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LOCKING ELECTRICAL CONNECTOR

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1 Claim. (Cl. 173—328)

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This invention relates to coupling devices in which electrical connections are made by conjoint terminal members and more specifically relates to quick-release locking devices adaptable to such members.

In general, the coupling involves cooperating male and female elements, such as a socket and a plug, and in particular applications, for example, such as electron discharge devices, the base thereof is provided with terminal pins which are inserted in a socket member to affix circuit connections to the various electrodes. In these applications, vibration or shock may loosen the coupling and introduce high resistance effects to the current flowing in the circuit. These effects are prohibitive, for example in the high frequency or ultra-short wave systems employing electronic devices. It is also desirable to accomplish the coupling without undue inconvenience when the connection must be parted to replace the electronic device.

An object of this invention is to efficiently lock the coupling members in operative position and readily disconnect the coupling when desired.

Another object of the invention is to prevent vibration or shock displacing the coupling connections and thereby to eliminate high resistance effects in circuit junctions.

A further object of the invention is to facilitate rapid connection and release of the coupling to provide a convenient mechanism which is positive in action and readily accessible.

Another object of the invention is to simplify the construction so that the locking mechanism is formed of a minimum number of components which may be fabricated into an assembly at low cost.

These objects are attained in accordance with this invention by a push-type coupling connector element adapted to engage a plug or base terminal member to join multiple conductors in a cable to the terminals or contacts of the plug or base.

A locking clamp is captively attached to the connector element and is provided with parallel arms engaging a flange or projection on the plug or base member, the arms being attached to offset projections of a yoke member pivotally connected to the connector element. The clamp is operated through the arcuate travel of the yoke which cooperates with the arms and the connector element to advance the connector with respect to the base or plug and by further action displaces the arms with respect to a transverse axis of the connector to positively lock the cou-

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pling regardless of forces tending to loosen the joint between elements. The lock is readily released by the reversal of the yoke member which automatically withdraws the connector from the terminals of the plug or base so that the arms may be released from the flange or projection on the plug or base member.

The advantages and features of the invention will be more clearly set forth in the following detailed description which, together with the accompanying drawing, disclose several constructions.

In the drawing,

Fig. 1 is a view in elevation of one embodiment of the invention showing a connector assembly with the locking device applied thereto;

Fig. 2 is a plan view of the assembly shown in Fig. 1;

Figs. 3 and 4 are two views in elevation of another embodiment of the invention employing an improved locking assembly;

Fig. 5 illustrates the relationship of the two parts of the connector assembly and the relative position of the locking device prior to clamping the two parts of the connector together; and

Fig. 6 is an enlarged perspective view of the locking mechanism showing details of its construction.

Referring to the drawings and particularly to Figs. 1 and 2, one embodiment of the invention is shown in a separable connector assembly having a hollow socket member 10, either of molded insulating material or a metallic shell, enclosing a plurality of sleeves or tubular spring contact elements, not shown, which are connected to a group of conductors combined in a flexible cable 11 extending through a side opening 12 in the socket member. A protective grommet 13 is fitted over the edge of the opening and is formed of suitable resilient material, such as rubber. The socket member 10 is adapted for a push-fit connection to a plug or base member 14 provided with a plurality of terminal pins for engagement with the tubular contacts in the socket member, as shown in Fig. 5, to couple the multiple conductors in the cable 11 to the terminals on the base member 14. The latter, for example, may constitute the base of an electronic discharge device enclosing a plurality of electrodes. The base 14, in accordance with this invention, is provided with a projection or circular flange 15 adjacent the terminal end of the plug or base member. The socket member 10 is provided with a transverse shaft 16 extending therethrough and having terminations

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projecting through the exterior of the casing or shell of the socket member, the extensions forming bearings or pivots for a wire bail or handle 17. The bail or handle has ends wound around the shaft and the extremities of the wire are bent upwardly at an angle and then bent outwardly to form terminal pins 18, as shown in Fig. 2. A pair of wire arms 19 provided with eyelet rings 20 on one end are pivotally attached to the pin extensions 18 on the wire bail and extend longitudinally downward towards the base member 14. The arms are connected to a semi-circular channel member 21 in pivotal relation and the arcuate channel member is adapted to engage the flange 15 on the base 14.

This construction provides an efficient locking mechanism formed of a small number of parts which is positive in action and rigidly secures the two separable connectors of the assembly together in locking relation so that vibration or shock does not disrupt the connection between the terminals and the contacts. The arcuate channel member 21 is rigidly affixed to the flange 15 on the base member 14 and through the coupling of the arms 19 reciprocally moves the socket member 10 with respect to the base member when the handle or bail 17 is rotated either to lock or release the socket member from the base. This is accomplished by the offset relation of the pivot pins 18 on the handle in engagement with the arms since these pins move in an arc about the pivot center of the shaft 16. Furthermore, when the handle 17 is in locking position, as shown in Fig. 1, the arms 19 are offset from the vertical plane of the pivot shaft 16 so as to rigidly lock the members of the connector assembly together.

Another form of the locking mechanism is shown in Figs. 3 to 6, inclusive, and comprises a pin shaft 22 extending through the socket member 10 and having a metallic strap yoke member 23 pivotally secured thereto, the yoke being provided with offset angular ears 24 which extend at an angle with respect to the longitudinal dimension of the yoke member 23. The offset extensions are provided with pivot bearings 25 from which dependent strap arms 26 extend, the lower ends of the arms being bent inwardly to form ears or gripping portions 27 which engage the lower surface of the flange 15 on the base member 14. The arms are also connected adjacent the ears 27 by a brace or bridge member 28 which engages the top surface of the flange and prevents spreading of the arms 26. The offset ears

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24 on the yoke member are also provided with bent extensions 29 which engage opposite sides of the arms 26 to define limits of travel of the yoke in its arcuate manipulation to lock and unlock the connectors in the assembly. In this construction, the strap arms 26 are also offset longitudinally from the axis of the pivot shaft of the socket member when the yoke is in locked position so that shock is prevented from accidentally releasing the locking arrangement of the connectors.

While the invention has been disclosed in several embodiments and particularly described as captively associated with the socket member of the connector assembly it is, of course, understood that the locking arrangement may be applied to the base connector with equal effect. In the latter case, the socket member will be provided with the flange to be engaged by the arcuate channel member 21 or the ears 27 on the arms. Accordingly, the invention is to be limited only by the scope of the appended claim.

What is claimed is:

A separable socket connector comprising a hollow insulating casing, a bearing shaft extending therethrough at right angles to the axis of said casing, a yoke pivotally carried by said shaft and having offset projections at opposite ends movable in an arc about said shaft, a pair of parallel arms extending from said projections and pivotally attached thereto, said arms having bent ends adapted to engage one side of the flange on a cooperating plug connector and having a bridge-piece connecting them and adapted to engage the other side of said flange, and lateral angular ears formed on said projections for contacting said arms to limit the travel of said yoke.

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