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3,566,336

CONNECTOR ASSEMBLY

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FIG. 1.

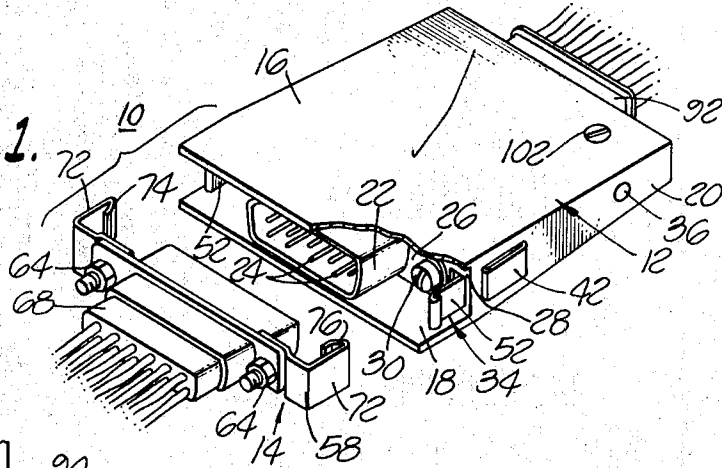


FIG. 2.

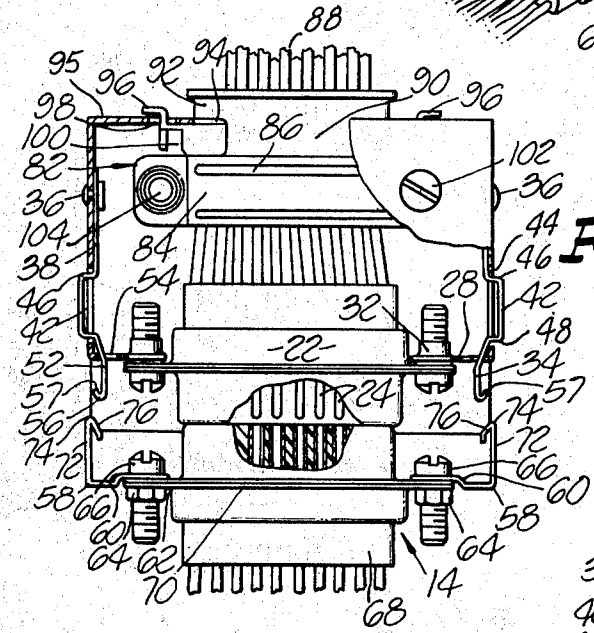


FIG. 3.

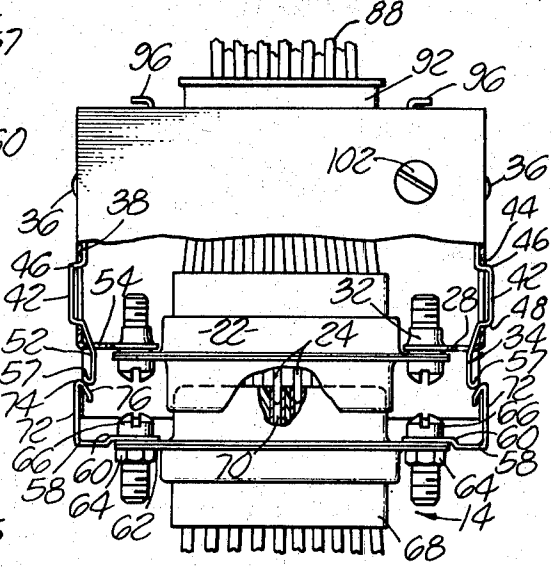
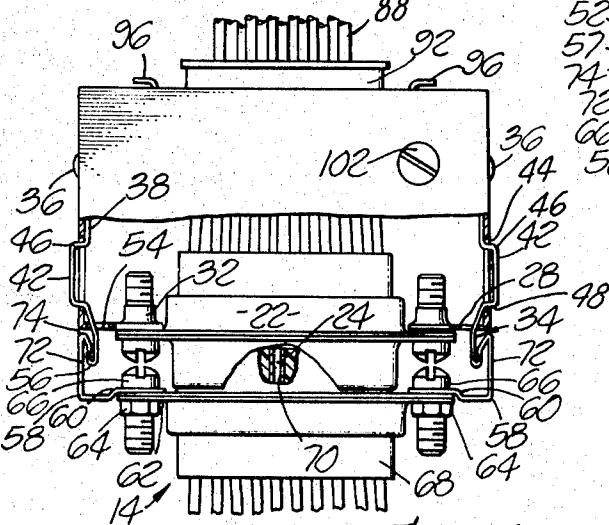


FIG. 4.



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CONNECTOR ASSEMBLY

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5 Claims

ABSTRACT OF THE DISCLOSURE

The invention comprises a plug connector and a mating receptacle connector with one of the connectors secured within a housing. A pair of locking spring members are secured at one end to the housing and extend generally parallel to the axis of its associated members and terminate in a lip-shaped member. The other connector is secured to one end of each of a pair of brackets; the other ends of the brackets extend substantially parallel to the axis of its associated connector and terminate in a ramp-shaped section which extends inwardly toward its associated connector. The distance between the lip-shaped members is less than the distance between the ramp-shaped brackets. Upon mating of the connectors, the lip-shaped member rides up the ramp incline of an associated locking ramp bracket and snaps into place in a positive abutting relationship with the ramp incline in order to restrict the backing off of the mated connectors. The housing to which one of the connectors is secured is used to house a cable clamp for protecting cable wires from undue strain.

The invention relates in general to a connector assembly and, more particularly, to a latching system for rapidly locking and unlocking a pair of mating connectors.

BACKGROUND OF THE INVENTION

In conventional connector assemblies where cable-to-cable or cable-to-panel connections are to be made, a junction shell is used to house a cable strain relief clamp. The strain relief clamp protects the cable wires from undue strain such as when a connector is disengaged from a mating connector. Further, conventional connector assemblies utilize separate latching devices, which are housed and operated independently of the junction shell, for securing a connector and its mating connector together. Moreover, the latching devices either utilize a screw-lock assembly which requires much time for assembly or a slide-lock assembly which requires numerous parts that must be machined to close tolerances. Where the latching mechanism has been made integral with the junction shell housing, the latching mechanism has heretofore been external to the housing, made it susceptible to damage, and increased the dimension of the entire assembly.

In order to overcome the attendant disadvantages of prior art connector locking assemblies, the present invention provides an automatic latching system which is achieved immediately upon full engagement of the mating connectors. Further, the latching system may be incorporated in the junction shell housing, thus, eliminating duplication of parts where separate junction shells and latching devices are used, thereby providing an extremely compact latch lock junction shell.

SUMMARY OF THE INVENTION

More particularly, the invention comprises a plug connector and a mating receptacle connector with one of the connectors secured within a housing. A pair of locking spring members are secured at one end to the housing

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and extend generally parallel to the axis of its associated members and terminates in a lip-shaped member. The other connector is secured to one end of each of a pair of brackets; the other ends of the brackets extend substantially parallel to the axis of its associated connector and terminate in a ramp-shaped section which extends inwardly toward its associated connector. The distance between the lip-shaped members is less than the distance between the ramp-shaped brackets. Upon mating of the connectors, the lip-shaped member rides up the ramp incline of an associated locking ramp bracket and snaps into place in a positive abutting relationship with the ramp incline in order to restrict the backing off of the mated connectors.

The advantages of this invention, both as to its construction and mode of operation, will be readily appreciated as the same becomes better understood by references to the following detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like parts throughout the figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partly in section of the connector assembly prior to mating of the connector;

FIG. 2 is a top view of the connector assembly of FIG. 1, partly in section, with the plug connector and receptacle connector abutting, prior to insertion of the plugs into the sockets;

FIG. 3 is a top view of the connector assembly of FIG. 1, partly in section, with the plugs partially inserted into the sockets; and

FIG. 4 is a top view of the connector assembly of FIG. 1, partly in section, with the connector assembly fully mated.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, FIG. 1 shows a connector assembly generally designated as 10. The assembly includes a main housing 12 and a latching assembly 14. The main housing 12 is essentially rectangular in shape and comprises a top wall 16, a bottom wall 18, and a pair of side walls 20. A conventional plug connector 22 having a plurality of pins 24 and a pair of mounting flanges 26 is secured to support flange 28 of the housing 12 by means of a screw 30 which is fastened by a nut 32. Normally, the housing 12 and flanges 26 and 28 are made of steel, brass alloy, or other metal which readily lends itself to stamping, drawing, or forming.

Referring now to FIG. 2, a pair of latch-spring locking mechanisms 34 which are normally made of beryllium copper, but could also be made of spring steel, are secured at one end to the inner side of side walls 20 of the housing 12, near the rear end thereof by means of a rivet 36. The locking mechanism 34 extends toward the front end of the housing, essentially parallel to the axis of the connector 22, with the rear portion 38 of the locking mechanism normally abutting the side walls 20. The locking mechanism 34 further comprises a pair of release buttons 42 which extend outwardly from the housing 12 through apertures 44 in the side walls. Each of the buttons 42 is connected at one end to the forward end of the rear portion 38 by means of a first leg member 46 which extends through the aperture 44 and which is integral with the rear portion 38 and each of the buttons 42. The other end of each of the buttons 42 is connected to a second leg member 48 which extends through the other end of the aperture 44 and is connected to the rear end of a forward portion 52 of the locking mechanism. The forward portion 52 extends through an aperture 54 of the support flange 28; the forward portion 52 forms a latch

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spring terminating in a lip-shaped portion 56; and the end section 57 of the lip-shaped portion extends laterally outward from the plug connector.

The latching assembly comprises a pair of generally right angle support flanges 58 which are secured at one end 60 to a pair of support flanges 62 by means of a nut 64 and bolt 66 arrangement. The support flanges 62 are integral with a conventional receptacle connector 68 having sockets 70 for mating with the pins 24 of plug connector 22. The other end of support flange 58, which forms a locking ramp bracket 72, terminates in a generally V-shaped section 74; a ramp incline portion 76 of the V-shaped section 74 extends laterally inward toward the receptacle connector 68.

Normally, the plug connector and receptacle connector are polarized for proper mating. Once properly polarized, as shown in FIG. 2, the end section of the latch spring rides up the ramp incline portion 76 of the locking ramp bracket 72, as shown in FIG. 3, and snaps into place in a positive abutting relationship, as shown in FIG. 4. However, it should be noted that the end section 57 does not abut the ramp incline portion 76 as depicted in FIG. 3 until after the plug and receptacle connectors are partially mated and correctly polarized, thus, eliminating the possibility of locking the connectors prior to having the connectors properly polarized and mated.

In the position shown in FIG. 4, the plug connector and receptacle connector are fully mated, and the positive abutting relationship restricts the backing off of the mated plug and receptacle connectors. To unmate the connectors, the locking mechanisms 34 are released from the support flanges 58 by depressing the release buttons 42 which allows the latch spring to ride down the ramp incline as the assemblies are disengaged.

Also contained within the main housing is a cable clamp 82 having a main clamping section 84 with ribs 86 for providing extra strength and rigidity to the clamp. Cables 88 are secured at one end to the plug connector and pass through the clamping section 84 to a reduced opening coupling section 90 into a wide mouth section 92 which is external the housing. The coupling section 90 abuts the section 92 and is integral therewith and passes through an aperture 94 in the end wall 95 of housing 12.

The clamping section 84 is positioned in the housing with respect to the rear wall of the housing 14 by means of a pair of right angle brackets 96 which pass through apertures 98 in the rear wall of the housing. The brackets are positioned at one end of the outer surface of the rear wall; the other end is integral with the flange 100 which is integral with the clamping section.

After the cables 88 have passed through the clamping section 84, the cables 88 are held securely in the clamping section 84 by means of a first screw 102 which passes through the top wall 16 of the housing and second screw 104 which passes through the bottom wall 18 of the housing. The screws are flush-mounted on the housing, and alternate turning of the screws causes the cable clamp to open or close. Securely tightening the cable clamp prevents strain on the contact-to-cable termination should any stress be put on the cables external of the housing. Further, the enclosed cable clamp eliminates the safety hazard normally associated with cable clamps where the clamp actuating screws are exposed.

Further, while the latching system has been depicted for use with rectangular connectors, it should be understood that other shapes such as circular connectors could be used. Moreover, while the assembly has been depicted as a cable-to-cable connection, it should be understood that cable-to-panel connections could also be used.

Further, while the clamp has been shown as being internal of the housing, it should be understood that the clamp could be mounted external of the housing, for example, by securing it to the end wall 95 of the housing.

Moreover, while the brackets 58 secured to the connector 68 have been depicted as two separate brackets,

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it should be understood, of course, that the brackets could be shaped into a unitary structure.

It should be further understood that the foregoing disclosure relates only to the preferred embodiments of the invention and that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. In an electrical connector assembly having a plug connector and a receptacle connector; a device for locking said plug connector to said receptacle connector upon full engagement of said plug connector and said receptacle connector comprising; a housing member having means for securing one of said connectors to bracket means, said bracket means extending substantially parallel to the axis of said connectors and terminating in substantially V-shaped sections of bent over sheet metal and having a ramp-shaped portion extending inwardly toward said one of said connectors and whose end faces away from said other connector when said connectors are mated; a pair of locking springs, each spring being secured at one end to a housing, each of said locking springs being associated with one of said V-shaped sections, said locking springs extending generally parallel to the axis of said connectors and terminating in a lip-shaped member whose end faces away from said one connector when said connectors are mated, said lip-shaped member being formed of bent over sheet metal; the distance between said lip-shaped members being less than the distance between said ramp-shaped portions, said lip-shaped member riding up the ramp incline of an associated ramp portion upon mating of said connectors and snapping into place in a positive abutting relationship of the end aforesaid V-shaped section and the end of the lip-shaped member, thereby restricting the backing off of the mated connectors.

2. A connector assembly in accordance with claim 1 and further comprising means for unlocking said assembly comprising a locking spring release for causing said locking spring lips to move inwardly and ride down the locking bracket ramp, said release forming an integral part of said locking springs, thereby allowing the mated plug and receptacle connectors to be separated.

3. A connector assembly in accordance with claim 1 wherein said locking springs are secured at said one end within said housing member.

4. A connector assembly in accordance with claim 1 wherein said plug connector and receptacle connector initially mate prior to contact of said lip-shaped members and said ramp-shaped members.

5. A connector assembly in accordance with claim 1 and further comprising cable clamping means positioned with respect to said housing means by brackets connected to said housing for securing cables terminating in said connector so as to prevent strain on said cable termination caused by stresses on said cable external to said housing.

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