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ELECTRICAL CONNECTOR

Filed Dec. 16, 1960

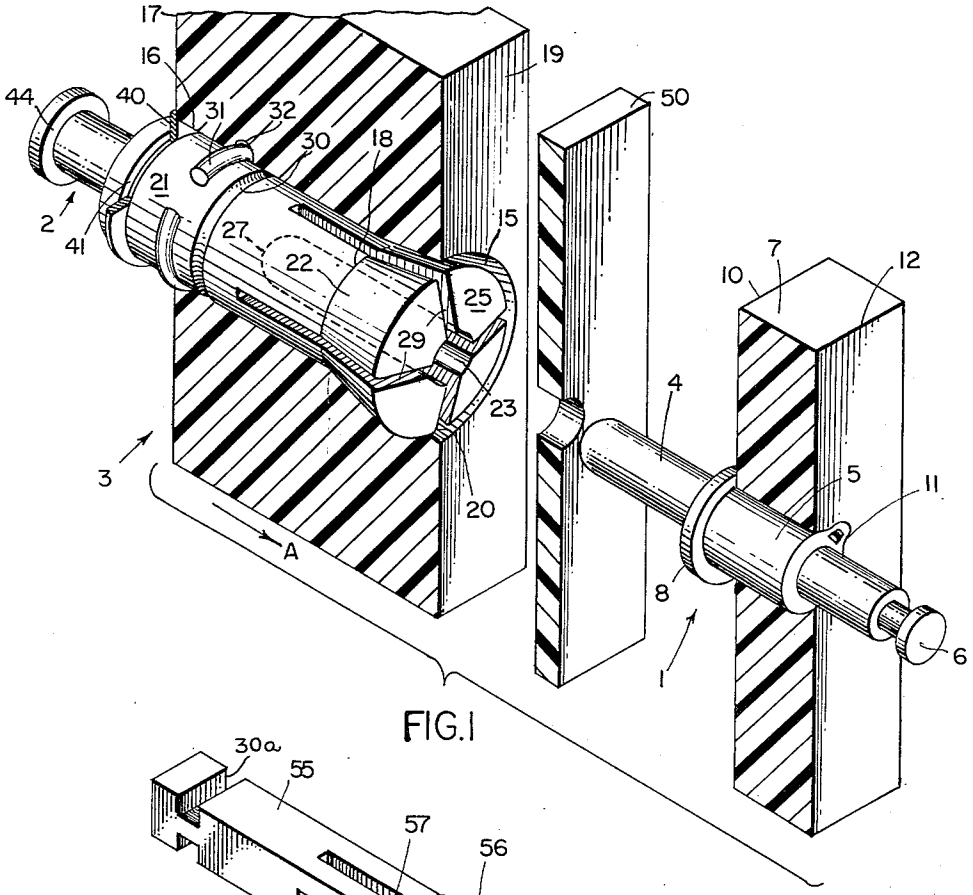


FIG. 1

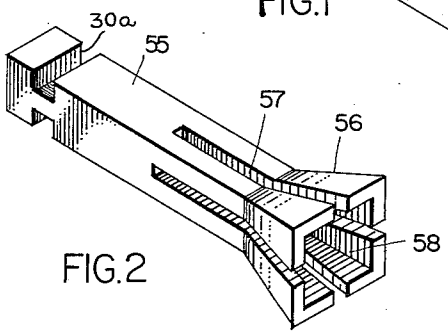


FIG. 2

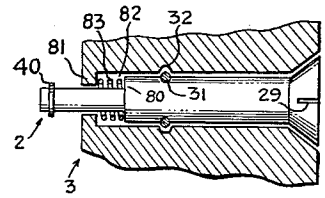


FIG. 4

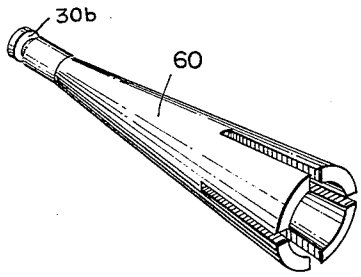


FIG. 3

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ELECTRICAL CONNECTOR

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The present invention relates to a coupling device and more particularly to a coupling device adapted to interconnect cables or the like.

It is an object of the present invention to provide a coupling device adapted to connect electrical conductors wherein the coupling device is designed and constructed so that mateable or interengageable parts may be locked together in a positive manner, but nonetheless in a manner capable of relatively quick manual release. It is also an object of the present invention to provide a quick release type of electrical connector in which the electrically mateable parts when interengaged form a continuous electrical connection over a substantial area with a positive pressure exerted pressing the two parts together. A further object of the present invention is to provide a connector which may be used to support and interengage various components and in which the mateable parts may be shaped for various applications. A further object of the present invention is to provide a coupling device having a design which may be varied readily both in size and specific shape for adaptation to various purposes. A further object of the present invention is to provide a coupling device wherein mateable or interengageable parts may be coupled together or disengaged by a relatively simple straight line friction free movement of one part relative to the other. One further object of the present invention is to provide an electrical coupling device adapted to withstand severe mechanical strains and stresses but nonetheless easily released by a straight outward pull of one of the connectors.

In the present invention there is provided an electrical connector comprising a male and female section. The male section is formed as a relatively rigid probe adapted to be projected into the female section. The female section is supported for longitudinal axial movement between a locking and release position in a static base having an opening conforming generally in shape to the outer surface of the female section. The female section is formed with an elongated axial recess extending inwardly from a flared end. The outward edges of the opening are chamfered. Radial slots are arranged in the flared end to permit a narrowing of the recess on longitudinal movement of the female section toward the locking position. Thus, as the probe end of the male section is projected into the recess of the female section, and the sections are simultaneously longitudinally moved to the locking position, the flared ends of the female section tighten about the probe. Means are provided to define the locking and release positions.

These and other objects and advantages of the present invention will be more fully understood when considered in conjunction with the accompanying drawings which illustrate preferred embodiments of the present invention, and in which,

FIG. 1 is a cross sectional perspective view of a preferrred form of the invention,

FIG. 2 is a perspective of a detail of a modification of the present invention,

FIG. 3 is a perspective of a detail of a further modification of the present invention, and,

FIG. 4 is a schematic cross sectional elevation of a detail of a modification of the invention.

Referring to the preferred form of the invention as illustrated in FIG. 1 there is shown a male section 1 adapted to be interengaged in a female section 2 in turn supported

in a static base or structure 3. The male section 1 is formed with a probe 4 continuous with a center portion 5 and a cable connecting end 6. This probe is formed of a conductive material and may be secured to a dielectric member 7 which may form a part of an instrument, casing or any other device. The male section 1 is secured within an opening in the member 7 by means of a flange 8 integral with the male section and engaging one surface 10 of the member 7 and flared member 11 engaging the opposite surface 12 of the member 7. A suitable connection to an electrical conductor may be made by known means at the connector end 6. If desired, the male section 1 may be secured to a cable without attachment to the dielectric member 7.

The female section 2 is mounted in a static base 3 having an elongated opening 15. This opening has a cylindrical section 16 extending from the rear wall 17 to a plane 18 intermediate the rear wall 17 and forward wall 19. The opening 15 is flared outwardly in a truncated conic form from the plane 18 to the forward wall 19 as illustrated at 20. The female section 2 is positioned within the opening 15 and is formed with a cylindrical section 21 having a flared end section 22. A recess 23 extends axially from the face 25 of the flared end section inwardly of the female section to a point preferably intermediate its ends as illustrated at 27. The recess 23 conforms in shape with the probe 4. A plurality of slots 29 are arranged radially in the female section between the recess 23 and the outer wall of the female section, thereby cleaving the flared end section 22, preferably into quadrants. The walls forming the slots 29 are spaced apart in a normal untensioned position as is illustrated in FIG. 1. Intermediate the ends of the cylindrical section 21 is an annular groove 30. The annular groove 30 is adapted to engage a split resilient ring 31 which extends about the cylindrical section 21 and which fits into annular slot 32 in the static base 3. The diameter of slot 32 should be of sufficient size to permit expansion of the spring 31 about the cylindrical section 21. The spring 31 may be made of any suitable resilient material either metallic or dielectric. The spring should have a diameter and spring tension sufficient to simultaneously engage the walls of the slot 32 and the annular groove 30 on longitudinal movement of the female section 2 into a position in which the groove 30, spring 31 and slot 32 are coplanar. In this position the female section is in a locking position. An annular flange 40 is secured in a groove 41 or by other suitable means at the end of the female section 2 opposite to the flared end. This opposite end of the female section projects through the rear wall 17 and is provided with a cap which is adapted to be used for engagement with an electrical cable or for other suitable and similar connections. The flange 40 is adapted to engage the rear wall 17 on movement of the female section in a direction of the arrow A and defines the release position of the female section 2. When the flange 40 engages the wall 17 the spring 31 is positioned between the groove 30 and flange 40. In this position, as illustrated, the flared end section 22 is positioned in the flared end 20 of the opening 15 and is spread outwardly, thereby slightly enlarging the recess 23. When the male section 1 is inserted so that the probe 4 projects into the opening 23, the engagement of the tip of the probe and/or flange 8 with the female section 2 moves the female section 2 in a direction opposite to that of arrow A. This forces the female section rearwardly until the groove 30 engages the spring 31 at which time the spring 31 snaps into the groove and releasably locks the female section in this longitudinal position. In this position, the flared end section 22 has been clamped about the probe 4 as the flared end section passes into the

cylindrical section 16 of the opening 15 beyond a line defined by the plane 18.

The walls of the opening 15 bear against the outer surfaces of the flared end section 22 at the plane 18.

An intermediate dielectric plate such as the dielectric plate 50 may thereby be secured between the male and female probe for any suitable purposes. This plate 50 may comprise a dielectric member of any other suitable device.

In FIG. 2 there is illustrated a modification of the present invention. In this modification, the female section is generally rectangular in shape having a center rectangular section 55 and a flared truncated pyramidical end section 56. Slots 57, groove 30*a* and a recess 58 correspond respectively with slots 29, groove 30 and recess 23 of FIG. 1. The other components in this modification correspond with the other components illustrated in FIG. 1, modified to engage and coact with this female section.

A similar modification is illustrated in FIG. 3 wherein the female section has generally a conic form as is illustrated at 60 and a groove 30*b* equivalent to groove 30 in the embodiment of FIG. 1. The other components are modified accordingly. In modifications illustrated in FIG. 2 and FIG. 3 a flange corresponding to flange 40 may be welded or otherwise suitably secured to the female section.

In the modification illustrated in FIG. 4 wherein like members correspond with like parts illustrated in FIG. 1, there is provided a structure adapted to present an initial resistance to engaging movement of the male section. This is particularly useful to avoid accidental engagement of the sections.

In this arrangement the female section is formed with a shoulder 80. A lip 81 formed about the female section at the rear wall 17 coacts with it to form an annular space 82. A helical expansion spring 83 coaxial with the female section urges the female section forwardly. The tension of spring 83 is not sufficient to overcome the restraining force of split ring 31 when it is engaged in groove 30.

What is claimed is:

1. An electrical connector comprising interengageable male and female sections, said male section having an elongated probe, said female section having a body with a flared end section, means forming a recess in said female section extending longitudinally from the end of said flared end section with said recess adapted to receive said probe, means forming at least one slot extending from said recess through said flared end section whereby said flared end section may be radially expanded and compressed to vary the diameter of said recess, a static base having an opening within which said female section is positioned for movement in the direction of said recess between a locking and a release position, said static base having means in said opening for engagement with said flared end section to compress said flared end section when moved to said locking position whereby said probe may be inserted in said recess when in said release position and moved with said female section to said locking position whereby said sections will be securely interengaged, means forming a first annular groove in said opening encircling said female section, a second annular groove on said female section lying in a plane parallel to the plane in which said first annular groove lies and adapted to be positioned in the same plane as said first annular groove when said female section is in its locking position, a C-shaped spring positioned to be partially within each of said annular grooves when said female section is in its locking position and entirely within said first mentioned groove when said female section is in its released position, and means limiting the longitudinal movement of said female section between said locking and release positions.

2. A device as set forth in claim 1 wherein said female section extends outwardly of said static base at the end remote from said flared end section, and a flange integral with said female section in said portion extending outwardly of said static base and adapted to engage said static base when said female section is moved to extreme release position.

3. A device as set forth in claim 1 wherein said recess extends only partially through said female section.

4. An electrical connector comprising interengageable male and female sections, said male section having an elongated probe, said female section having a body with a flared end section, means forming a recess in said female section extending longitudinally from the end of said flared end section with said recess adapted to receive said probe, means forming at least one slot extending from said recess through said flared end section whereby said flared end section may be radially expanded and compressed to vary the diameter of said recess, a static base having an opening within which said female section is positioned for movement in the direction of said recess between a locking and a release position, said static base having means in said opening for engagement with said flared end section to compress said flared end section when moved to said locking position whereby said probe may be inserted in said recess when in said release position and moved with said female section to said locking position whereby said sections will be securely interengaged, means removeably interengaging said static base and said female section in said locking position, means limiting the longitudinal movement of said female section between said locking and release positions, means forming a shoulder on said female section, means forming a lip in said static base in spaced relation to said shoulder, and a helical spring positioned between said lip and shoulder normally urging said female section toward said release position.

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