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(54) Electrical connectors.

(57) An electrical connector including a moulded synthetic resin body (11) having therein a plurality of parallel passages (12) receiving respective electrical terminals (13). The terminals (13) are inserted into their respective passages from a rear end of the body, and each terminal includes integral latch means intended to co-operate with the body to resist withdrawal of the terminal from its respective passage in a direction opposite the direction of insertion. Each terminal (13) further includes an abutment (24), and the connector includes a terminal retainer (15) engageable with the body, said terminal retainer when engaged with the body, co-operating with said abutments (24) of said terminals to prevent withdrawal of said terminals from their respective passages. The terminal retainer (15), when engaged with the body, embraces the rear end region of the body, wall portions (16) of the retainer (15) extending along opposite outer walls of the body from the rear end of the body towards the front end and engaging beneath undercut shoulders (17*a*) of said walls of the body, whereby rearward movement of the terminal retainer (15) relative to the body (11) is prevented.

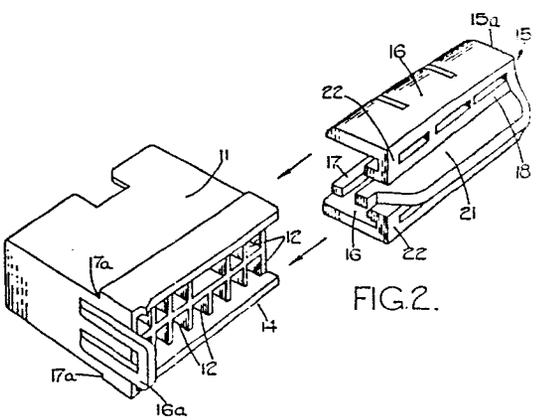

FIG.2.

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"ELECTRICAL CONNECTORS"

This invention relates to a multi-way electrical connector forming one part of a two part plug and socket connector unit. The invention may be embodied in either the plug connector or the socket connector of the unit, and preferably will be embodied in both connectors of the unit.

British Patent 2081526 discloses an electrical connector wherein the terminals of the connector are retained within passages in the moulded synthetic resin body of the connector both by resilient lances on the terminals which engage behind shoulders in their respective passages, and by means of a retainer plate which is received within the moulded synthetic resin body and which co-operates with abutments provided on the terminals. Thus there is a primary latching between the terminals and the body by way of the lances, and a secondary latching by means of engagement of the retainer with both the body and the terminals. Both primary and secondary latching serving to retain the terminals against withdrawal of the body. The use of such primary and secondary latching is extremely desirable in electrical connectors, but the provision of an internally received retainer such as disclosed in 2081526 is difficult to achieve satisfactorily in a miniature multi-way connector. The difficulties arise in a miniature connector both as a result of the problems inherent in moulding intricate miniature connector bodies and, more importantly, in the manual dexterity necessary to assemble the retainer into the miniature body.

It is an object of the present invention to provide a miniature connector having primary and secondary latching in a simple and convenient form.

The term miniature connector is used herein generally to denote an electrical connector having male terminals which are 2.50mm or less in width or female terminalswhich are arranged matingly to receive male terminals 2.50mm or less in width.

In an electrical connector in accordance with the present invention there is provided a moulded synthetic resin body having therein a plurality of parallel passages receiving respective electrical terminals, said terminals being inserted into their respective passages from a rear end of the body, and each terminal including integral latch means intended to co-operate with the body to resist withdrawal of the terminal from its respective passage in a direction opposite the direction of insertion, each terminal further including an abutment, and the connector including a terminal retainer engageable with the body, said terminal retainer when engaged with the body, co-operating with said abutments of said terminals to prevent withdrawal of said terminals from their respective passages, said terminal retainer, when engaged with the body, embracing the rear end region of the body, having wall portions extending along opposite outer walls of the body from the rear end of the body towards the front end, and engaging beneath undercut shoulders of said walls of the body, whereby rearward movement of the terminal retainer relative to the body is prevented.

Preferably said terminal retainer is arranged to be slidably engaged with the body, the direction of sliding movement of the retainer relative to the body being at right-angles to the length of said passages.

One example of the present invention is illustrated in the accompanying drawings wherein:-

Figure 1 is a perspective view of an electrical connector with its terminal retainer in position;
Figure 2 is a perspective view of a connector matable with the connector of Figure 1 to define a connector unit and having its terminal retainer removed;
Figure 3 is a plan view of the retainer shown in Figure 2;
Figure 4 is a view in the direction of arrow X in Figure 3; and

Figure 5 is a sectional view of a connector unit showing the two connectors thereof mated. It should be noted that Figure 5 shows more detail of a practical construction then is apparent from the simplified views comprising Figures 1 to 4.

Referring to the drawings, each connector whether it be a plug part or a socket part includes a moulded synthetic resin body 11 having therein a plurality of passages 12 for receiving respective electrical terminals 13. The passages 12 are open at the rear end 14 of each body 11 to permit insertion of the terminals into their respective passages from the rear end of the body 11. The terminals 13 will be accessible at the front end of their respective passage for mating engagement with a corresponding terminal when a pair of connectors of a connector unit are interengaged.

Prior to insertion into its respective passage 12, each terminal 13 will have a respective electrical lead 13a secured thereto in the usual manner. Thus a plurality of leads 13a will protrude from the rear end 14 of each body 11. Although not illustrated in the drawings, it will be recognised that each terminal and each passage includes stop means limiting movement of the terminal relative to its passage in the insertion direction, and furthermore each terminal will include at least one

resilient lance which is intended to co-operate with a shoulder in the wall of its respective passage to resist withdrawal of the terminal from its respective passage.

Each connector further includes a terminal retainer 15 moulded in synthetic resin material, and preferably of a colour which contrasts with the colour of the body 11.

It can be seen with particular reference to Figures 1 and 2 that the retainer 15 is intended to embrace the rear end portion of its respective body 11, and thus is of a length slightly greater than the equivalent dimension of its respective body. In transverse cross-section the retainer is generally U-shaped having a pair of parallel wall portions 16 formed adjacent their free ends with inwardly directed longitudinally extending ribs 17. The base region 18 of the U-shape retainer 15 is divided into three parallel sections by two parallel slots 19 which extend longitudinally of the retainer 15 from one end thereof. The slots 19 do not extend completely to the opposite end of the retainer, and thus the three portions of the base of the retainer defined by the slots 19 are integral with one another at one end of the retainer. The central bar of the retainer defined between the two slots 19 is indicated at 21 in the drawings and as can be seen clearly in Figure 3 projects at its free end beyond the free ends of the two portions 22 on opposite sides thereof. The portions 22 are formed internally with integral longitudinally extending flanges 23 which lie parallel to the wall portions 16. The flat, longitudinally extending surfaces of the flanges 23 and the bar 21 which lie at right angles to the wall portions 16 and within the retainer 15 are co-planar.

It can be seen that the passages 12 are arranged in two parallel rows, the extent of the rows being in a direction at right angles to the length of the passages and parallel to the length of the retainer 15. The retainer 15 is engaged with the respective body 11 in the following manner.

After insertion of the terminals 13 into their respective passages 12, the leads 13a will be protruding from the rear end of the body generally in two parallel rows. The retainer 15 is aligned with the body 11 and is moved relative to the body 11 in the direction of the length of the retainer 15 and at right angles to the passages 12. The body 11 enters between the walls 16 and the leads 13a of the two rows of leads enter, respectively, the slots 19 of the retainer 15. The retainer 15 is slid across the end of the body 11, embracing the rear end of the body 11 until the closed end 15a of the retainer abuts the body and prevents further sliding movement. At this point the protruding end of the central bar 16 will have been received within a stirrup 16a integral with the body 11. The retainer 15 is held against movement relative to the body 11 in the direction of the length of the passages in one direction by abutment of the interior of the retainer with the rear end of the body, and in the opposite direction by engagement of the ribs 17 beneath undercut shoulders 17a of the opposite outer walls of the body 11. If desired some form of latch arrangement can be provided to resist withdrawal of the retainer 15 from the body 11 in a direction opposite to that in which it is slidably engaged with the body 11.

As can be seen in Figure 5 each terminal 13 includes a pair of outwardly directed abutments 24 which, when the terminal is fully inserted into its respective passage,

lie at the rear end of the respective passage 12. Thus after fitting of the retainer 15 to the body 11 the lower surface of the bar 21 overlies an abutment 24 of each of the terminals in both parallel rows, and the co-planar lower surface of each flange 23 overlies the other abutment 24 of the terminals of the respective row.

It will be recognised therefore that should the aforementioned resilient lance or lances of a particular terminal fail to latch the terminal in its respective passage, then withdrawal of the terminal from its respective passage would be prevented by engagement of the abutments 24 of the terminal with either or both of the central bar 21 and a flange 23 of the retainer 15. Moreover, in the event that a terminal is not fully engaged in its respective passage during engagement of the retainer 15 with the respective body 11, then either the terminal will impede fitting of the retainer 15 and the operator will realize that there is a misalignment and will correct the fitting of the offending terminal, or alternatively engagement of an abutment 24 with part of the retainer 15 will push the offending terminal into its correct position. If desired the leading edges of the bar 21 and the flanges 23 can be provided with ramp surfaces for this purpose.

It will be recognised that the presence of a correctly fitted retainer 15 on a body 11 is an assurance that the terminals thereof are locked in position.

It will be recognised that Figures 1 to 4 are somewhat simplified diagrammatic representations, and thus there are changes in detail between the shapes and dimensions illustrated in Figures 1 to 4, and the equivalent shapes and dimensions in Figure 5. Figure 5 illustrates

a more practical embodiment. It can also be seen in Figure 5 that the two body parts 11 are latched together by integral latch parts including an integral resilient finger 25 on one of the body parts 11 which engages beneath a shoulder 26 of the other body when the two connectors of the unit are inter-engaged.

While the use of an integral lance on each terminals engaging a respective shoulder in a passage 12 is preferred in miniature connectors, it is to be recognised that "primary" latching could be obtained by providing a resilient lance like member on or in the wall of the passage engaging a latch means in the form of a shoulder formed integrally on the respective terminal.

The terminals 13 in the unit shown in Figure 5 are male terminals having a width not exceeding 2.50 mm. The mating female terminals (not shown) will of course be dimensioned matingly to receive the male terminals.

CLAIMS.

1. An electrical connector comprising a moulded synthetic resin body (11) having therein a plurality of parallel passages (12) receiving respective electrical terminals (13), said terminals (13) being inserted into their respective passages (12) from a rear end of the body (11), and each terminal (13) including integral latch means intended to co-operate with the body (11) to resist withdrawal of the terminal (13) from its respective passage in a direction opposite the direction of insertion, each terminal (13) further including an abutment (24), and the connector including a terminal retainer (15) engageable with the body (11), said terminal retainer (15) when engaged with the body, co-operating with said abutments (24) of said terminals (13) to prevent withdrawal of said terminals (13) from their respective passages (12), the connector being characterised in that said terminal retainer (15), when engaged with the body (11), embraces the rear end region of the body, the retainer (15) having wall portions (16) extending along opposite outer walls of the body from the rear end of the body towards the front end, and engaging beneath undercut shoulders (17a) of said walls of the body, whereby rearward movement of the terminal retainer (15) relative to the body (11) is prevented.

2. A connector as claimed in Claim 1 characterised in that said terminal retainer (15) is arranged to be slidably engaged with the body (11), the direction of sliding movement of the retainer relative to the body being at right-angles to the length of said passages (12).

3. A connector as claimed in Claim 1 or Claim 2 characterised in that said terminals are either male terminals having a width dimension not exceeding 2.50 mm. or are female terminals dimensioned matingly to receive male terminals having a width dimension not exceeding 2.50 mm.

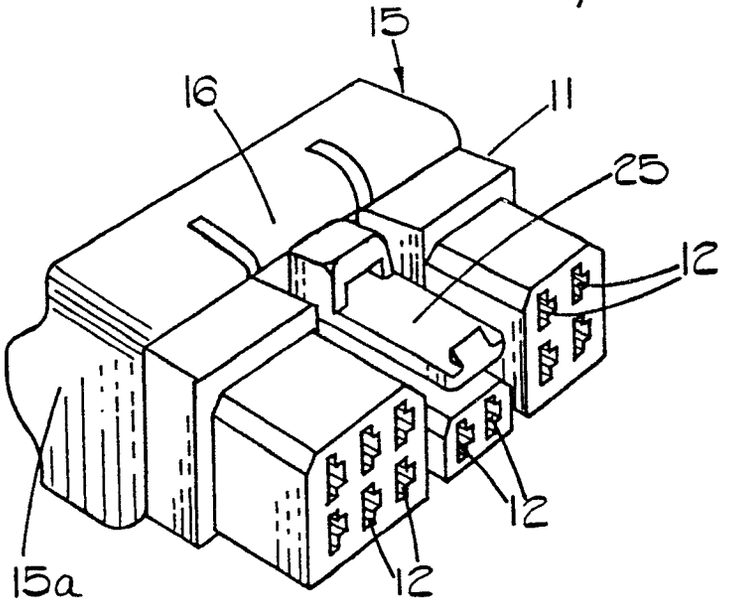

FIG.1.

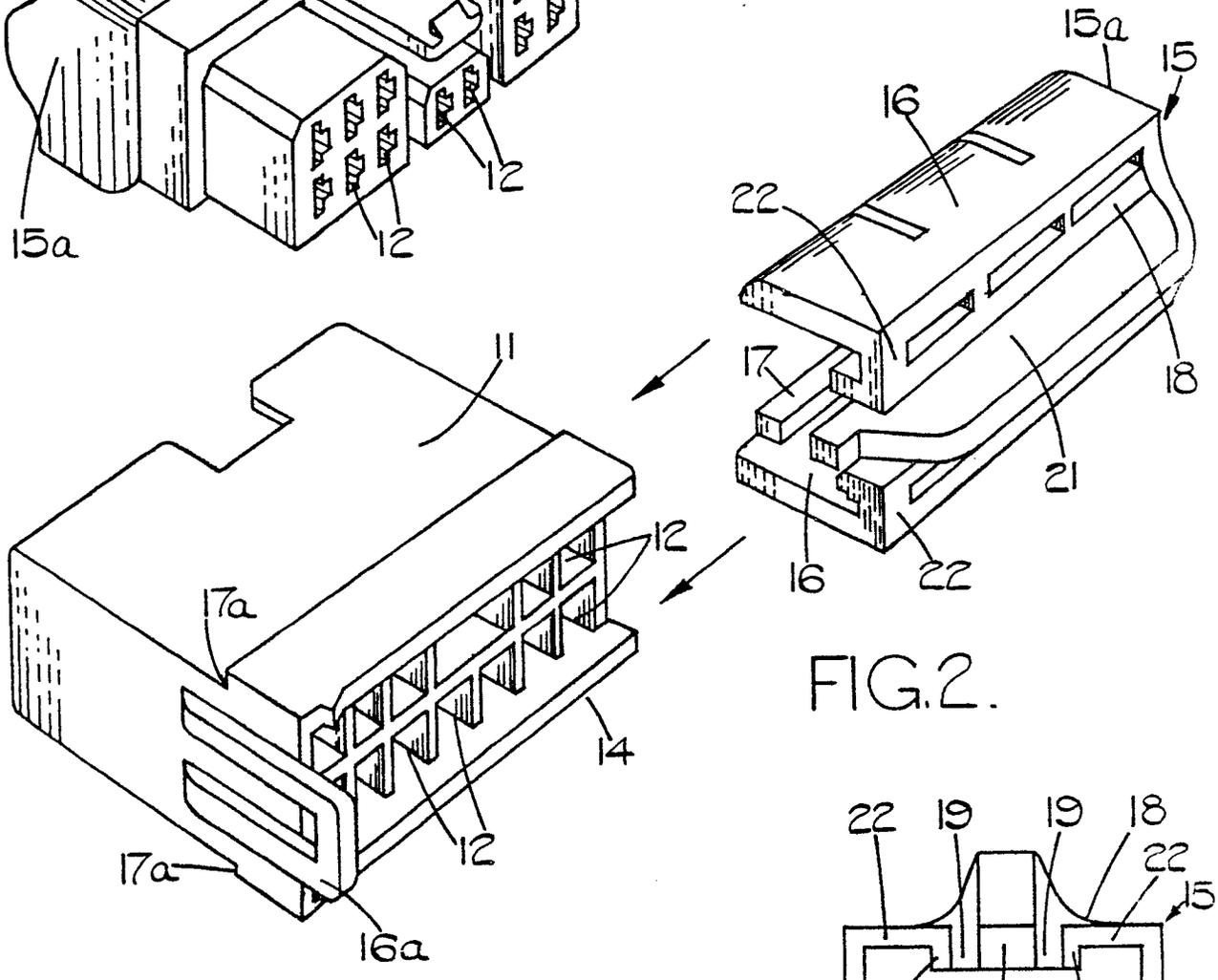

FIG.2.

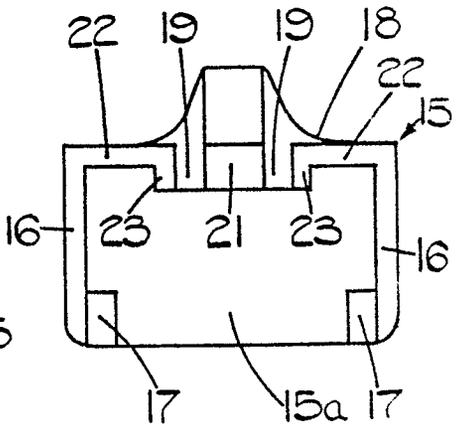

FIG.4.

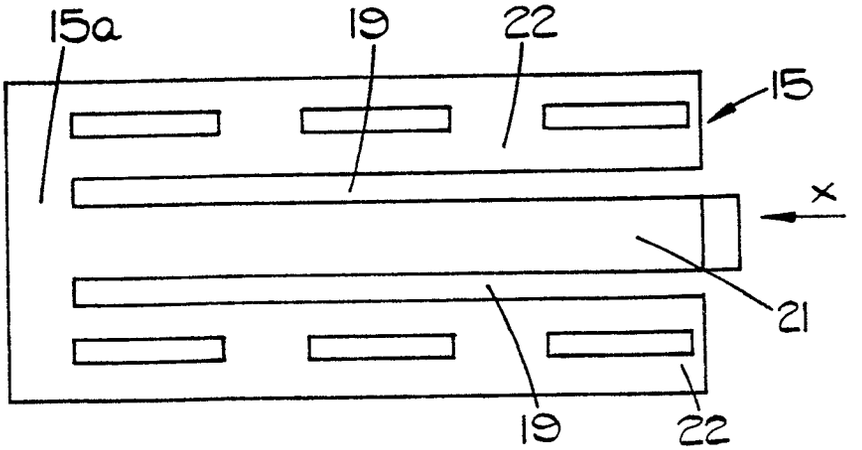

FIG.3.

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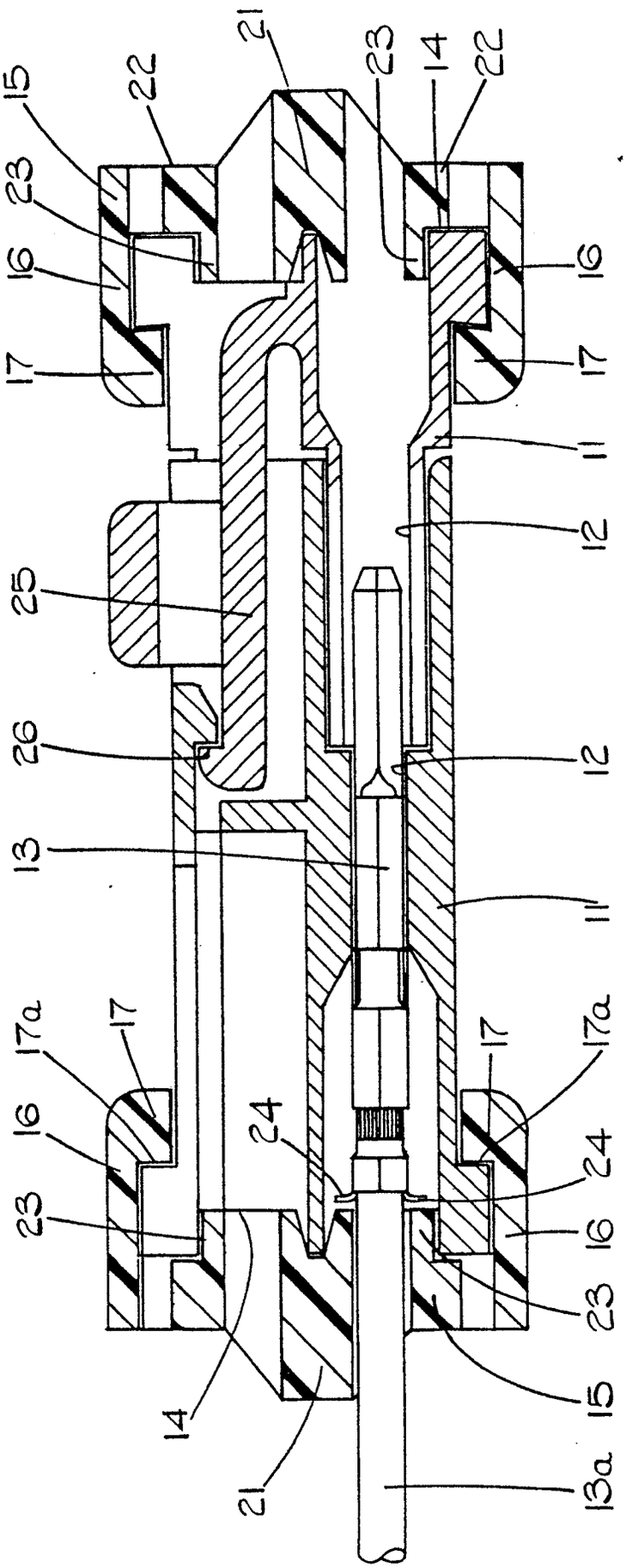

FIG.5.