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Ljubijankic et al.

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(54) **PRINTED CIRCUIT BOARD ELECTRICAL CONNECTOR AND ASSEMBLY METHOD FOR THE SAME**

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See application file for complete search history.

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Related U.S. Application Data

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(57) **ABSTRACT**

An electrical connector and method of assembling an electrical connector that is configured for mounting to a printed circuit board. The electrical connector has interleaved contact wafers to form one or more contact wafer assemblies that are supported by an insert of the electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of mating ends of the plurality of contacts at a mating interface of the electrical connector.

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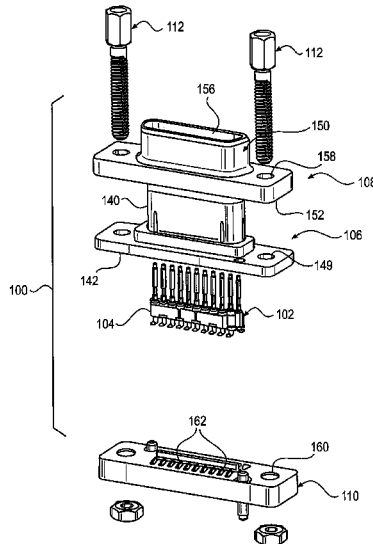
H05K 3/34 (2006.01)

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21 Claims, 6 Drawing Sheets

(52) **U.S. Cl.**

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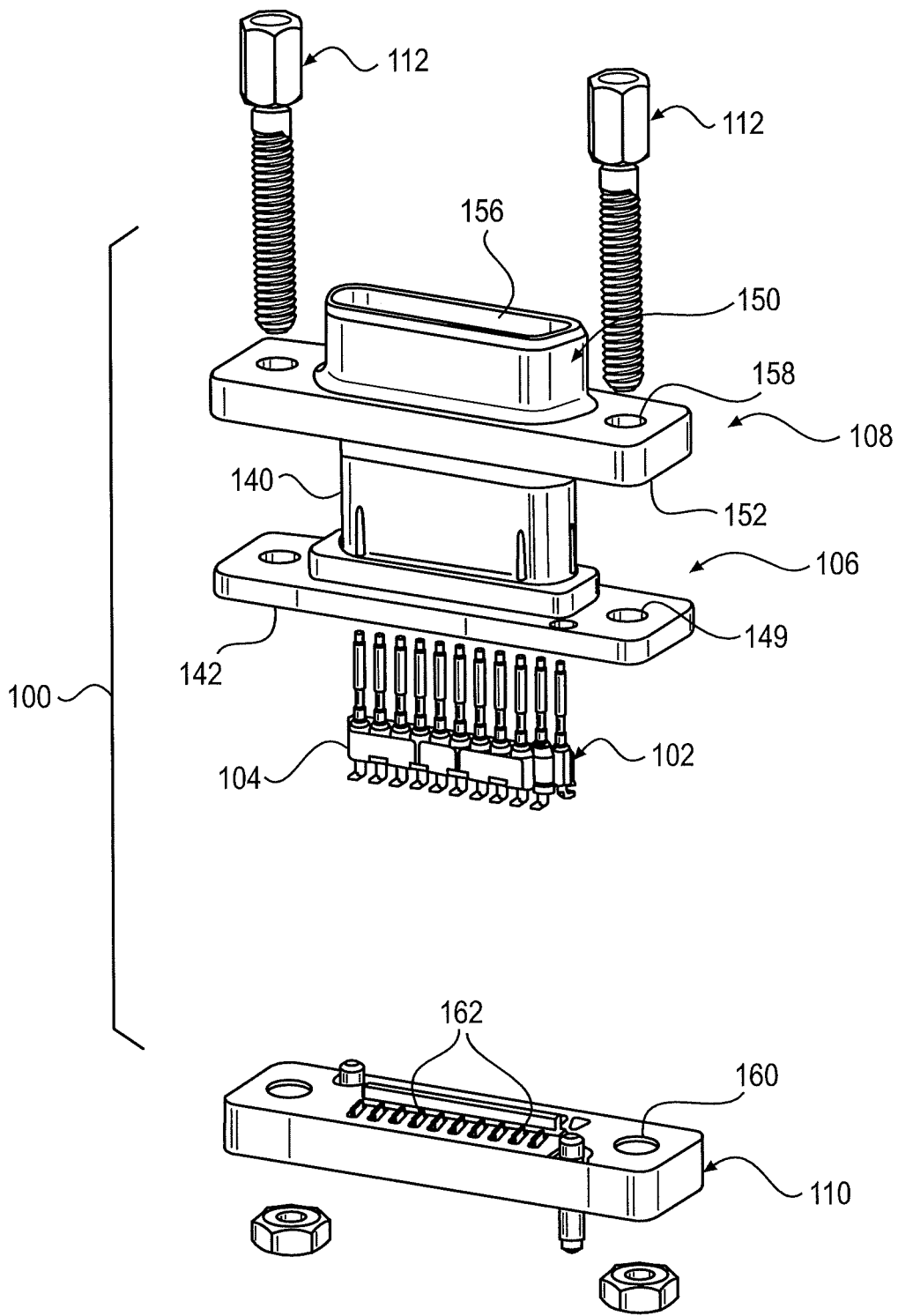


FIG. 1

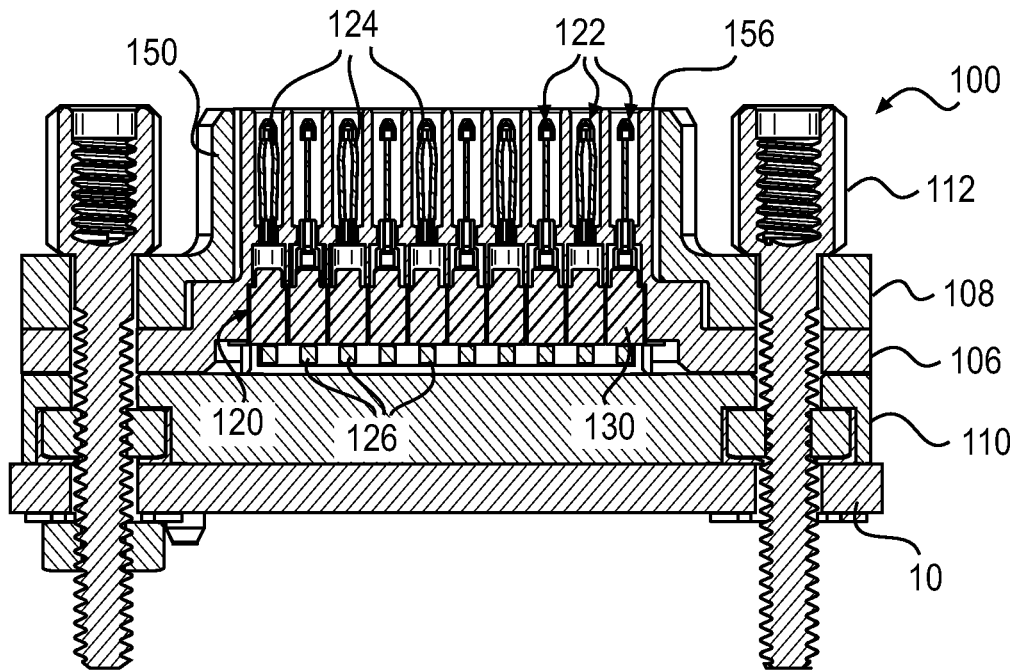


FIG. 2A

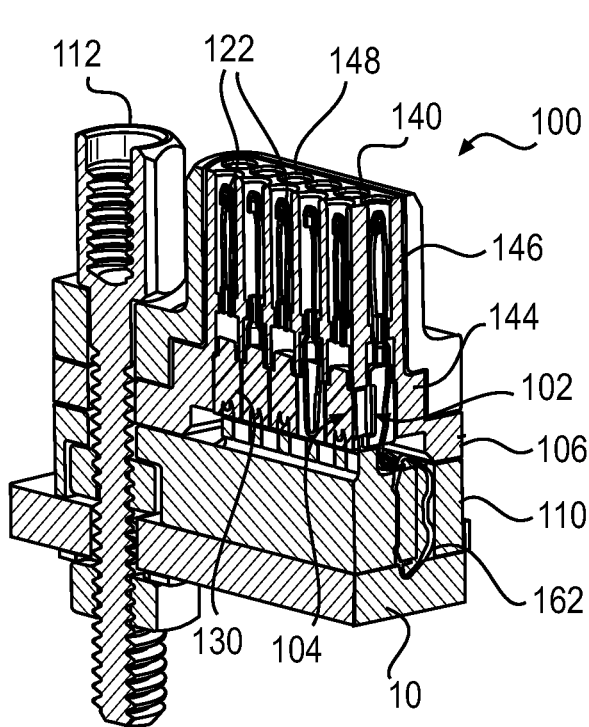


FIG. 2B

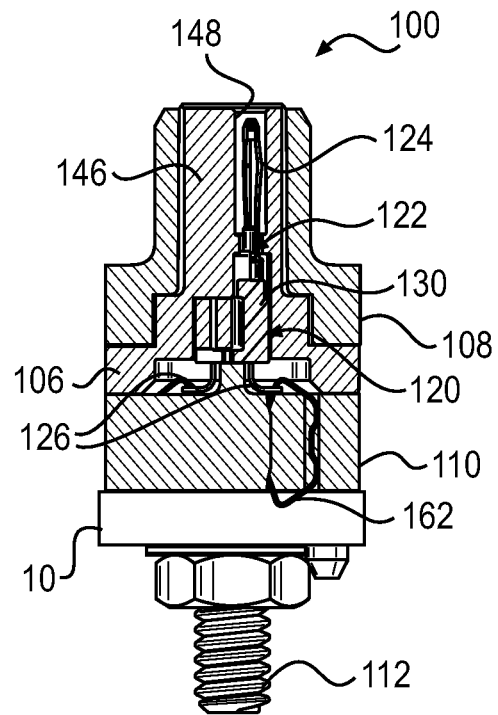


FIG. 2C

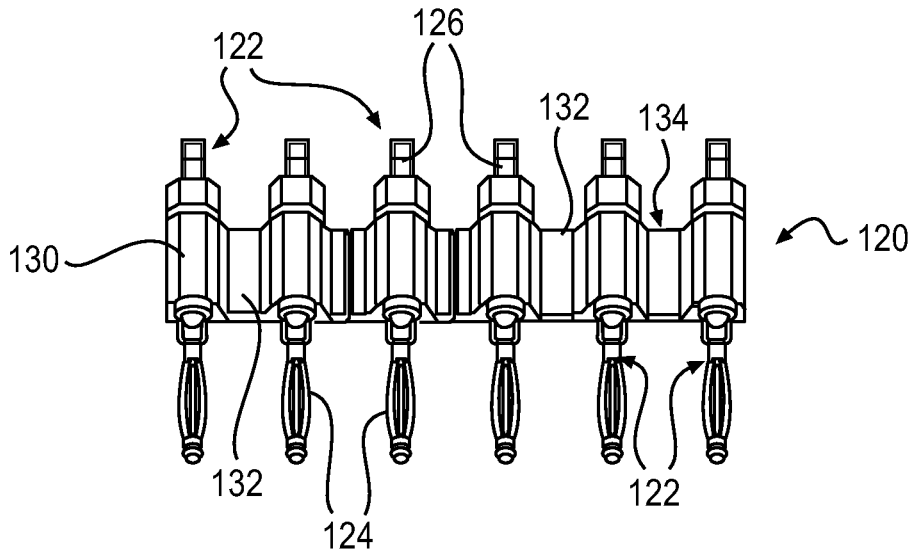


FIG. 3

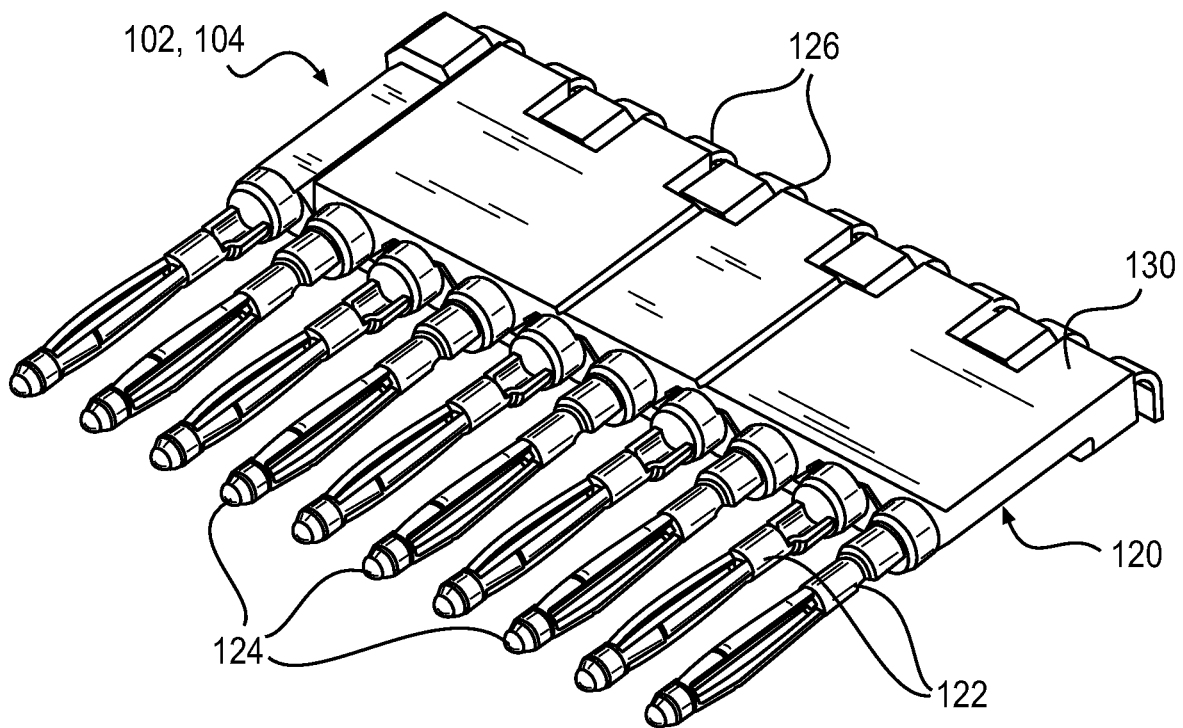


FIG. 4A

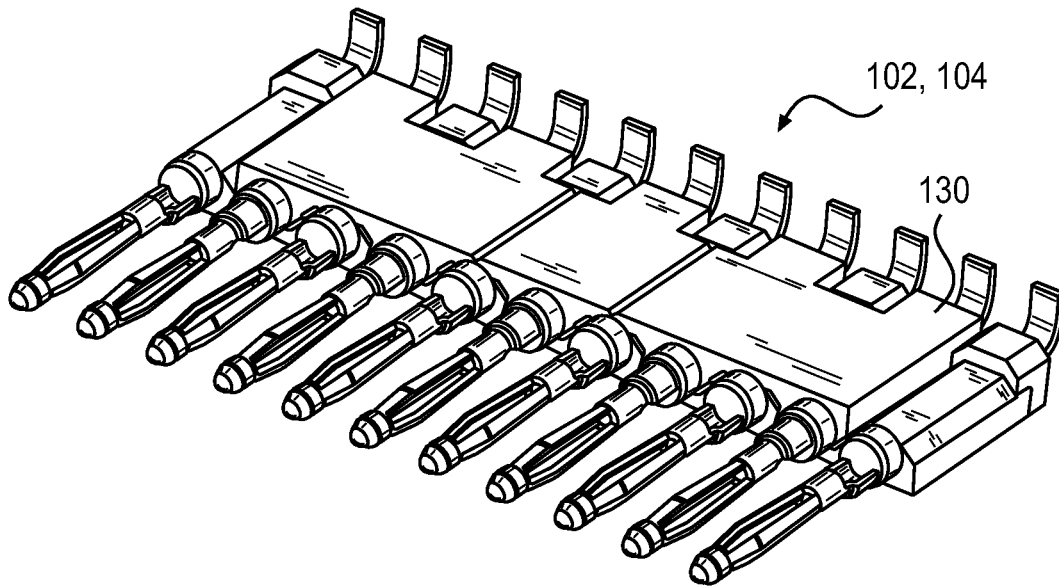


FIG. 4B

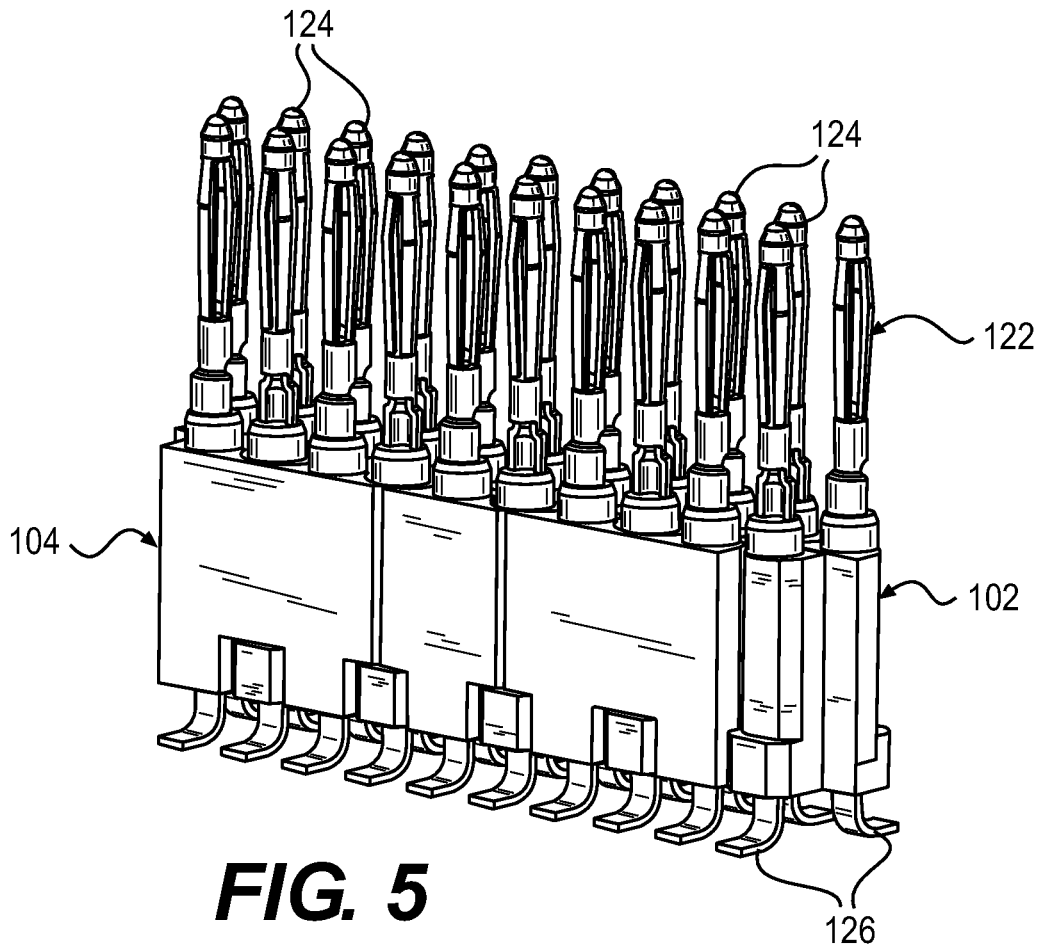


FIG. 5

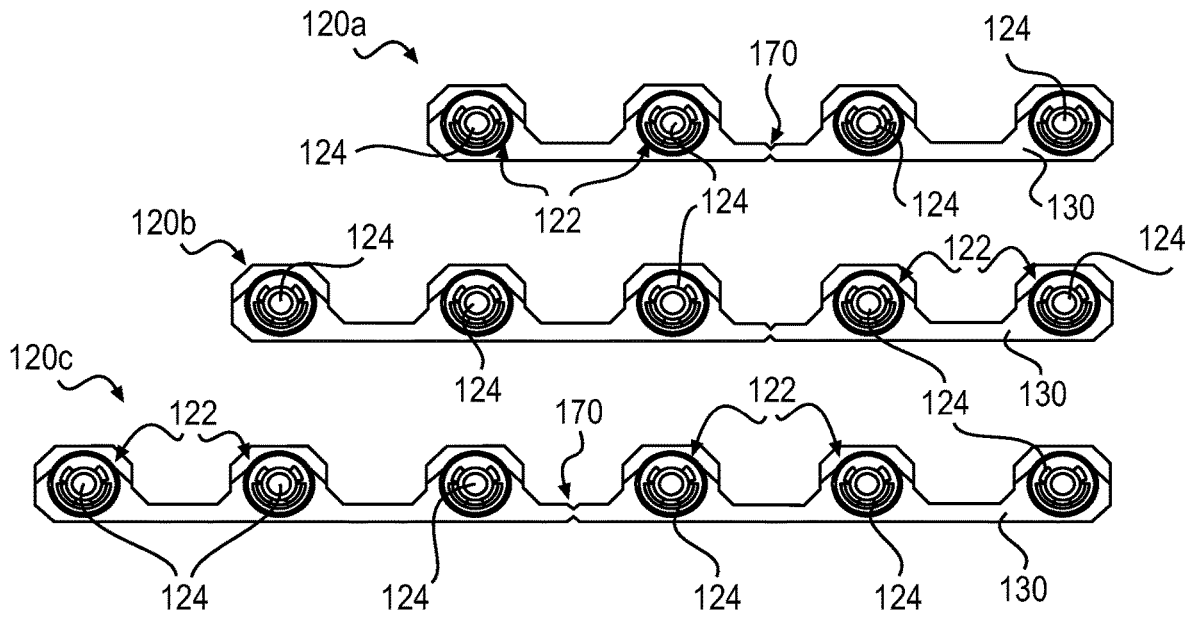


FIG. 6

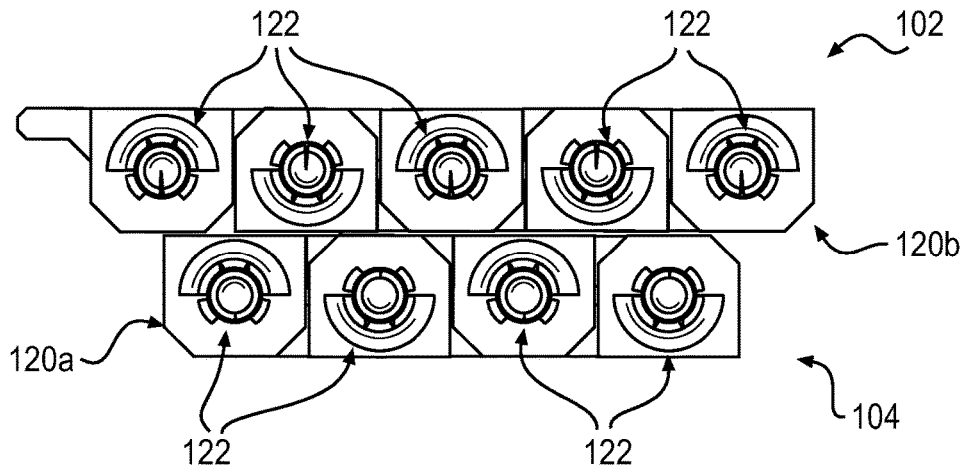


FIG. 7

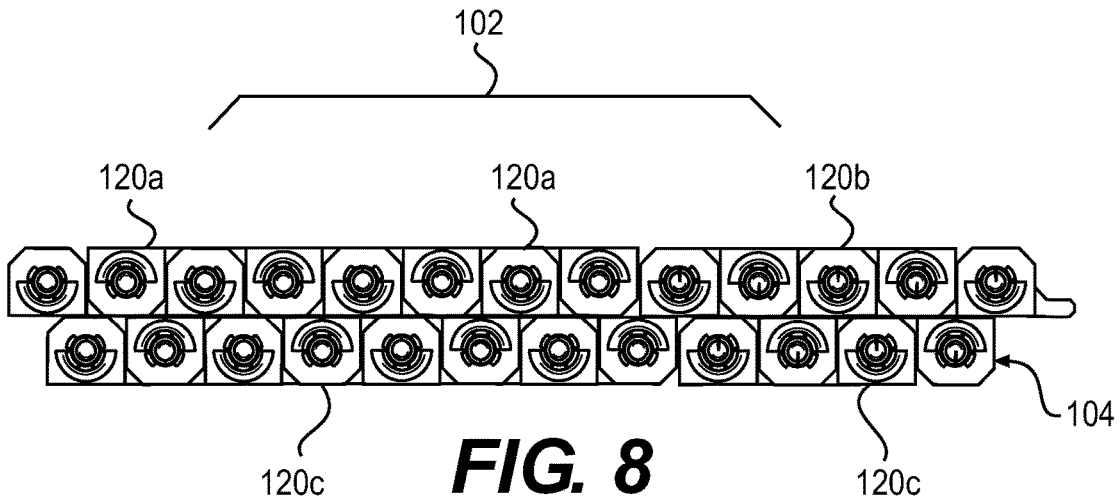


FIG. 8

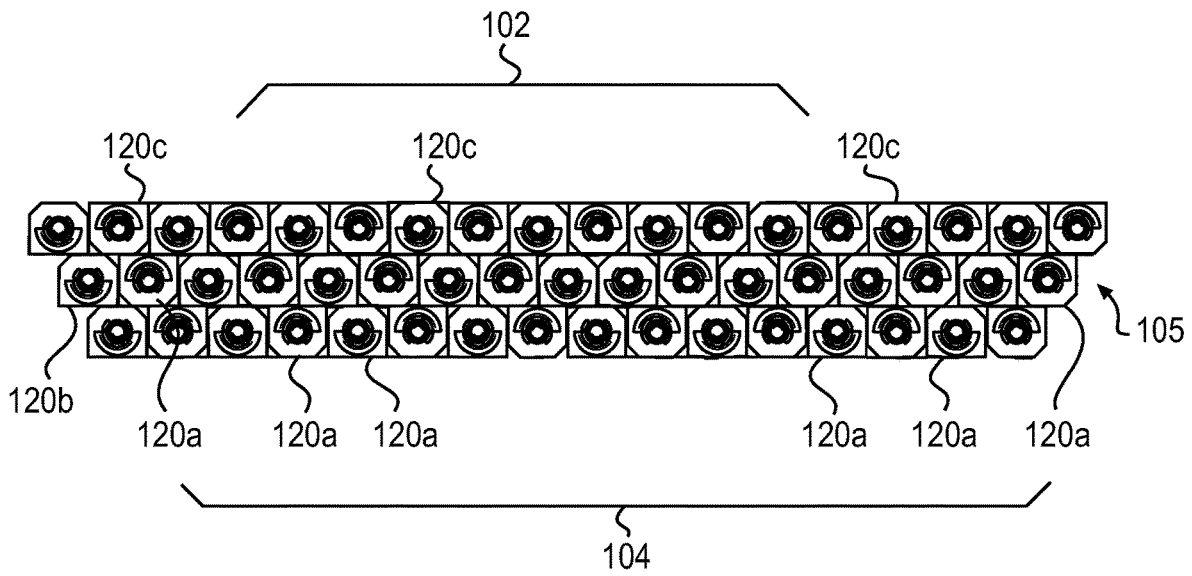


FIG. 9

**PRINTED CIRCUIT BOARD ELECTRICAL
CONNECTOR AND ASSEMBLY METHOD
FOR THE SAME**

CROSS-REFERENCE TO RELATED
APPLICATION

This application claims the benefit of priority of U.S. application Ser. No. 16/108,633, filed Aug. 22, 2018 and entitled "Assembly Method for a Printed Circuit Board Electrical Connector," the content of which is relied upon and incorporated herein by reference in its entirety.

BACKGROUND

Manufacture and assembly of electrical connectors, such as those configured for use with a printed circuit board, like micro D and D-shaped connectors, is often time consuming and cumbersome. That is because when assembling a standard micro D electrical connector, for example, numerous steps are required. Those steps can include removing the individual contacts from a reel, crimping each of those contacts, installing each of the crimped contacts into a holder, inserting the holder with the crimped contacts into a shell, adding thin potting layer to the shell, arranging and managing the contact terminations, and then adding thicker potting layer to the shell. The terminations are arranged and managed to provide the correct termination position for installation onto the printed circuit board. The thin and thick potting layers are added to secure the contacts in position and prevent shorts after termination management. The steps of adding the thin potting layer, adding the thicker potting layer, and contact termination management, in particular, make the manufacturing and assembly process inefficient and burdensome.

Therefore, a need exists for a method of assembling an electrical connector to be installed on a printed circuit board, that is efficient and eliminates time consuming and cumbersome steps.

SUMMARY

The present disclosure may provide a method of assembling an electrical connector, the electrical connector being configured for mounting to a printed circuit board, that comprises the steps of providing a plurality of contact wafers, each contact wafer including a plurality of contacts supported by a housing, wherein each of the plurality of contacts includes a mating end for engaging a mating connector and a tail end for electrically connecting to the printed circuit board, the mating and tail ends being exposed outside of the housing; bending the tail ends of each contact wafer; interleaving the contact wafers to form one or more contact wafer assemblies; loading the one or more contact wafer assemblies into an insert of the electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at a mating interface of the electrical connector; and inserting the insert, with the one or more contact wafer assemblies, into a shell of the electrical connector.

In one embodiment, the method further comprises the step of installing a contact support member at the tail ends of the contact wafers and the contact support member may include a plurality of conductive springs corresponding to each of the plurality of contacts. In some embodiments, the method may further comprise the step of coupling the insert, the

shell, and the contact support together or the step of testing the electrical connector for electrical conductivity there-through after the step of coupling the insert, the shell, and the contact support together; the step of coupling may include inserting at least one fastener through each of the insert, the shell, and the contact support member, the fastener being configured to engage the printed circuit board for mounting the electrical connector thereto; and/or the fastener may be configured to engage the printed circuit board for mounting the electrical connector thereto such that the one or more contact wafer assemblies are electrically connected to the printed circuit board via the tail ends of the plurality of contacts.

In certain embodiments, the method further comprised the step of soldering the tail ends of the plurality of contacts to the printed circuit board; no potting material or layer is added to the electrical connector; neither the step of loading the one or more contact wafer assemblies in the insert nor the step of inserting the insert into the shell, includes the step of managing the plurality of terminations; the method further comprises the step of combining at least two contact wafer assemblies to form the predetermined arrangement of the mating ends of the plurality of contacts; the contact wafers of one of the two contact wafer assemblies may have a different or the same number of plurality of contacts from one another; the contact wafers of the other of the two contact wafer assemblies may have a different or the same number of plurality of contacts from one another.

In other embodiments, the method may further comprise the step of selecting from the plurality of contact wafers at least two contact wafers that may have a different or the same number of the plurality of contacts from one another to form at least one of the contact wafer assemblies; each of the contact wafers has a different number of contacts from the other contact wafers; and/or the method may further comprise the step of combining at least two of the contact wafer assemblies to form the predetermined arrangement of the mating ends of the plurality of contacts.

The present disclosure may also provide a method of assembling an electrical connector, the electrical connector being configured for mounting to a printed circuit board, that comprises the steps of providing a plurality of contact wafers, each contact wafer including a plurality of contacts supported by a housing, wherein each of the plurality of contacts includes a mating end for engaging a mating connector and a tail end for electrically connecting to the printed circuit board, the mating and tail ends being exposed outside of the housing, and wherein at least one contact wafer is formed with four contacts, at least one contact wafer is formed with five contacts, and at least one contact wafer is formed with six contacts; interleaving the contact wafers to form one or more contact wafer assemblies; loading the one or more contact wafer assemblies into an insert of the electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at a mating interface of the electrical connector; and inserting the insert, with the one or more contact wafer assemblies, into a shell of the electrical connector.

In some embodiments, the step of interleaving includes interleaving one of the contact wafers with four, five, or six contacts with another of the contact wafers with four, five, or six contacts to form at least a first contact wafer assembly of the contact wafer assemblies; the step of interleaving includes interleaving one of the contact wafers with four, five, or six contacts with another of the contact wafers with four, five, or six contacts to form at least a second contact

wafer assembly of the contact wafer assemblies; the method may further comprise the step of combining the first and the second contact wafer assemblies to form the predetermined arrangement of the mating ends of the plurality of contacts; the step of loading the contact assemblies into the insert includes loading the combined first and second contact wafer assemblies; each of the contact wafers with four, five, and six contacts includes at least one weakened area between the contacts; the method may further comprise the step of breaking at least one of the contact wafers with four, five, and six contacts at the at least one weakened area, thereby forming multiple contact wafers therefrom; and/or the method may further comprise the step of bending the tail ends of each contact wafer prior to the step of interleaving the contact wafers. In one embodiment, the predetermined arrangement of the mating ends of the plurality of contacts at the mating interface of the electrical connector is one of a 9-position, a 15-position, a 21-position, a 25-position, a 31-position, a 37-position, a 41-position, a 51-position, a 69-position, or a 100-position or any other varying number of contacts as desired.

The present disclosure may further provide a method of assembling an electrical connector, the electrical connector being configured for mounting to a printed circuit board, that comprises the steps of bending the tail ends of each of a plurality of contact wafers, each contact wafer including a plurality of contacts supported by a housing, wherein each of the plurality of contacts includes a mating end for engaging a mating connector and a tail end for electrically connecting to the printed circuit board, the mating and tail ends being exposed outside of the housing; interleaving the contact wafers such that the mating ends thereof are substantially aligned with one another to form one or more contact wafer assemblies; loading the one or more contact wafer assemblies into an insert of the electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at a mating interface of the electrical connector; and inserting the insert, with the one or more contact wafer assemblies, into a shell of the electrical connector.

In some embodiments, the method further comprises the step of installing a contact support member at the tail ends of the contact wafers, wherein the contact support member includes a plurality of conductive springs corresponding to each of the plurality of contacts; further comprises the step of coupling the insert, the shell, and the contact support together; and/or further comprises the step of combining at least two contact wafer assemblies to form the predetermined arrangement of the mating ends of the plurality of contacts.

In other embodiments of the method, the step of coupling includes inserting at least one fastener through each of the insert, the shell, and the contact support member, and the fastener is configured to engage the printed circuit board for mounting the electrical connector thereto; the contact wafers of at least one of the two contact wafer assemblies have a different number of plurality of contacts from one another; and/or each of the contact wafers has a different number of contacts from the other contact wafers.

The present disclosure may further provide an electrical connector for a printed circuit board that comprises a mating interface for interfacing with a mating connector and one or more contact wafer assemblies. Each contact wafer assembly includes two interleaved contact wafers. Each contact wafer has a plurality of contacts supported by a housing and each of the plurality of contacts includes a mating end for

engaging the mating connector and a tail end for electrically connecting to the printed circuit board wherein the mating and tail ends are exposed outside of the housing. The mating ends of the contact wafers of each contact wafer assembly are substantially aligned with one another. The one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at the mating interface.

In certain embodiments, one or more of the contact wafer assemblies are combined to form the predetermined arrangement of the mating ends of the plurality of contacts; the combined contact wafer assemblies are supported by an insert; a contact support member is provided at the tail ends of plurality of contacts; the contact support member includes a plurality of conductive springs corresponding to each tail end of each of the plurality of contacts; and/or the insert is received in a shell, and the insert, the shell, and the contact support member are coupled together.

In other embodiments, each of the contact wafers is formed with four, five, or six contacts; each of the contact wafers has a different number of contacts from the other contact wafers; the contact wafers of at least one of the one or more contact wafer assemblies have a different number of plurality of contacts from one another; the contact wafers of the other of the two contact wafer assemblies have a different number of plurality of contacts from one another; each of the contact wafers has a weakened area between two adjacent contacts of the plurality of contacts for breaking the respective contact wafer; the predetermined arrangement of the mating ends of the plurality of contacts at the mating interface of the electrical connector is one of a 9-position, a 15-position, a 21-position, a 25-position, a 31-position, a 37-position, a 41-position, a 51-position, a 69-position, or a 100-position; and/or the electrical connector is devoid of potting material.

The present disclosure may yet further provide an electrical connector for a printed circuit board that comprises a mating interface for interfacing with a mating connector and a plurality of contact wafer assemblies. Each contact wafer assembly includes two interleaved contact wafers. Each contact wafer has a plurality of contacts supported by a housing. Each of the plurality of contacts includes a mating end for engaging the mating connector and a tail end for electrically connecting to the printed circuit board, and the mating and tail ends are exposed outside of the housing. The mating ends of the contact wafers of each contact wafer assembly are substantially aligned with one another. The plurality of contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at the mating interface. A contact support member is provided at the tail ends of plurality of contacts and the contact support member includes a plurality of conductive springs corresponding to each tail end of each of the plurality of contacts.

This summary is not intended to identify essential features of the claimed subject matter, nor is it intended for use in determining the scope of the claimed subject matter. It is to be understood that both the foregoing general description and the following detailed description are exemplary and are intended to provide an overview or framework to understand the nature and character of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the disclosure and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the

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following detailed description when considered in connection with the accompanying drawings, wherein:

FIG. 1 is an exploded perspective view of an electrical connector of the method of assembling the same according to an exemplary embodiment of the present disclosure;

FIGS. 2A-2C are various cross-sectional views of the electrical connector illustrated in FIG. 1, once the electrical connector is assembled;

FIG. 3 is a perspective view of a contact wafer of the electrical connector illustrated in FIG. 1;

FIGS. 4A and 4B are perspective views of exemplary contact wafer assemblies of the electrical connector illustrated in FIG. 1;

FIG. 5 is a perspective view of combined contact wafer assemblies of the electrical connector illustrated in FIG. 1;

FIG. 6 are end views of exemplary contact wafers in accordance with an exemplary embodiment of the present disclosure; and

FIGS. 7-9 are an end views of an exemplary combinations of the contact wafers illustrated in FIG. 6, e.g. 9-position, 25-position, and 51-position, respectively, according to an exemplary embodiment of the present disclosure.

DETAILED DESCRIPTION

Referring to the figures, the present disclosure generally relates to a method of assembling an electrical connector 100 configured for installation on a printed circuit board 10, such as a micro D or D-shaped type connector. The method of the present disclosure eliminates time consuming and cumbersome assembly steps for a more efficient and faster assembly process of the connector.

Electrical connector 100 generally comprises one or more contact wafer assemblies 102 and 104 supported by an insert 106 which is received in a shell 108 of the connector. A support member 110 may be used to retain the contact wafers 102 and 104 in the insert 106 and shell 108. The support member 110, the insert 106, and the shell 108 may be coupled together, such as by one or more fasteners 112, as seen in FIGS. 2A-2C. The method of the present disclosure comprises the steps of assembling these components of electrical connector 100.

Each contact wafer assembly 102 and 104 is preferably formed by interleaving at least two contact wafers 120. Each contact wafer 120 supports a plurality of contacts 122 in a housing 130 where each contact 122 has a mating end 124 and an opposite tail end 126 extending and being exposed outside of the housing 130, as best seen in FIG. 3. Housing 130 may, for example, be overmolded onto the contacts 122 in a manner similar to that disclosed in commonly owned U.S. Pat. No. 9,362,638, the subject matter of which is herein incorporated by reference. The housing 130 may have one or more recessed surfaces 132 on at least one side 134 thereof where each recessed surface 132 is designed to receive a corresponding portion of another housing, as seen in FIGS. 4A and 4B, when interleaving the contact wafers 120 to form the contact wafers assemblies 102 and 104. Once the contact wafers 120 are interlocked, the contacts 122 of the contact wafers 120 alternate and are substantially in axial alignment. That is, the mating ends 124 of the contacts 122 of both wafers 120 may be aligned and likewise the tail ends 126 of the contacts of both wafers may be aligned.

Insert 106 may have a contact receiving portion 140, designed to receive the contact wafer assemblies 102 and 104, and a flange portion 142, designed to couple with the support member 110, as best seen in FIGS. 1 and 2A-2C.

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Alternatively, support member 110 may be eliminated such that flange portion 142 of insert 106 is mounted directly to the printed circuit board 10. Contact receiving portion 140 may include a housing section 144 that accommodates the housings 130 of the contact wafer assemblies 102 and 104 and a contact section 146 that accommodates the contacts 122. In a preferred embodiment, the contact section 146 includes a plurality of open ended passageways 148 that receive the individual contacts 122. Flange portion 142 may include one or more holes 149 to receive the one or more fasteners 112.

Shell 108 has an insert receiving portion 150 and a flange portion 152. The insert receiving portion 150 is sized to receive the contact receiving portion 140 of insert 106. An open end 156 of the insert receiving portion 150 exposes the mating ends 124 of the contacts 122 and defines a mating interface for connecting to a mating connector (not shown). Flange portion 152 may abut flange portion 142 of insert 106 and also has one or more holes 158 that align with the one or more holes 149 of insert 106 for receiving the fasteners 112. Support member 110 may also include one or more holes 160 that align with the holes 149 and 158 of insert 106 and shell 108, respectively, to receive the fasteners 112 and the fasteners 112 may engage the printed circuit board 10, thereby mounting the connector 100 to the board 10. In one embodiment, support member 110 may include conductive springs 162, such as c-clips, that correspond to each of the contacts 122 and engage their tails ends 126, to establish an electrical connection between the contacts 122 and the printed circuit board 10. Alternatively, the support member 110 may be eliminated and the tail ends 126 of the contacts 122 may directly engage the printed board 10, such as by soldering, to establish the electrical connection therebetween.

The method of the present disclosure preferably includes the step of bending the tail ends 126 of each contact 122 of each contact wafer 120. The tails ends 126 may be bent about 90 degrees, for example, as seen in FIGS. 3, 4A, and 4B, to assist with engagement with either the conductive springs 162 of the support member 110 or with direct engagement with the printed circuit board. The tails ends 126 are preferably bent before the contact wafers 120 are interleaved to form the contact wafer assemblies 102 and 104.

A least two of the contact wafers 120 may be interleaved to form a contact wafer assembly, such as contact wafer assembly 102 (FIG. 4A) or contact wafer assembly 104 (FIG. 4B). Once the contact wafer assemblies 102 and 104 are formed, they can be easily loaded into the contact receiving portion 140 of the insert 106 such that the mating ends 124 of the contacts 122 are receiving in the individual passageways 148. When loading the contact wafer assemblies 102 and 104, they may be combined, as seen in FIG. 5, for loading into insert 106 such that the contact wafer assemblies 102 and 104 form a predetermined arrangement of the mating ends 124 of the plurality of contacts 122. As such, no contact or wire management is required during assembly of the connector 100.

The insert 106 with the contact wafer assemblies 102 and 104 loaded therein, can then be inserted into the insert receiving portion 150 of shell 108 such that the contact mating ends 124 are in the predetermined arrangement at the mating interface of the electrical connector, that is at the open end 156 of shell 108. Because the contacts 122 are fully supported in their predetermined arrangement by insert 106, no potting or epoxy material or layer needs to be added to the connector 100 during assembly. The predetermined

arrangement of the mating ends **124** of the contacts **122** may be selected based on the desired connector type, e.g. 9-position, a 15-position, a 21-position, a 25-position, a 31-position, a 37-position, a 41-position, a 51-position, a 69-position, or a 100-position or any other varying number of contacts, as desired. FIG. 7, for example, illustrates a 9-position arrangement of the contacts **122** in which one contact wafer assembly **102** includes five contacts and the other contact wafer assembly **104** includes four contacts. Once the loaded insert **106**, shell **108**, and support member **110** are coupled together, the connector **100** may then be tested for electrical conductivity therethrough prior to shipping to a customer.

In a preferred embodiment, the contact wafers **120** may have a different number of contacts **122** from one another. For example, each contact wafer **120** may be one of three types, that is a 4-contact type wafer **120a**, a 5-contact type wafer **120b**, and 6-contact type wafer **120c**, as seen in FIG. 6. Each of the 4, 5 and 6-contact type wafers **120a**, **120b**, and **120c** has 4, 5, and 6 contacts **122**, respectively, supported in the housing **130**. Each housing **130** of 4, 5 and 6-contact type wafers **120a**, **120b**, and **120c** may have one or more weakened areas **170** allowing the wafers to be broken apart into more than one wafer. Using the breakable 4, 5 and 6-contact type wafers **120a**, **120b**, and **120c**, any of the connector positions (e.g. 9-position, 15-position, 21-position, 25-position, 31-position, 37-position, 41-position, 51-position, 69-position, or 100-position) can be arranged. For example, the 9-position contact arrangement illustrated in FIG. 7 is formed by combining contact wafer assembly **102** with five contacts and contact wafer assembly **104** with four contacts. Contact wafer assembly **102** may be created, for example, by interleaving two of the contact wafers **120** which are formed by breaking the 5-contact type wafer **120b** into two the wafers via weakened area **170** with one wafer have two contacts and the other wafer having the remaining three contacts. Similarly, the other contact wafer assembly **104** may be created, for example, by interleaving two of the contact wafers formed by breaking the 4-position type wafer **120a** into the two wafers each having two contacts. When these contact wafer assemblies **102** and **104** are combined and loaded into insert **106** and shell **108**, the result is a 9-position contact arrangement ready for connection to a corresponding mating connector at open end **156**.

Similarly, the 25-position contact arrangement illustrated in FIG. 8, for may be formed by interleaving two 4-contact type wafers **120a** plus one 5-contact type wafer **120b** that is broken into two and three contacts interleaved for contact wafer assembly **102**; and interleaving two 6-contact type wafers **120c** for the other contact wafer assembly **104**. Another example is the 51-position contact arrangement shown in FIG. 9, which is formed in a similar manner. That is contact wafer assembly **102** is formed by interleaving two 6-contact type wafers **120c** plus one 6-contact type wafer **120c** broken in half and interleaved. The other contact wafer assembly **104** may be formed by interleaving four of the 4-contact type wafers **120a**. Yet another contact wafer assembly **105** is provided between the contact wafer assemblies **102** and **104** to complete the 51-position contact arrangement. The middle contact wafer assembly **105** may be formed by one 4-contact type wafer **120a** interleaved with one 5-contact type wafer **120b** plus two 4-contact wafers **120a** interleaved with one another.

While particular embodiments have been chosen to illustrate the disclosure, it will be understood by those skilled in the art that various changes and modifications can be made

therein without departing from the scope of the disclosure as defined in the appended claims.

What is claimed is:

1. A method of assembling an electrical connector, the electrical connector being configured for mounting to a printed circuit board, comprising the steps of:

bending tail ends of each of a plurality of contact wafers, each contact wafer including a plurality of contacts supported by a housing, wherein each of the plurality of contacts includes a mating end for engaging a mating connector and a tail end for electrically connecting to a printed circuit board, the mating and tail ends being exposed outside of the housing;

interleaving the plurality of contact wafers such that a recessed surface of the housing of one of the plurality of contact wafers receives a corresponding portion of the housing of another one of the plurality of contact wafers such that the mating ends thereof are substantially axially aligned with one another to form one or more contact wafer assemblies;

loading the one or more contact wafer assemblies into an insert of an electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at a mating interface of the electrical connector; and

inserting the insert, with the one or more contact wafer assemblies, into a shell of the electrical connector.

2. The method of claim 1, further comprising the step of installing a contact support member at the tail ends of the contact wafers, wherein the contact support member includes a plurality of conductive springs corresponding to each of the plurality of contacts.

3. The method of claim 2, further comprising the step of coupling the insert, the shell, and the contact support together.

4. The method of claim 3, wherein the step of coupling includes inserting at least one fastener through each of the insert, the shell, and the contact support member, the fastener being configured to engage the printed circuit board for mounting the electrical connector thereto.

5. The method of claim 1, further comprising the step of combining at least two contact wafer assemblies to form the predetermined arrangement of the mating ends of the plurality of contacts.

6. The method of claim 5, wherein the contact wafers of at least one of the two contact wafer assemblies have a different number of plurality of contacts from one another.

7. The method of claim 1, wherein each of the contact wafers has a different number of contacts from the other contact wafers.

8. An electrical connector for a printed circuit board, comprising:

a mating interface for interfacing with a mating connector; and

one or more contact wafer assemblies, each contact wafer assembly including,

two interleaved contact wafers, each contact wafer having a plurality of contacts supported by a housing, each of the plurality of contacts includes a mating end for engaging the mating connector and a tail end for electrically connecting to the printed circuit board, the mating and tail ends being exposed outside of the housing, and

wherein the housing of one of the two interleaved contact wafers has a recessed surface that receives a corresponding portion of the housing of the other of

the two interleaved contact wafers, and the mating ends of the contact wafers of each contact wafer assembly are substantially axially aligned with one another, and

wherein the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at the mating interface.

9. The electrical connector of claim 8, wherein two of the one or more contact wafer assemblies are combined to form the predetermined arrangement of the mating ends of the plurality of contacts.

10. The electrical connector of claim 9, wherein the combined contact wafer assemblies are supported by an insert.

11. The electrical connector of claim 10, wherein a contact support member is provided at the tail ends of plurality of contacts.

12. The electrical connector of claim 11, wherein the contact support member includes a plurality of conductive springs corresponding to each tail end of each of the plurality of contacts.

13. The electrical connector of claim 11, wherein the insert is received in a shell, and the insert, the shell, and the contact support member are coupled together.

14. The electrical connector of claim 8, wherein each of the contact wafers has a different number of contacts from the other contact wafers.

15. The electrical connector of claim 8, wherein the contact wafers of at least one of the one or more contact wafer assemblies have a different number of plurality of contacts from one another.

16. The electrical connector of claim 15, wherein the contact wafers of another of the one or more contact wafer assemblies have a different number of plurality of contacts from one another.

17. The electrical connector of claim 8, wherein each of the contact wafers has a weakened area between two adjacent contacts of the plurality of contacts for breaking the respective contact wafer.

18. The electrical connector of claim 8, wherein the predetermined arrangement of the mating ends of the plurality contacts at the mating interface of the electrical connector is one of a 9-position, a 15-position, a 21-position, a 25-position, a 31-position, a 37-position, a 41-position, a 51-position, a 69-position, or a 100-position.

19. The electrical connector of claim 8, wherein the electrical connector is devoid of potting material.

20. An electrical connector for a printed circuit board, comprising:

a mating interface for interfacing with a mating connector;

a plurality of contact wafer assemblies, each contact wafer assembly including,

two interleaved contact wafers, each contact wafer having a plurality of contacts supported by a housing, each of the plurality of contacts includes a mating end for engaging the mating connector and a tail end for electrically connecting to the printed circuit board, the mating and tail ends being exposed outside of the housing, and

the mating ends of the contact wafers of each contact wafer assembly are substantially aligned with one another, and

wherein the plurality of contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at the mating interface; and

a contact support member being provided at the tail ends of plurality of contacts, the contact support member including a plurality of conductive springs corresponding to each tail end of each of the plurality of contacts.

21. A method of assembling an electrical connector, the electrical connector being configured for mounting to a printed circuit board, comprising the steps of:

bending tail ends of each of a plurality of contact wafers, each contact wafer including a plurality of contacts supported by a housing, wherein each of the plurality of contacts includes a mating end for engaging a mating connector and a tail end for electrically connecting to a printed circuit board, the mating and tail ends being exposed outside of the housing;

interleaving the plurality of contact wafers such that the mating ends thereof are substantially aligned with one another to form one or more contact wafer assemblies;

loading the one or more contact wafer assemblies into an insert of an electrical connector, such that the one or more contact wafer assemblies form a predetermined arrangement of the mating ends of the plurality of contacts at a mating interface of the electrical connector;

inserting the insert, with the one or more contact wafer assemblies, into a shell of the electrical connector; and installing a contact support member at the tail ends of the contact wafers, wherein the contact support member includes a plurality of conductive springs corresponding to each of the plurality of contacts.

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