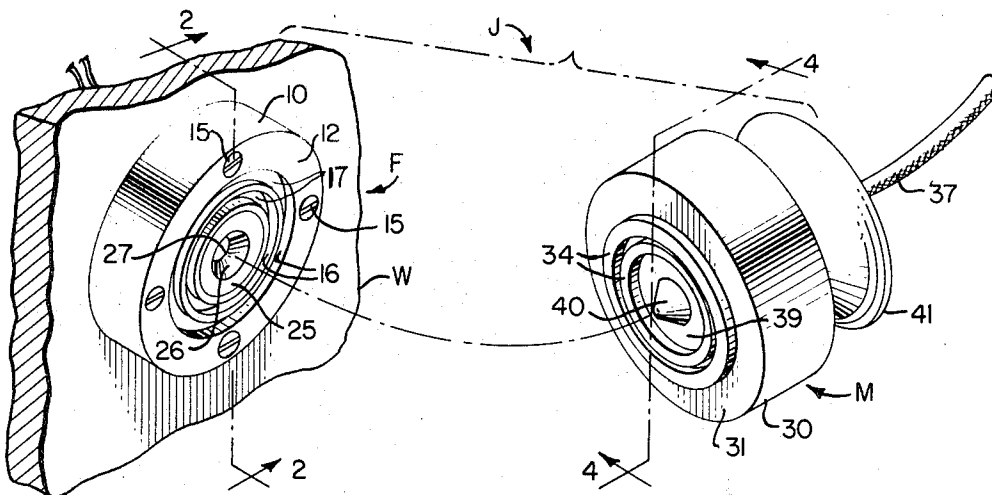
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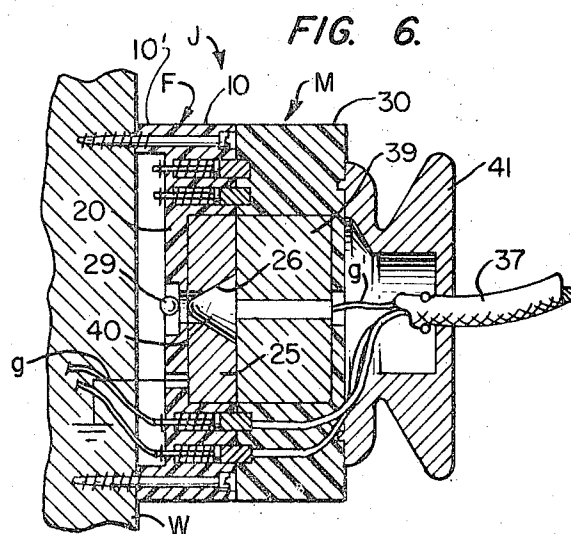
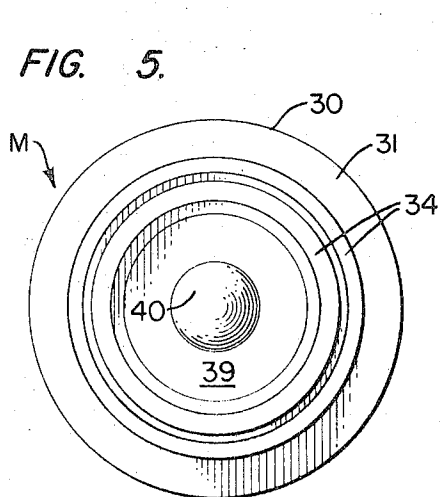
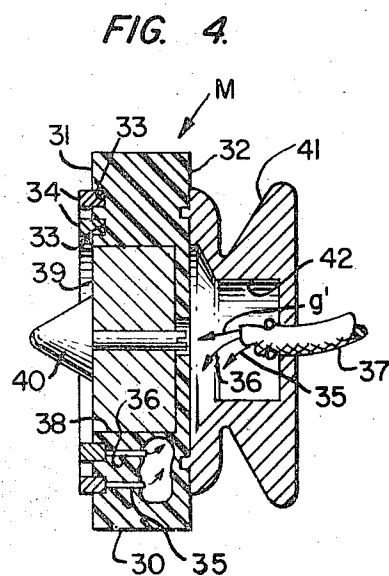
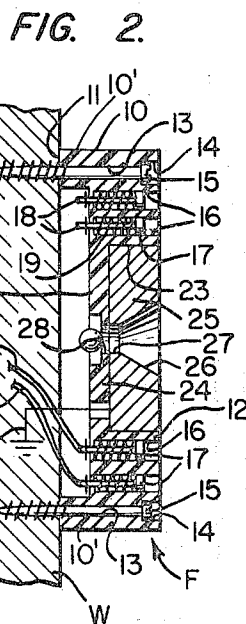
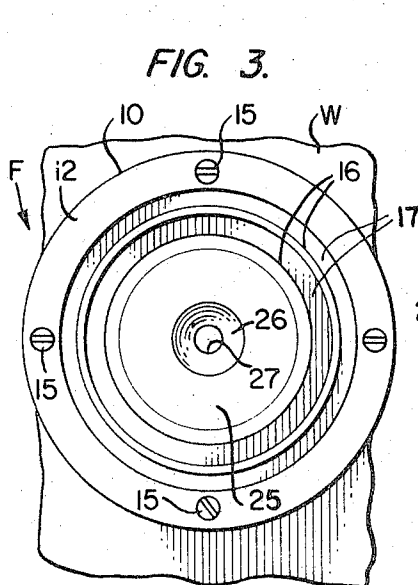
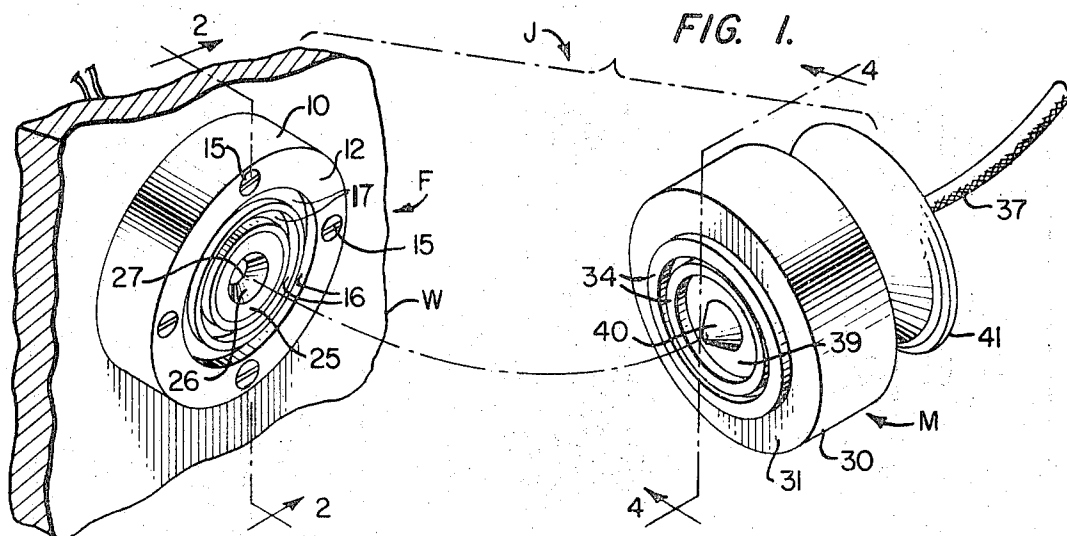
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ABSTRACT

A quick-disconnect, magnetic, self-aligning telephone jack or other communication equipment connection, including a male connector half and a female connector half, each with self-aligning magnetic means therein to hold the male and female halves together and cooperating electrical contact means in the male and female connector halves to establish electrical connection between a telephone or other communication equipment and a source of electrical energy.

10 Claims, 15 Drawing Figures





SHEET 2 OF 3

FIG. 7.

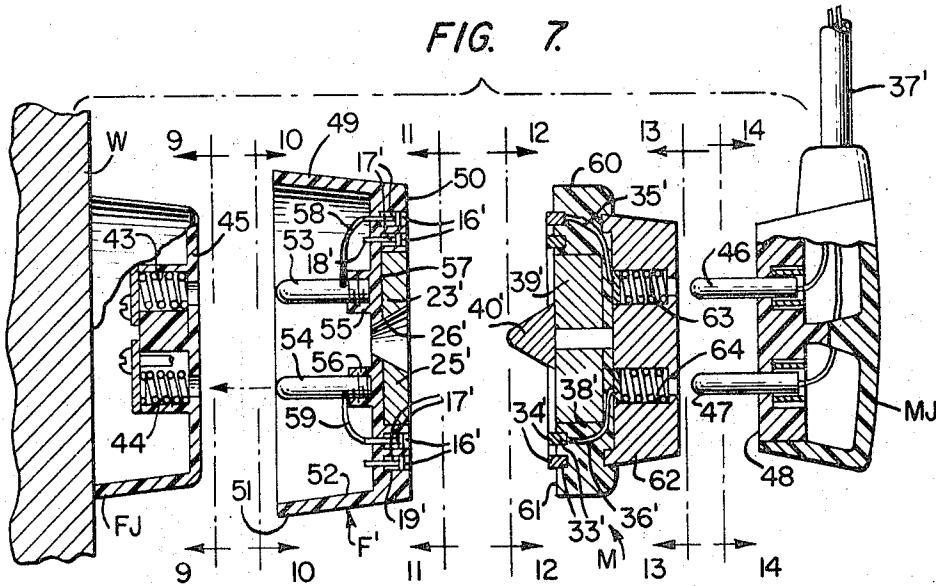


FIG. 8.

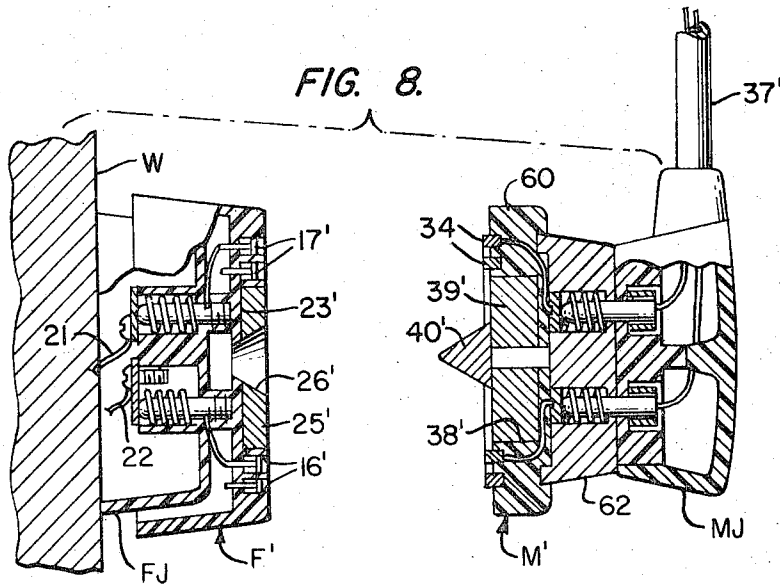


FIG. 9.

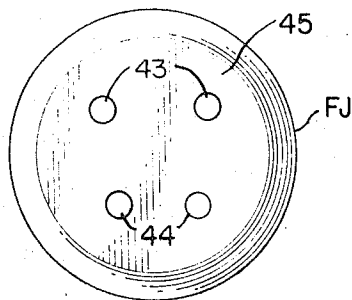


FIG. 10.

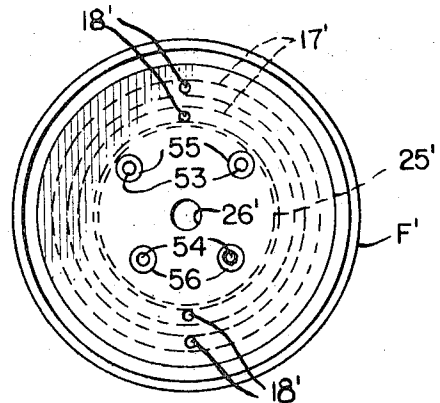


FIG. 11.

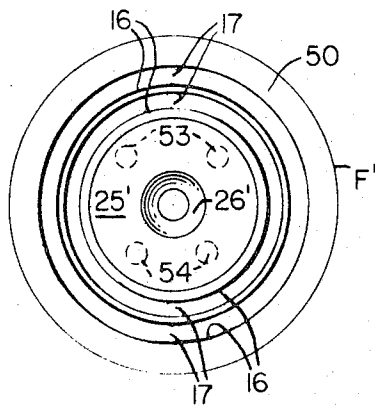


FIG. 12.

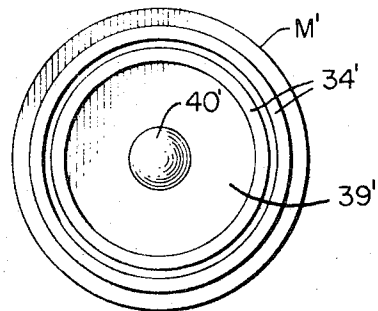


FIG. 13.

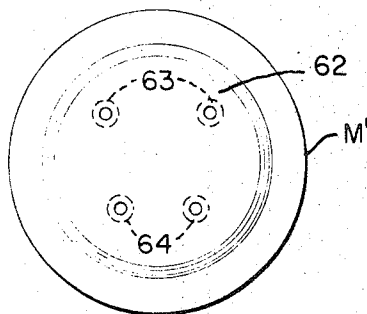


FIG. 14.

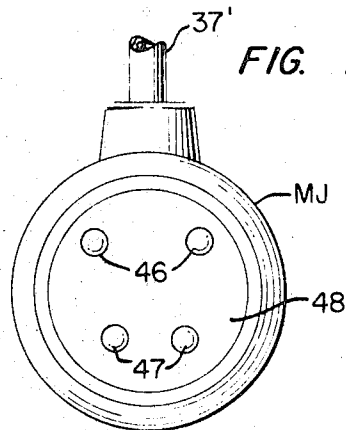
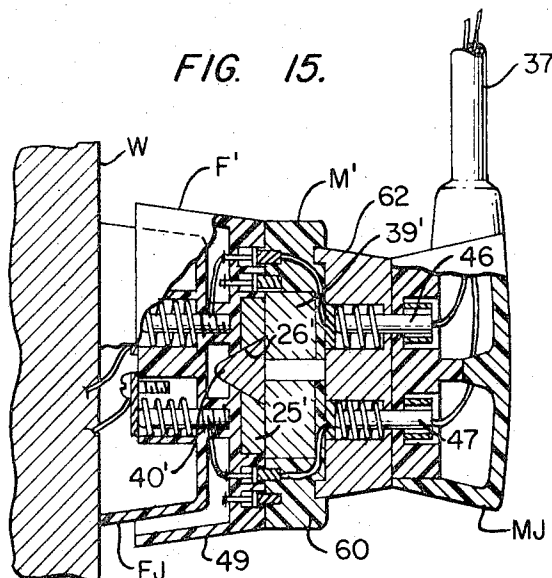


FIG. 15.



MAGNETIC SELF-ALIGNING QUICK-DISCONNECT FOR A TELEPHONE OR OTHER COMMUNICATIONS EQUIPMENT

BACKGROUND OF THE INVENTION

This invention relates to electrical connectors and in particular, to connectors for audio communication equipment, such as telephone jacks, for establishing electrical connections between a source of energy and a telephone or other communications equipment.

Conventional telephone jacks have male and female halves with cooperating recess and projecting prong means on the halves which must be aligned and coupled together to establish electrical connection between the halves. The halves are held in assembled relationship by frictional engagement of the projecting prongs with the recess or socket means in the other half.

In a typical conventional telephone jack, the projecting prongs are on the half of the jack which is connected to the telephone. With conventional telephone jacks, the prongs and sockets must be properly aligned to insure proper electrical connection between the halves, and this is sometimes difficult to accomplish if, for example, the jack is in an unlighted area or if the jack is in a relatively difficult area to reach. Further, conventional telephone jacks are susceptible to damage if the telephone or telephone cord is pulled either intentionally or accidentally, since the elongate prongs are easily bent or broken under such circumstances.

With the present invention, the unique magnetic means in the male and female halves for holding the connector, or in particular, the telephone jack in connected relationship holds the halves together under normal useage; but if the telephone or telephone cord is pulled either intentionally or accidentally, the magnetic means enables the halves to be readily disconnected to prevent damage thereto. Moreover, the electrical contact means in the telephone jack of the present invention does not have elongate projecting means thereon as in conventional telephone jacks and accordingly, if the halves of the jack are separated, there is little likelihood of damage to the electrical contacts.

Still further, the unique telephone jack of the invention has means enabling the male and female halves of the jack to be connected in any rotational position relative to one another and still insure proper electrical connection therebetween thus obviating the necessity of indexing the halves before they are coupled together. This enables the telephone jack to be quickly and easily connected in unlighted areas or areas which are relatively inaccessible.

OBJECTS OF THE INVENTION

It is an object of this invention to provide a unique connector for a telephone or other communication equipment, wherein magnetic means are utilized to hold the male and female halves of the connector in assembled relationship.

Another object of this invention is to provide a unique telephone jack wherein male and female halves are provided with means whereby the male and female halves of the jack may be connected together in more than one position relative to one another to establish proper electrical connection between the halves.

A still further and more specific object of the invention is to provide a unique quick-disconnect magnetic self-aligning telephone jack wherein magnetic means are utilized to hold male and female halves of the jack together, and wherein the electrical contact means in each of the halves is such as to enable the halves to be connected together in more than one position relative to one another and establish proper electrical connection therebetween and wherein the electrical contact means does not project a substantial distance from either of the halves and thus substantially reduces the likelihood of damage to the electrical contact means in the event of accidental or improper disconnection of the halves.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view of a first form of telephone jack according to the invention.

FIG. 2 is a sectional view in elevation, taken along line 2—2 in FIG. 1.

FIG. 3 is a front view of the female half of the telephone jack and with the female half connected to a wall or the like and to a source of electrical energy.

FIG. 4 is a sectional view in elevation taken along line 4—4 in FIG. 1.

FIG. 5 is a front or plan view of the male connector half which is connected to the telephone.

FIG. 6 is a sectional view in elevation of the male and female connector halves in connected together relationship.

FIG. 7 is an exploded view in section of a modified telephone jack, wherein adapter means are provided for utilization with conventional telephone jack constructions.

FIG. 8 is an exploded view in section of the modified telephone jack with the adapter units connected to the respective male and female conventional telephone jack parts.

FIG. 9 is a view taken along line 9—9 in FIG. 7.

FIG. 10 is a view taken along line 10—10 in FIG. 7.

FIG. 11 is a view taken along line 11—11 in FIG. 7.

FIG. 12 is a view taken along line 12—12 in FIG. 7.

FIG. 13 is a view taken along line 13—13 in FIG. 7.

FIG. 14 is a view taken along line 14—14 in FIG. 7.

FIG. 15 is a sectional view in elevation of the modified, telephone jack adapter of FIG. 7 shown in completely assembled relationship.

DETAILED DESCRIPTION OF THE INVENTION

In the drawings, wherein like reference numerals indicate like parts throughout the several views, a first form of telephone jack is indicated generally at J in FIG. 1 and comprises a male connector half M and a female connector half F. The female half F of the jack comprises a substantially cylindrically shaped housing 10 of a suitable insulating material such as rubber, synthetic plastic or the like and having a rear face 11 and a front face 12, and an annular peripheral skirt 10' extending rearwardly from the periphery of rear face 11.

A plurality of circumferentially spaced bores or openings 13 extend through the housing from the front

to the rear face thereof adjacent the outer periphery of the housing, and the outer ends of the bores 13 are countersunk or enlarged at 14 in the outer face 12 of the housing.

A plurality of elongate screws or the like 15 extend through the openings and into a wall or other surface W for attaching the housing to the wall and the outer ends or heads of the screws are recessed in the countersunk or enlarged portions 14 of the bores 13 to prevent a flush outer surface on the front face of the housing.

Spaced radially inwardly from the screws 15 are a pair of concentric radially spaced apart annular channels or grooves 16 opening through the front face 12 of the housing and terminating short of the rear face of the housing.

An annular, floating electrical contact ring 17 is fitted within each of the annular channels 16, and the contact rings 17 are recessed inwardly in the channels 16, spaced behind the front face 12 of the housing. A plurality of elongate pins 18 are connected to each of the rings 17 and extended rearwardly therefrom through openings in the housing at the rearward or base end of the channels 16 for guiding movement of the rings 16, and a coil spring means is positioned between each of the contact rings 17 and the bottom of the channels 16 around the guide pins 18 for yieldably urging the contact rings 17 outwardly to the position shown in FIG. 2.

The rearward ends of the pins 18 which project rearwardly through the bottoms or bases of the channels 16 extend into an enlarged recessed area 20 in the rear face 11 of the housing 10.

A pair of electrical leads 21 and 22, respectively, are connected to the inner and outer contact rings 17 to connect the contact rings to a source of electrical energy for the telephone.

A central, relatively enlarged, cylindrically shaped indexing recess 23 is formed in the front face 12 of the housing and opens through the front face but terminates short of the rear face or recess 20 thereof to define a disc-shaped rear wall 24. A suitable magnetic means 25 such as a permanent magnet of suitable material or an electromagnet or armature, as desired, is fitted within the opening or recess 23, and the front surface of the magnet means 25 is flush with the front face 12 of the housing.

A central, frusto-conically shaped recess 26 is formed in the magnet means 25 and tapers rearwardly inwardly from the front face thereof toward the rear surface of the magnet means, and a relatively short cylindrically shaped opening 27 extends rearwardly from the rearward end of the frusto-conically shaped recess 26 through the rear of the magnet means 25 and into registry with a correspondingly shaped opening 28 through the rear wall 24 of the housing.

A suitable light means such as 29 is positioned in the recess 20 behind the openings 28 and 27 so that in unlighted areas the female connector half F is readily visible.

The magnet means 25 may be suitably grounded by means of a ground wire g, if desired.

The male half M of the jack likewise comprises a substantially cylindrically shaped housing or body 30 of a suitable insulating material such as rubber, synthetic plastic or the like and has a front face 31 and a rear face 32. A pair of annular, concentric, radially spaced,

relatively shallow grooves or channels 33 are formed in the front faces 31 of the housing 30 spaced radially inwardly from the outer circumference thereof, and a pair of suitable, annular, fixed electrical contact rings 34 are suitably secured in the annular channels 33 in alignment with the contacts 17 in the female half for establishing electrical connection therewith when the male and female halves are connected or coupled together.

A pair of electrical leads 35 and 36 are connected with the outer and inner electrical contact rings, respectively, and with a cord 37 which is connected in turn with a telephone.

An enlarged, substantially cylindrically shaped recess 38 is formed in the front face 31 of the housing or body 30, and a substantially cylindrically shaped magnet means 35 of a suitable magnetic material and comprising either a permanent magnet or an electromagnet or armature, as desired, is secured within the recess 38 and has a conically indexing shaped projection 40 affixed thereto and extending forwardly from the front face of the magnet means 39, the front face of the magnet means being flush with the front face 31 of the body or housing, whereas the contact rings 34 project axially forwardly from the face 31 from the body.

The conical projection 40 has a size and shape corresponding to the size and shape of the recess 26 in the magnet means 25 in the female half of the jack so that when the halves are coupled together, the conical projection 40 fits within the recess 26 to properly align the male and female halves with the contact rings 34 received in the annular channels 16 and in engagement with the floating contact rings 17 in the channels 16.

A suitable ground lead g' extends from the telephone through the cord 37 and is connected to the magnet means 39 so that when the halves are connected a ground is established between the male and female halves.

A suitable pull knob or handle means 41 of a suitable material such as wood, plastic, rubber or the like is suitably secured to the rear face 32 of the body 30 and has an enlarged recess 42 therein for receiving the electrical leads 35, 36 and g' of the cable or cord 37.

Thus, as can readily be seen, in this form of the invention, the male and female halves may be quickly and easily connected together or disconnected, and the annular contact means in the halves enable the halves to be connected together in any relative rotational position therebetween and still establish proper electrical connection therebetween. Moreover, the recessed contacts 17 which are connected to the source of electrical energy, prevent inadvertent shorting across these leads since they are recessed behind the front surface 12 of the housing 10. The conically shaped projection and recessed means on the respective halves automatically align the halves when they are brought into proximity with one another, and the magnet means actually pull or snap the halves together and securely holds them against accidental displacement.

In FIGS. 7 through 15 a modified telephone jack is illustrated and comprises an adapter for attachment to conventional, existing telephone jacks to provide them with the same advantages which accrue to the unique telephone jack illustrated and described with reference to FIGS. 1 through 6.

A unique telephone jack adapter is indicated generally at A and includes a female connector half F' and

a male connector half M', the female connector half F' being attachable to a conventional female telephone jack connector FJ attached to a wall W or the like, and the male adapter half M' being attachable to a conventional male telephone jack connector MJ, which is connected through a cord or cable 37' to the telephone. The conventional female half of the telephone jack FJ is of well-known construction and includes a plurality of sockets, including a pair of spaced apart upper sockets 43 and a pair of spaced apart lower sockets 44, the space between the upper sockets being greater than the space between the lower sockets, and the sockets 43 and 44 extending rearwardly from the front face 45 of the telephone jack for receiving a pair of spaced apart upper prongs 46 and lower prongs 47 projecting axially forwardly from the front face 48 of the conventional male jack MJ. The different spacing between the upper prongs and sockets and the lower prongs and sockets requires that the halves be properly indexed before they can be coupled together.

The female half F' of the adapter A comprises a substantially frusto-conically shaped body or housing 49 of a suitable insulating material such as synthetic plastic, rubber or the like and having a flush front face 50 and a rearwardly extending, annular, frusto-conically shaped or outwardly flared skirt 51 defining an enlarged recess 52 therein for receiving the conventional female jack FJ when the female half F' of the adapter A is attached thereto. A pair of rearwardly projecting upper prongs 53 and a pair of lower prongs 54 are secured with the recess 52 in upstanding bosses 55 and 56, respectively, on the rear surface of the front wall 57 of the body or housing 49.

The pairs of prongs 53 and 54 are the equivalent of, or correspond to, the prongs 46 and 47 on the conventional male jack MJ, and are received in the sockets 43 and 44 of the conventional female jack FJ when the adapter F' is attached thereto.

As in the previously described embodiment, a pair of annular, radially spaced, concentric channels 16' are in the front face 50 of the body 49 and terminate short of the rear surface or wall 57. A pair of annular, ring-shaped electrical contacts 17' are fitted within the annular channels 16' as in the previous embodiment and are similarly urged forwardly by spring means 19' and are guided in their movement by rods or pins 18' extending through the wall 57, and the rings are connected by suitable electrical leads 58 and 59 to the pins 53 and 54.

A central recess 23' is formed in the front face 50 of the body 49 and a suitable magnet means 25' such as a permanent magnet of electromagnet or armature or the like is secured within the recess 23' as in the previous embodiment, and a central, frusto-conically shaped indexing recess 26' is formed therein.

The male half M' of the jack adapter comprises a disc-shaped or cylindrically shaped body 60 of a suitable insulating material such as synthetic plastic, rubber or the like and has a front surface or face 61 with a pair of annular channels 33' therein as in the previous embodiment and with a pair of annular electrical contact rings 34' therein as in the previously described embodiment.

A suitable magnet means 39' corresponding to the previously described magnet means 39 is secured within a recess 38' in the front face of the male half M' of the adapter and has a forwardly projecting conical

indexing projection 40' thereon for a corresponding size and shape to the recess 26' in the female half F' of the adapter just as in the previously described embodiment. However, rather than a handle means 41 as in the previously described embodiment, the body 60 has an attaching means 62 secured to the rear surface of the body and sockets 63 and 64 are formed in the attaching means for receiving the prongs 46 and 47 on the conventional male jack MJ. Suitable electrical leads 35' and 36' establish connection between the ring-shaped contacts 34' and the sockets 63 and 64 and thus the pins or prongs 46 and 47.

Thus, as seen in FIG. 8, the female adapter half F' is simply attached to the conventional female jack FJ and the male adapter half M' is attached to the conventional male jack MJ, and the two portions thus assembled are then attached as seen in FIG. 15, with the adapter A providing the same beneficial results to a conventional telephone jack as is obtained with the unique magnetic telephone jack illustrated and described with reference to FIGS. 1 through 6.

For the purpose of reducing the weight of the male half of either of the forms of the invention, it is desirable to place the amature or electromagnet in the female half and the permanent magnet or other magnet means in the male half.

In one specific example of a telephone jack constructed according to the invention, the female half has an overall diameter of about 2 inches and an overall thickness of about 1/2 inch. The male half also has an overall diameter of about 2 inches, and a thickness of about 3/4 inch.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrated and not restrictive, since the scope of the invention is defined by the appended claims rather than by the description preceding them, and all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents, are therefore, intended to be embraced by those claims.

What is claimed is:

1. A magnetic, self-aligning, quick disconnect electrical connector for communications equipment and the like, comprising male and female connector halves, a plurality of annular, radially spaced apart, ring-shaped electrical contacts in each half, the contacts in one half being in aligned, interengaged relationship with the contacts in the other half when the halves are connected together, means rigidly fixed substantially in the center of the respective halves including a magnet in at least one of the halves and concentric with the electrical contacts and in aligned, cooperating relationship with one another to releasably and magnetically hold the halves connected together, one of said halves having a shaped indexing recess in the magnetic means therein at the center thereof in concentric relationship with the contacts, and a shaped indexing projection on the magnet means in the other half in the center thereof in concentric relationship with the contacts and substantially identical in size and shape to the recess in the other half and fitting in the recess to index the halves together when they are connected to one another, said centrally disposed indexing recess and projection and said concentric contacts and magnet means enabling

the halves to be quickly and easily connected together in any relative rotational position therebetween.

2. A connector as in claim 1, wherein the connector comprises a telephone jack, the male half of the jack is adapted to be connected to a telephone and the female half of the jack is connected to a source of electrical energy for the telephone, the electrical contacts in the female half being recessed therein and connected to said source of electrical energy, and the electrical contacts in said male half projecting outwardly therefrom for engagement with the recessed contact means in the female half when the halves are connected together.

3. A telephone jack as in claim 2, wherein the contact rings in the female half are floatably mounted and are yieldably urged outwardly toward the male half of the jack.

4. A telephone jack as in claim 3, wherein the electrical contact rings in the male half of the jack are fixed against movement and project forwardly therefrom toward the female half.

5. A telephone jack as in claim 2, wherein the female half of the jack is secured to a wall or like surface and is connected directly to the source of electrical energy, and the male half of the telephone jack is connected directly to a telephone by means of a cord or cable or the like.

6. A telephone jack as in claim 2, wherein the male and female halves of the jack comprise an adapter for use with a conventional telephone jack, and the female half of the telephone jack has electrical contact means thereon operatively connected to the ring shaped electrical contacts for cooperative engagement with a conventional female telephone jack secured to a wall or other surface, and the male half of the telephone jack has electrical contact means thereon operatively connected with the ring shaped electrical contacts for cooperative engagement with the electrical contact means on a conventional male telephone jack.

7. A telephone jack as in claim 6, wherein the female

half of the adapter comprises a substantially frusto-conically shaped body having a rearwardly extending, flared skirt defining a recess therewithin for receiving the conventional female telephone jack, and said electrical contact means thereon comprises a pair of rearwardly axially extending electrical contact prongs secured to said body for insertion in a pair of spaced sockets in the conventional female telephone jack, and the electrical contact means in the male half of the telephone jack comprises a pair of spaced sockets therein for cooperative engagement with a pair of axially projecting electrical contact prongs on a conventional male telephone jack.

8. A connector as in claim 1, wherein the indexing recess and projection are each conically shaped.

9. A connector as in claim 8, wherein the female connector half comprises a body of electrical insulating material and having a front face and a rear face, said electrical contacts, said magnet means and said recess being in said front face thereof, said body having an opening therethrough extending from the bottom of the recess through the rear face thereof, and a light means at said rear face adjacent said opening to render said connector half visible under conditions of low ambient light.

10. A telephone jack as in claim 5, wherein the female half of the jack comprises a circular body of electrical insulating material and having a front face and a rear face, an annular peripheral skirt on the rear face extending rearwardly from the rear face thereof, a plurality of fastening means extended axially through a peripheral portion of said body and through said skirt and into the wall, said magnet means, said indexing recess and said electrical contacts in said front face, said male half of the jack comprises a circular body of electrical insulating material and having a front face and a rear face, a handle means secured to the rear face, and said electrical contacts, said magnet means and said indexing projection on said front face.

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