March 8, 1955 D. WOODHEAD, JR 2,703,871

SEPARABLE CONNECTOR FOR ELECTRICAL CABLES

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Fig. 1

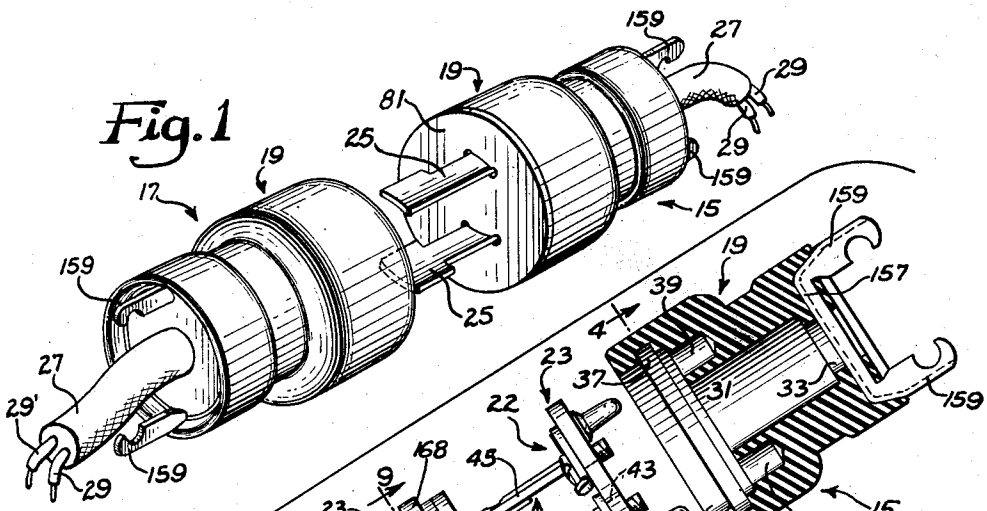



Fig. 2

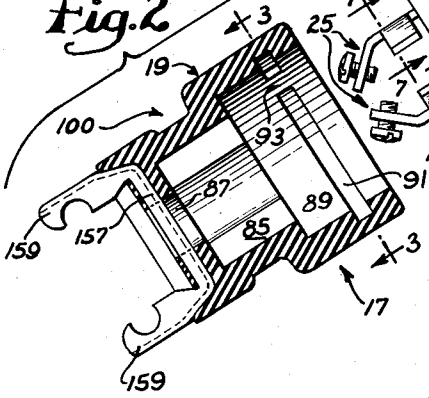



Fig. 4

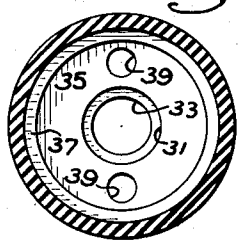



Fig. 3

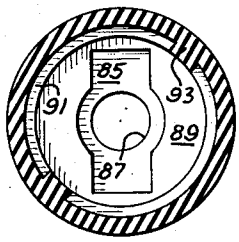



Fig. 9

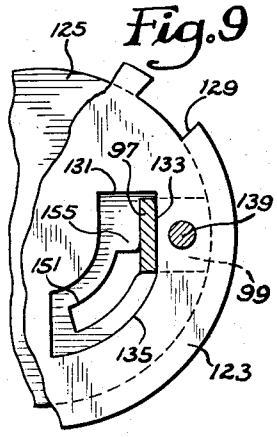



Fig. 5

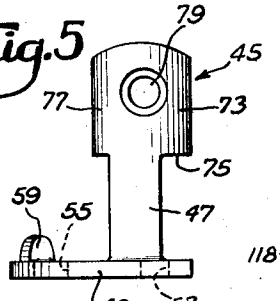



Fig. 6

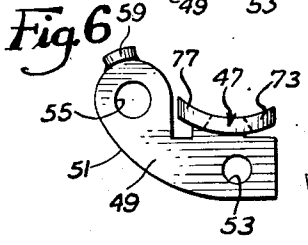



Fig. 7

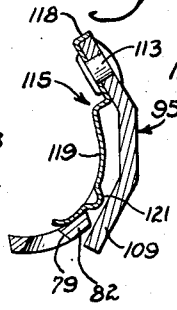
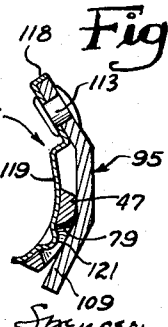



Fig. 8




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Fig. 10

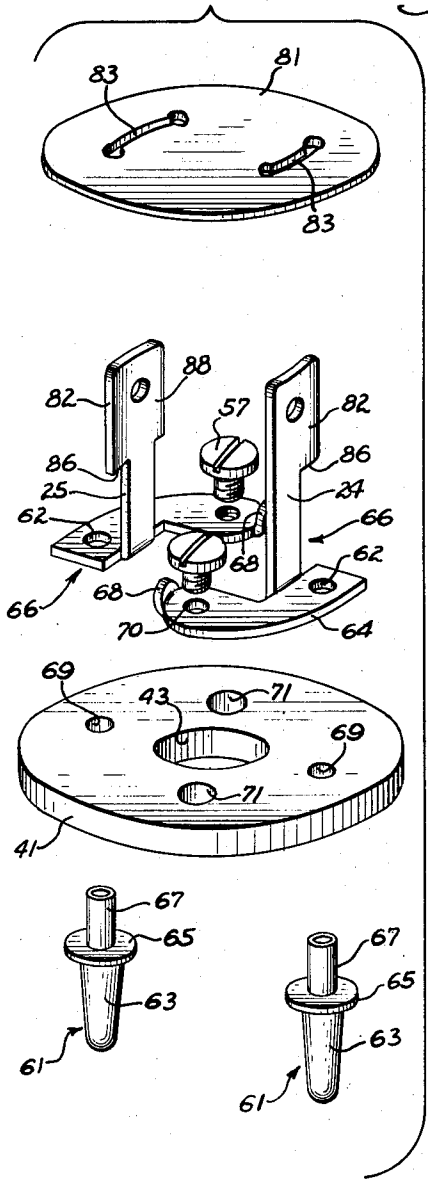
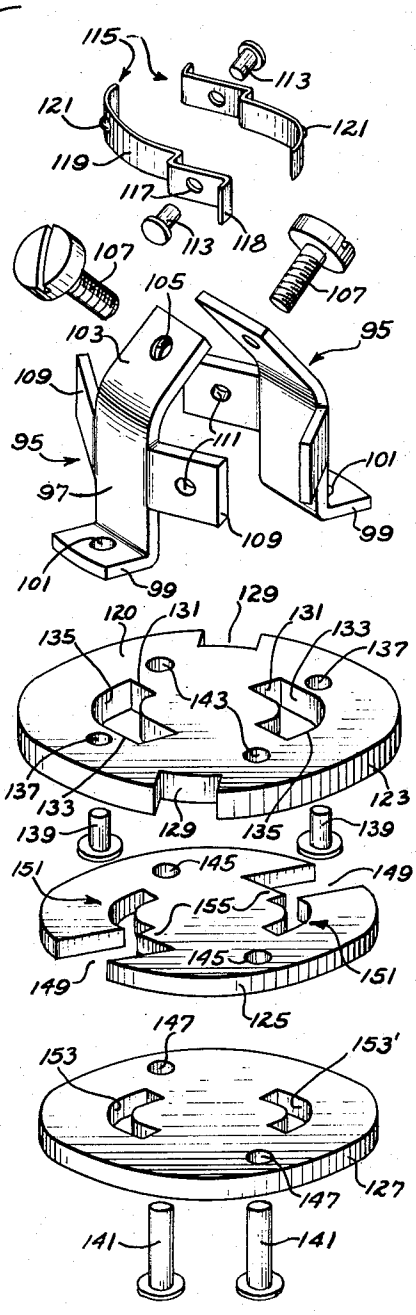



Fig. 11




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# SEPARABLE CONNECTOR FOR ELECTRICAL CABLES

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Application December 21, 1950, Serial No. 201,940

7 Claims. (Cl. 339—189)

The present invention relates in general to electrical connectors and more particularly to a separable connector assembly for use in connecting electrical conductors, the invention more especially relating to means for connecting conductors in operative electrical relationship against separation due to the application of opposing tension thereon. In its more specific aspects the invention concerns electrical connectors of the sort wherein cooperating members forming the connector may be coupled together against separation thereof by relative turning movement of one of the members with respect to the other.

In turn locking connectors of the character mentioned, it is of course necessary to mount the electrical connecting parts and the locking elements, in the cooperating coupling members of a connector, with sufficient firmness and rigidity to maintain the same in operative position when the cooperating connector members are coupled together. Accordingly, it has heretofore been considered necessary to provide coupling members comprising support elements of relatively rigid material on which the electrical connecting elements and the interlocking parts are mounted rigidly and thus supported in operative position firmly against deflection or displacement therefrom. While many considerations make it desirable to form the support elements of electrical connectors of resilient rubber-like material, it has heretofore been considered impractical to utilize such resilient material in the support elements of locking connectors because of the difficulty of anchoring especially the locking parts on such resilient support elements in fashion preventing deflection or displacement thereof to an extent allowing the parts to become released and hence separable when in locking position or relation.

As a consequence, no satisfactory turn locking connector structure has heretofore been provided having support elements comprising resilient rubber-like material and incorporating the several desirable characteristics, including high fracture resistivity, inherent in such resilient material.

An important object of the present invention thus is to provide a satisfactory turn lock electrical connector structure embodying electrical connector and mechanical locking elements mounted on support elements of resilient rubber-like material; a further object being to provide improved arrangements for mounting the electrical connecting and mechanical locking parts on the resilient support elements in such fashion that the said parts are held against displacement sufficiently to allow the same to perform their respective functions when the connector members are interlocked in coupled relation.

Another object of the invention is to mount the electrical connector and mechanical interlock elements of a coupling device upon a support structure of disc-like form providing means whereby the same may be mounted at its edge in an annular groove formed in a resilient support housing and thus held against dislodgment therefrom.

Another object is to prevent relative rotation of the disc-like support structure in the resilient housing structure by forming a tongue on one structure in position to interfit in a notch in the other; a further object being to provide the notch in the edge of the disc structure and the tongue as an integral part of the resilient housing structure; a still further object being to form the housing structure with an internal groove for interfittingly receiving the edge of the disc structure and to form the tongue in said groove in position to interlock in the edge notch of the disc structure.



Another object is to prevent relative rotation of a disc-like electrical connector support in its resilient housing by forming the housing with a socket for receiving a prong on the support; a further object being to form the housing with an internal groove for interfittingly receiving the edges of the support disc and to form the prong on the face of the disc in position to engage in the socket at right angles to the plane of the groove mounted disc and offset with respect to the center of the mounted disc.

A further object is to provide a two part separable connector in which each part embodies a resilient housing element carrying cooperable electrical connector elements, whereby electrical connection may be made between the cooperating electrical connector elements, on the parts, by axially coupling the parts together, and in which the parts may thereafter be locked against uncoupling movement by relatively turning the parts while in coupled position.

Another object is to provide a two part connector comprising a pronged part having an axially projecting blade or blades and a socket part formed to interfittingly receive the blade or blades of the pronged part in position electrically connecting the blade or blades with connection elements of the socket part, upon axial couplement of the parts, wherein the said connection elements are supported on a disc structure anchored against turning in a resilient housing, the blades being likewise supported on a disc anchored against turning movement in a resilient housing, the blades being formed for interlocking engagement with the disc structure of the socket element, in response to relative turning movement of the parts in one direction when in coupled relation, to thereby lock the parts against axial separation, said prongs and connection elements being formed with cooperating latch means adapted yieldingly to resist turning movement of the parts in the opposite direction when latched.

Another important object is to mount the connection elements of the socket part on a disc structure of insulating material in such fashion that no uninsulated conductor element, carrying electrical potential, is exposed outwardly of the socket part.

Numerous other important objects, advantages and inherent functions of the invention will become apparent as the same is more fully understood from the following description, which, taken with the accompanying drawings, discloses a preferred embodiment of the invention.

Referring to the drawings:

Fig. 1 is a perspective view of an electrical connector embodying the invention and showing the parts in position to be coupled together by axial movement thereof;

Fig. 2 is an exploded view showing the elements of the connector;

Figs. 3 and 4 are sectional views, respectively, taken substantially along the lines 3—3 and 4—4 in Fig. 2;

Fig. 5 is an enlarged side view of a blade element forming a part of the connector;

Fig. 6 is a top plan view of the blade element shown in Fig. 5;

Fig. 7 is a transverse sectional view taken through the coupling, substantially along the line 7—7 in Fig. 2, and showing the electrical connector parts thereof respectively in the position which they assume after axial coupling of the parts and immediately prior to the relative turning of the parts in locking the same;

Fig. 8 is a sectional view, similar to Fig. 7, showing the parts in locked position;

Fig. 9 is a fragmentary sectional view taken substantially along the line 9—9 of Fig. 2;

Fig. 10 is an exploded view of elements comprising a blade mounting assembly forming a part of one coupling unit of the connector; and

Fig. 11 is an exploded view of elements comprising a socket assmebly forming a part of the other assembly associated coupling unit of the connector.

To illustrate the invention, the drawings show an electrical connector comprising a pronged unit 15 and a cooperating socket unit 17 adapted to interfittingly engage

with the pronged unit in making electrical connection therebetween. Each unit includes a housing **19** and an assembly **21** mounted in the housing and comprising rigid support means **23** and electrical connection making elements **25** mounted securely on and carried by the support means.

The function of the connector units **15** and **17** is to provide for the detachable connection for the ends of a pair of electrical cables **27**, each comprising conductors **29** which are respectively connected with the connection making elements **25** of the connector units, so that the cable conductors may be electrically connected when the connector units are positioned in interfitting relationship. The connector units also are formed with cooperating locking means operable to secure the units firmly together in interfitting relationship against separation in response to tensional stresses applied to the cables **27** in a direction tending to pull the units apart when in coupled relationship. The housings **19** preferably comprise hollow casings or body portions molded or otherwise formed of resilient rubber-like material. The rigid support means **23** of the units are preferably of disc-like character and formed of relatively rigid insulating material, the same being secured each in its corresponding housing by interfitment of its peripheral edge portions in corresponding internal grooves formed in the housing.

Referring now more particularly to the pronged unit **15**, its housing is formed internally to provide a medial chamber **31** extending axially of the housing and opening outwardly of the housing at one end thereof through an opening **33** sized to snugly receive the cable **27**. At its opposite end the housing is formed with a shallow preferably circular cavity **35** of diameter substantially larger than that of the chamber **31** and disposed concentrically with respect to said chamber which opens into the bottom of the cavity, the top of the cavity opening outwardly of the housing. The housing walls defining the cavity **35** are formed with an annular groove **37** opening inwardly into the cavity **35**; and the body of said housing is formed with one or more anchoring sockets **39** having axes disposed parallel with respect to the axis of the chamber **31**, said sockets being located in the body of the housing outwardly of the chamber and opening into the cavity **35** at its bottom. As shown, a pair of said sockets may be provided in diametrically opposed position in the housing.

The support means **23** of the assembly **21** of the pronged unit preferably comprises a circular disc **41** of relatively rigid insulating material having a central opening or perforation **43** and carrying the connection making elements **25** securely mounted on the disc in accurately spaced relation outwardly of the opening **43**. These connection making elements of the pronged unit each preferably comprise a blade element **45** of suitable preferably metallic electrical conducting material. Each of the elements **45** preferably comprises a blade or prong portion **47** and an integral base or mounting portion **49** disposed substantially at right angles with respect to the prong portion. The base portion of each blade element is preferably of kidney shaped marginal configuration as shown more particularly in Fig. 6 of the drawings, so that said base portion has a curved outer edge **51** substantially conforming with the circular edge of the disc **41**. The blade portion **47** extends from the base portion preferably at the side thereof opposite from the curved edge **51** and is preferably located at one end of the base. At said end the base is formed with a perforation **53** forming a rivet hole. The base also, at its other end, is formed with a preferably threaded opening **55** adapted to threadingly receive the correspondingly threaded shank of a binding screw **57**. The base portion **49**, at its edge adjacent the opening **55**, is also provided with an upstanding ear **59** in position extending at the outer margin of the head of the screw **57** when the same is screwed down snugly in the threaded opening **55**.

Each of the blade elements **45** may be secured in accurately spaced relation on the disc **41** by means of a corresponding rivet **61** comprising a locating pin. Each of these rivets has a peg-like portion **63**, a medial seating flange **65** and a shank **67**. The disc **41** outwardly of its central opening **43**, and preferably in diametrical opposition therein, may be formed with openings **69** sized to snugly receive the shank portions of the rivets. Accordingly, the rivet elements **61** may be assembled on one side of the disc by inserting the shanks **67** thereof through the openings **69**, said shanks having length sufficient to project the ends thereof at the opposite side of the disc. The blade elements **45** may then be mounted on the opposite side of the disc with the projecting ends of the rivet elements extending in and through the rivet openings **53** of the base portions of the blade elements, and the ends of the shanks may be riveted tightly upon said base portions to secure the same firmly upon the disc, in properly spaced relation, with the prong portions **47** projecting in parallel spaced apart relation and at right angles with respect to the plane of the disc. The blade elements are thus mounted on the disc in position with the curved edges of this base portions disposed slightly inwardly of the periphery of the disc; and, in order to prevent relative turning movement of the elements about the axes of the rivets, the disc **41** is provided with openings **71** sized to snugly receive the threaded shanks of the binding screws **57** so that the same may serve as anchoring dowels in the openings **71** to hold each its corresponding blade element against turning movement about the axis of the riveted locating pins **61**.

Each of the blade portions **47** is preferably provided with a laterally extending ear **73** in an edge thereof and forming a locking shoulder **75** facing toward the base portion **49** of the blade element, said locking shoulders extending in the same tangential relationship with respect to the longitudinal axis of the pronged unit, the shoulders **75**, in cooperation with corresponding locking portions of the cooperating socket connector unit **17**, being adapted to effect the locking of the parts in response to relative turning movement of the connector units, as hereinafter more fully described.

If desired, one of the blade portions may be provided with an offset portion or ear **77** on the side thereof opposite from the ear **73**, said ear **77** being provided in polarizing connector structures, that is to say connectors by means of which the cables of one conductor **27** may each be electrically connected only with a corresponding conductor of the other cable. The additional overall width provided by the blade having the ear **77** will prevent such relatively wide blade from being received in a socket portion of the socket unit **17** sized for the reception of a narrower blade, thus assuring that the units may be coupled together only in predetermined polarized relationship. Each of the blades also is preferably provided with a perforation **79** near the end thereof remote from the base portion **49**, for a purpose hereinafter more fully described.

The assembly **21** of the pronged unit may be mounted in its housing by flexing outwardly the edges of the housing defining the cavity **35** to thereby allow the edges of the disc portion to be received and snugly held in the groove **37**. When the assembly is so mounted in the housing the peg portions **63** of the locating pin rivets may be received in the sockets **39** in order to spline the parts together against relative rotation of the assembly with respect to the housing and thereby firmly mounting the blades on the housing in assembled position projecting in parallel spaced relation at an end of the housing. The cable **27** may be attached and electrically connected to the pronged unit by inserting an end thereof through the opening **33** and the chamber **31**. The bared ends of the conductors **29** may extend through the central opening **43** of the disc and be respectively connected electrically each with its corresponding blade element **45** by means of the binding screws **57**. If desired, a circular cover disc **81**, preferably formed from a relatively thin sheet of insulating material and having a pair of blade receiving slots **83**, may be provided for assembly in position with the blades **47** extending through the slots **83**, so that the disc **81** may cover the end of the housing and conceal the exposed ends of the conductors, the base portions **49** of the blades and the heads of the binding screws **57**.

Referring now particularly to the socket unit **17**, its housing is formed internally to provide a chamber **85** at one end of the housing, said chamber being preferably of narrow elongated rectangular sectional shape. Said chamber opens outwardly of the housing at one end thereof through a preferably circular opening **87** formed at the bottom of the chamber, said opening being sized to snugly receive the cable **27**. At its opposite end the housing is formed with a preferably circular cavity **89** open-

ing outwardly of the housing and communicating with the chamber **85** at the bottom of the cavity **89**. The housing walls defining the cavity **89** are formed to provide an annular groove **91** opening inwardly upon the cavity said groove being interrupted, preferably at diametrically opposed sides of the housing, by transverse locking ribs **93** comprising integral portions of the housing body.

The support means **23** of the assembly **21** of the socket unit preferably comprises a plurality of discs or plates secured in stacked relationship and preferably having circular peripheral configuration, the connection making elements **25** of the socket unit **17** being rigidly mounted on said stacked discs of the assembly.

The contact making elements **25** of the socket unit **17** each comprises a formed sheet metal element **95** providing a central strip portion **97** having an offset flange formed at one end to provide a mounting base **99** extending on one side of the portion **97** and having a rivet hole **101** formed therein. Each element **95** at the end of the portion **97** remote from the base **99** has a connection portion or lug **103** bent from the body portion **97** on the side thereof opposite from the base flange **99** and formed with a preferably threaded opening **105** sized for the reception of conductor clamping screws **107**. Each of the elements **95** also has a pair of arms **109** extending at the sides of the body portion **97** and inclined therefrom on the side thereof opposite from the base flange **99** so that the central portion **97** and the arms **109** of each element present a generally arcuate configuration as shown more especially in Figs. 7 and 8 of the drawings. One of the arms **109** of each element is provided with an opening **111** formed to receive a fastening element **113** such as a rivet by means of which a spring clip **115** may be secured on each of the elements **95** in position extending transversely across the arms **109** and the central portion **97**, a spring clip being thus mounted on each of the elements **95**. Each spring clip thus has an end portion secured to an arm **109** of its carrying element by means of the fastening element which passes through an opening **117** in the end portion of the spring clip, said end portion being flanged as at **118** to extend around and engage the end of the arm **109** on which the clip is mounted. Each clip is formed with a generally arcuate offset portion **119** formed to bear against the arm of the element remote from the arm thereof on which the spring clip is secured. The arcuate portion **119** of each spring clip is preferably provided with a latching protuberance **121** in position extending toward the facing surface of the arm **109** opposite which said arcuate portion extends.

As shown in the illustrated embodiment, the rigid support means **23** of the socket unit preferably comprises three discs **123, 125, 127**, the disc **123** being sized to fit snugly in the groove **91** of the housing and having notches **129** formed in its edges, preferably in diametral opposition therein, said notches being positioned and sized to snugly receive the ribs **93** of the housing. The discs **125** and **127** are sized to fit snugly within the open end of the chamber **89** of the housing outwardly of the groove **91**.

The disc **123** is also formed with a pair of openings **131** in diametrically opposed relation in the body of the disc. These openings preferably have straight sides **133** at one end of the openings and curved portions **135** at the opposite ends of the slots, said slots being slightly wider than the combined thickness of the prongs **45** and the portions **97** of the elements **95**. Immediately outwardly of the straight sides **133** of the openings **131**, the disc **123** is formed with rivet holes **137**. Accordingly, the elements **95** may be mounted and secured in spaced relation on the disc **123** by disposing the lower ends of the element portions **97** in the openings **131**, with the base flanges **99** extending beneath the disc in position aligning the openings **101** and **137**, the parts being secured together by means of rivets or other suitable fastening elements **139** extending in the so aligned openings. When so positioned, the outer faces of the element portions **97**, at the lower end of said portions, are held in engagement with the outer straight sides **133** of the openings **131**, the upper portions of the elements **95** including the arms **109**, the connection lugs **103** and the clips **115** being supported above the disc **123**.

The discs **125** and **127** are secured on the disc **123**, in concentric alignment therewith by means of rivets or other suitable fastening elements **141** which extend in aligned openings **143, 145, 147** formed respectively in the discs **123, 125** and **127**. The disc **125** is formed with edge notches **149** sized and positioned therein to receive the mounting flanges **99** of the elements **95** in anchored position on and beneath the disc **123**. The disc **125** is also formed with arcuate openings **151** which may communicate at one end with the bottoms of the edge notches **149**, said arcuate openings being slightly wider than the thickness of the prongs **45** and being thus adapted freely to receive said prongs upon insertion thereof endwise in an axial direction in said openings. These openings **151**, furthermore, are disposed in the disc **125** in position aligned with the curved portions of the openings **135** adjacent the innermost edge of the said curved portions. The disc **127** also is formed with arcuate curved openings **153, 153'** disposed therein in position to register with the curved openings **151** and the disc **125**. In constructions where one of the prongs is formed, for polarity purposes, with an extension or ear like the ear **77** shown in Fig. 5, one of the openings, such as the opening **153**, may be made correspondingly larger than the other opening or openings so that the pronged and socketed units may be connected only by inserting the enlarged prong or prongs in correspondingly enlarged openings sized to receive the same. As shown more particularly in Fig. 11, the opening **153** is relatively longer than the opening **153'**.

The assembly **21** of the socket unit **17** may be assembled in its housing by first passing the end of the cable through the opening **87** and through the housing, and connecting the bared ends of its conductors **29** to the connection lugs **103** by means of the clamping screws **107**. Thereupon the cable **27** may be retracted through the opening **87** in order to mount the assembly **21** in the housing. This may be accomplished by stretching the open end of the cavity **89** in order to dispose the peripheral edges of the disc **123** in the notch **91** and to interlock the ribs **93** in the notches **129**. When in such position the connection lugs **103** will be disposed within the rectangular cavity **85** of the housing with the opposite side edges of said connection lugs in snug engagement with the opposite sides of the housing defining said cavity. Relative rotation of the assembly **21** in the housing will thus be prevented not only by the engagement of the lug bars **93** in the notches **129** but also by the engagement of the connection lugs **103** in the housing cavity **85**. Accordingly, in connecting the pronged unit with the socket unit, the housings may be manipulated to guide the prongs **45** in an axial direction through the aligned openings **153, 151** and **135** into the relative position shown in Fig. 7.

The edges **73** of the prongs **45** will extend between the free ends of the clips **115** and the arms **109** of the elements **95** opposite such free ends of the clips. The housing units may then be relatively turned in order to advance the blade edges **73** between the clips **115** and the clip supporting elements **95** toward the anchored ends of the clips. During such twisting movement the assemblies **21** of the pronged and socket units may not turn with respect to the housings in which mounted, because of the interlocking action accomplished by the housing portions **93** in the notches **129**, by the lug portions **103** with the sides of the cavity **85**, and by the action of the peg portions **63** in the sockets **39**. Accordingly, by manipulation of the housings only the blades **45** may be turned into position such that the locking shoulders **75** of the blades may latch upon locking shoulders **155** provided by the disc **125** at the ends of the arcuate openings **151**. When in such position, the connector units cannot be separated by forces applied axially in opposite directions on the connector units as by strain applied thereto through the interconnected cables **27**.

When in locked position, as shown more particularly in Fig. 8 of the drawings, the latching protuberances **121** of the clips **115** register with the openings **79** in the prongs **45** and yieldingly resist relative turning movement in a direction to disengage the locking shoulders **75** from the locking portions **155** of the socket unit. This latching action, however, is of non-positive character and will not resist positive twisting forces applied through the housings of the units in order to unlock the same for disconnecting separation.

If desired, each of the housings **19** at its cable receiving end may be provided with a ring **157** molded in the end of the housing and serving to reinforce the same. These rings may each carry a pair of diametrically opposed out-

standing posts **159**, or other suitable support means for securing a cable clamp on the housing, the notched posts **159** shown in the illustrated embodiment being of the sort adapted to carry clamp means of the type illustrated in U. S. Patent No. 2,276,559 of March 17, 1942, no claim being made herein to such cable clamping means.

It is thought that the invention and its numerous attendant advantages will be fully understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein disclosed being the preferred embodiment for the purpose of illustrating the invention.

The invention is claimed as follows:

1. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member and extending from a face thereof in a direction to project within said cavity, said contact elements having portions, remote from said plate member, in position extending adjacent said cable opening and means for electrically connecting cable conductors on said portions.

2. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact elements comprising lugs secured on said plate member and arms on said lugs extending from said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from one side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member.

3. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact elements comprising lugs secured on said plate member and arms on said lugs extending from said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from one side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member, said contact elements having portions, remote from said plate member, in position extending adjacent said cable opening and means for electrically connecting cable conductors on said portions.

4. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact elements comprising lugs extending at and secured on one side of said plate member and arms on said lugs projecting through said openings and extending from the opposite side of said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from said one side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member.

5. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact elements comprising lugs extending at and secured on one side of said plate member and arms on said lugs projecting through said openings and extending from the opposite side of said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from said one

side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member, and a cover disc of insulating material secured to said plate member in position covering said lugs, said cover disc having slots formed therein in alinement with said spaced openings of the plate member.

6. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact member having spaced openings formed therethrough, said contact elements comprising lugs extending at and secured on one side of said plate member and arms on said lugs projecting through said openings and extending from the opposite side of said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from said one side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member, a filler disc of insulating material overlying said one side of said plate member and having cut out portions snugly receiving said lugs and registering with said openings, and a cover disc of insulating material overlying said filler disc in position covering said lugs, said cover disc having slots formed therein in alinement with said spaced openings of the plate member.

7. In an electric connector, a coupling unit comprising a molded element of flexible rubber-like insulating material forming a hollow resilient housing member providing a mounting cavity having an open end at an end of said housing member, said housing member being formed with an inwardly opening circumferential groove providing a seat, peripherally of said cavity, adjacent and spaced inwardly of said open end thereof, said housing member also having a conductor cable opening communicating with said cavity at the end thereof remote from said seat, and a connection assembly structure adapted to be removably mounted on said housing and comprising a flat disc of relatively rigid insulating material forming a mounting plate member having a peripheral edge sized and configurated to interfittingly extend in said seat forming groove, whereby to detachably secure the mounting plate member, on the housing member, in mounted position enclosing said open end of said cavity, said plate member, when in mounted position, serving also to brace and rigidify the housing member, contact elements rigidly secured in spaced apart relationship on said mounting plate member, said plate member having spaced openings formed therethrough, said contact elements comprising lugs secured on said plate member and arms on said lugs extending from said plate member within said cavity, said openings having sufficient width to receive plug contact prongs inserted removably therethrough from one side of the plate member into position to make electrical contact with said contact elements on the other side of the plate member, said openings being elongated and circularly curved and having length greater than the width of said plug contact prongs, and means on said plate member providing a lock shoulder at an end of a said opening in position to engage with a cooperating lock shoulder formed on a said contact prong.

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