

Specification11053
copyELECTRICAL CONNECTOR WITH REINFORCED ENGAGEMENT MEANSBackground Of The Invention ✓

The present invention relates to electrical connectors and more particularly to an electrical connector component having a reliable latching member formed in its housing for engaging a complementary mating connector component.

Electrical connectors are used for many applications and such connectors are commonly used to connect two printed circuit boards together. One such connector is known which has a connector housing with a mating cavity disposed between opposing sidewalls of the housing that are of uniform thickness. A plurality of electrically conductive terminals are arranged along the mating cavity with their contact sections positioned therein. Such connectors may have some type of latch means formed in the sidewalls for fastening a mating connector component thereto. The latch means may take the form of an opening or step-like indentation which catches a resilient tongue formed in the mating connector-component.

These type of locking connectors are designed for use on printed circuit boards and accordingly, it is desirable to have the size of the connector reduced as much as possible. In order to meet this reduced size requirement, it would be desirable to reduce the thickness of the sidewalls of the connector housing. However, this reduction may result in a detrimental loss of mechanical strength when such thin walls are provided with the latch openings or indentations.

The present invention is therefore directed to a connector structure which has a reliable engagement feature that overcomes the aforementioned disadvantage and does not result in a detrimental decrease in the mechanical strength of the connector.

Summary Of The Invention

Accordingly, an object of the present invention is to provide a locking-type electrical connector structure which permits a maximum reduction in the size of the connector, while still ensuring that its sidewalls retain sufficient mechanical strength for reliable engagement with a complementary-shaped mating connector component.

To attain this object, the present invention provides an electric connector comprising a housing having a plurality of sidewalls which define a mating space and a plurality of terminals fixed to the housing with their contact sections positioned in the mating space. Two of the sidewalls which serve to define the mating space of the connector housing have inner and outer wall sections, the inner wall section being resilient and having a locking means formed therein which engages the mating connector component when mated together and, the outer wall section providing mechanical strength.

The terminals of the connector may have solder tails lying generally flush with the bottom surface of the housing to permit the soldering of the soldering tails to the surface of a printed circuit board.

The mating space is defined by two opposite sidewalls of the connector component, a ceiling or top wall of the connector housing, and a floor or bottom wall. The inner and outer wall sections cooperate to form a double-walled sidewall structure and, in accordance with the principles of the present invention, this double wall characteristic permits the outer wall to retain a good and sufficient mechanical strength to the structure, while

letting the inner wall function independently as a resilient fastening structure of the mating space.

5 These and other objects, features and advantages of the present invention will be clearly understood through a consideration of the following detailed description.

Brief Description Of The Drawings

In the course of the following description of the detailed description, reference will be made to the attached drawings wherein like reference numerals identify like parts and wherein:

FIG. 1 is a perspective view of an electrical connector component constructed in accordance with the principles of the present invention;

FIG. 2 is a cross sectional view of the connector component of FIG. 1 taken along lines 2-2 thereof;

FIG. 3 is a front elevational view of the connector component of FIG. 1;

FIG. 4 is a plan view of the connector component of Fig. 1;

FIG. 5 is a plan view of the connector component of Fig. 1;

FIG. 6 is an enlarged cross section of the electric connector taken along the lines A-A in FIG. 3.

Description Of The Preferred Embodiment

Turning first to FIG. 1, an electric connector component constructed in accordance with the principles of the present invention is illustrated generally at 1. This connector 1 is shown in the drawings as being of a "right-angle" type, but it will be understood that this specific configuration is intended only for exemplary purposes and the principles of the present invention may be used with other connector component configurations.

The connector component 1 includes an elongated, insulative housing 2 having a mating cavity or receptacle 3 formed therein and oriented generally at a right angle to the plane of the printed circuit board surface (not shown) upon which the connector is mounted. The mating cavity 3 opens at the front 2b of the connector component in order to accommodate a mating connector component (not shown). A plurality of terminals 4, 4' are fixed to the housing 2 with their contact sections 5, 5' arranged in parallel fashion within and along opposite sides of the mating cavity 3. The opposite sidewalls 6 of the housing 2 cooperate with the ceiling plate, or top wall 2c, of the connector housing 2 and the floor, or bottom wall 2d, of the connector housing 2 to partly define the mating space 3

As best seen in the cross-sectional view of FIG. 2, the upper set of terminals 4 at the top of the connector component has solder tails 8 lying at or just below the bottom surface 2a of the housing 2, so that the connector 1 may be fixed to a printed circuit board by surface mount soldering the solder tails 8 of the terminals to selected conductive pads of the printed circuit board. The lower set of terminals 4' of the connector 1, which are spaced apart from the upper set 4, are disposed along the bottom of the mating cavity 3 of the connector component 1. The solder tails 8' of these second terminals 4' also lie at or just below the bottom surface 2a of the connector component

and preferably lie at or in a common plane with the solder tails of the upper set of terminals 4.

5 As best seen in FIGS. 1 & 2, each sidewall 6 of a housing 2 has a generally right angled metal fastener 9 fixed to its lower part. The fastener 9 of each sidewall 6 is configured to permit the housing 2 to be soldered to a selected area of a printed circuit board when the terminals 4, 4' are soldered to selected conductive pads of the printed circuit board (not shown).

10 These sidewalls 6 include distinct inner and outer wall sections 6a and 6b. As seen from FIGS. 1 & 6, the inner wall section 6a extends forwardly of its associated outer wall section 6b and has an engagement slot, or opening 7, illustrated as a rectangular recess,
15 defined therein in order to catch and fasten the mating connector component by permitting a latching piece of the mating connector component or locking projection, to fall within and engage the engagement opening 7 when the two components are mated together. As such, the inner wall is relatively thin so as to be flexible. The outer wall
20 section 6b is flat in nature, and is thick enough to provide good mechanical strength to the sidewall. The inner and outer wall sections 6a, 6b are separated in the embodiment illustrated by an intervening space 24 so that the inner wall section 6a has sufficient room or space from
25 the outer wall section 6b to permit the inner wall section to flex in the longitudinal direction "L" (Fig. 1) during mating with the opposing mating connector while the outer wall section 6b primarily provides structural support to the connector housing by interconnecting the top wall 2c
30 and the bottom wall 2d together.

As seen in FIGS. 1 & 6, the inner wall portion 6a lies interior of the outer wall portion 6b of the sidewalls 6 of the connector housing 2. The inner wall portion 6a is slightly spaced apart from the outer wall portion 6b as
35 illustrated in FIG. 6. The front, or leading edge 21, of

the inner wall portion 6a may also extend forwardly past the front, or leading edge 22, of the outer wall portion 6b and give the sidewalls 6 a stepped configuration when viewed from either of the top or bottom walls 2c, 2d of the connector housing 2.

The leading edge 21 of the inner wall section 6a may have an inclined or ramped inner edge 23 which extends away from the outer wall sections 6b toward the mating space 3 to act as lead-in to facilitate insertion of the mating connector component.

The ceiling 2c and floor 2d of the housing 2, which, along with the opposite sidewalls 6, define the mating cavity 3, are thick enough to ensure a required mechanical strength. Thus, the connector component 1 may be advantageously reduced in size without causing any problems which result in the deterioration of the connector components overall mechanical strength. In addition, the connector housing 2 includes a rear wall 25 which serves as a base of the mating cavity 3 and into which retention sections of terminals 4, 4' are secured.

The mating connector component may be inserted into the mating cavity 3 of the connector component 1 without substantial concern of degradation of the connector housing due to loss in strength or deformation of the sidewalls 6 due to the sufficient mechanical strength provided by the double wall structure of the sidewalls 6. The mating connector component may then be fastened to the connector component 1 by permitting the latch pieces (which will typically take the form of projecting lugs or the like) of the mating connector component to fall into and engage the openings 7 of the inner wall sections 6a of the opposite sidewalls 6 of the connector component 1. In the alternative, the projecting lugs of the latch structure could be located on inner wall portion 6a rather than on the mating connector component. In such instance, the mating connector component would include an opening or recess into which each lugs would fit during mating.

The present invention is described as being applied to a "right-angle type" electric connector using terminals whose solder tails can be soldered to contact pads on the surface of a substrate, but the present invention can be equally applied to a "through hole" electric connector using terminals whose solder tails extend through holes in the printed circuit board so that they may be wave soldered. Also, the inner wall section 6a of the double-walled structure 6 may have a step-like indentation as a locking means in place of the opening 7.

As may be understood from the above, due to the double-walled structure on each side of the housing, a required mechanical strength can be obtained in the electric connector structure even though its size has been substantially reduced. The outer wall section of substantial thickness provides a required mechanical strength to the housing around the engagement area designated by the engagement opening 7, thereby permitting the apertured or step-like indented inner wall section to function as a resilient latch.

It will also be understood that the embodiments of the present invention which have been described are illustrative of some of the applications of the principles of the present invention. Various modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.



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CLAIMS:

1. In an electrical connector (1) having an insulative housing (2), the connector housing (2) including at least two spaced apart sidewalls (6) partially defining a mating component-receiving space (3) within the housing (2) and a plurality of electrically conductive terminals (4, 4') disposed within the component-receiving space (3), the improvement comprising:

each sidewall (6) having distinct, spaced apart inner and outer sidewall portions (6a, 6b), the inner sidewall portion being flexible (6a) including an engagement ledge for engaging and latching a complementary mating component and the outer sidewall portions (6b) providing structural support for said connector housing (2).

2. The connector as defined in claim 1, wherein said inner and outer sidewall portions (6a, 6b) have distinct respective leading edges (21, 22), the leading edges (21) of said inner sidewall portions (6a) extending past said outer sidewall portion leading edges (22).

3. The connector as defined in claim 1, wherein each said inner sidewall portion includes an opening (7) therein and said engagement ledge is part of said opening.

4. The connector as defined in claim 3, wherein said connector housing (2) includes a base wall (25) defining a base of said component-receiving space (3), the base wall (25) interconnecting said sidewalls (6) together and said engagement openings (7) extending in said sidewall inner wall portions (6a) past said base wall (25).

5. The connector as defined in claim 4, wherein said terminals include mounting portions and said mounting portions are secured within said base wall.





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5 6. The connector as defined in claim 1, wherein said conductive terminals (4, 4') have contact portions (5, 5') disposed within said component-receiving space (3) and solder tail portions (8, 8') which extend out of said connector housing (2).

10 7. The connector as defined in claim 6, wherein said terminal solder tail (8, 8') and contact portions (5, 5') extend generally parallel to each other.

15 8. The connector as defined in claim 1, wherein said connector housing (2) includes opposing, spaced-apart walls (2c, 2d) which interconnect said sidewalls (6) together at said outer sidewall portions (6b) thereof.

20 9. The connector as defined in claim 1, wherein each of said pair of said inner wall portion (6a) and said outer wall portion (6b) are spaced apart along a longitudinal axis of said housing.

25 10. An electrical connector comprising:
an insulative housing including first and second pairs of opposing spaced-apart housing walls, said first pair of said housing walls extending generally parallel to a longitudinal axis (L) of said connector housing (2) and defining a pair of longitudinal walls (2c, 2d) of said housing (2), said second pair of housing walls extending generally transversely to the longitudinal axis (L) and defining a pair of transverse walls (6) of said connector housing (2), the transverse and longitudinal walls being interconnected together at ends thereof to define a component receiving cavity (3) for receiving a complementary mating connector component therein;

35 a plurality of electrically conductive terminals (4, 4') mounted in the housing, a contact portion of each terminals being disposed within the cavity (3) along said

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longitudinal walls (2c, 2d),

each said transverse wall (6) having inner and outer portions (6a, 6b), the inner and outer portions being spaced apart along the longitudinal axis, the transverse wall outer portions (6b) interconnecting said longitudinal walls (2c, 2d) together in order to provide structural support to said transverse walls (6), each inner portion (6a) providing a distinct, flexible engagement member to said transverse walls (6) adjacent said component receiving cavity (3), said engagement member being configured for engagement with a latching portion of said complementary mating connector component.

11. The connector as defined in claim 12, wherein said inner and outer portions (6a, 6b) have respective leading edges (21, 22), the inner portion leading edges (21) extending past said outer portion leading edges (22) such that said transverse walls (6) have a stepped configuration when viewed from said longitudinal walls (2c, 2d).

12. The connector as defined in claim 12, wherein said inner portions (6a) have engagement slots (7) disposed therein.

13. The connector as defined in claim 14, wherein said connector housing (2) includes a base wall (25) defining a base of said cavity (3), the base wall (25) interconnecting said walls (6) together and said engagement slots (7) extending in said inner portions (6a) past said base wall (25).

14. The connector as defined in claim 15, wherein each said engagement slot (7) includes an interior ledge.





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15. The connector as defined in claim 12, wherein each said conductive terminal (4, 4') includes an associated solder tail portion (8, 8') which lies adjacent one (2) of said longitudinal walls.

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16. The connector as defined in claim 12, wherein said space (24) between said inner and outer portions extends through said connector housing (2) to isolate said transverse inner and outer portions (6a, 6b) from each other.

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