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(54) Wiring connector housing

(57) A wiring connector housing (100) including a housing body (110) having first and second ends (111,112) and at least one interference tab (130) extending outwardly from the second end (112) is provided. The wiring connector housing (100) further comprises spaced apart channels (121-123) located through the housing body (110) extending from the first end (111) to the second end (112) with the first end (111) of the channels (121-123) each configured to receive a quick connector (200) therein. Each of the second ends (112) of the spaced apart channels (121-123) being located to register with and receive corresponding quick connect terminals therein. The at least one interference tab (130) is configured to contact an isolation ridge of an electrical relay and thereby prevent the second ends (112) of the spaced apart channels (121-123) from being improperly registered with the corresponding quick connect terminals.

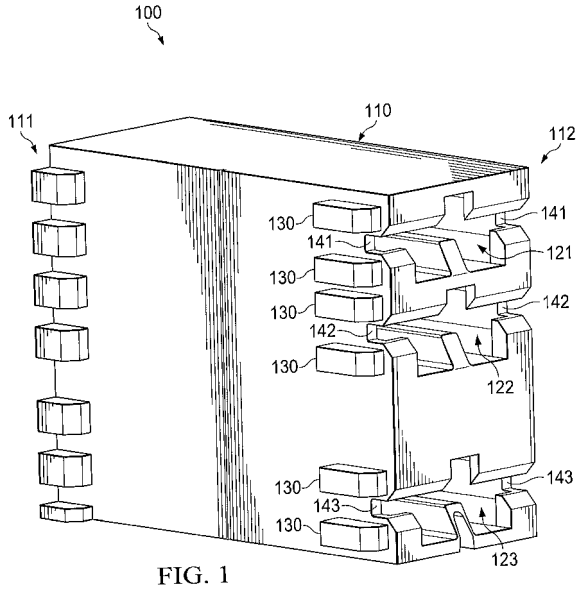

FIG. 1

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Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Application Serial No. 12/694,447, filed by Mark Beste, et al., on January 27, 2010, entitled "WIRING CONNECTOR HOUSING," and incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This application is directed, in general, to an air conditioning system and, more specifically, to a wiring connection system for "ice cube" relays.

BACKGROUND

[0003] Current air conditioning (HVAC) systems employ multi-pole relays encased in clear polycarbonate and resembling an oversize ice cube; thus the common name "ice cube" relays. The relays are typically mounted to the chassis or a board and have up to 11 single point connections configured with 0.25" x o.032" male quick disconnect wiring terminals. As all of the terminals on the multi-pole relay are physically the same, i.e., male quick disconnect type, and the wires to be connected to the relay are all terminated with the same size female quick disconnects, this leads to the possibility of incorrect connection of the wires to the relay terminals during manufacturing, assembly and troubleshooting.

[0004] For example, the relays in question may have up to three poles with double throw and nine connectors to the internal relays with an additional two connectors for coil voltage. Thus, with 11 terminals and 11 wiring leads there are *11!* (eleven factorial) ways to connect the wiring leads to the terminals. This can lead to errors in servicing the unit, which in turn can lead to a malfunction in the operation of the unit.

SUMMARY

[0005] One aspect provides a wiring connector housing comprising a housing body having first and second ends and at least one interference tab extending outwardly from the second end. The wiring connector housing further comprises spaced apart channels located through the housing body extending from the first end to the second end with the first end of the channels each configured to receive a quick connector therein. Each of the second ends of the spaced apart channels are located to register with and receive corresponding quick connect terminals therein. The at least one interference tab is configured to contact an isolation ridge of an electrical relay and thereby prevent the second ends of the spaced apart channels from being improperly registered with the corresponding quick connect terminals.

[0006] In another aspect, there is provided a method of manufacturing a wiring connector housing comprising forming a housing body having first and second ends and forming at least one interference tab extending outwardly from the second end. Spaced apart channels are formed through the housing body and extend from the first end to the second end. The first ends of the channels are each configured to receive a quick connector therein. Each of the second ends of the spaced apart channels are formed to register with and receive corresponding quick connect terminals therein. The interference tab is configured to contact an isolation ridge of an electrical relay and thereby prevent the second ends of the spaced apart channels from being improperly registered with the corresponding quick connect terminals.

[0007] In yet another aspect, there is provided an air conditioning system comprising an air handler, a controller, a chassis having an electrical relay mounted thereon, and a wiring connector housing having first and second ends and spaced apart channels therethrough. The electrical relay has at least one isolation ridge and terminals thereon. Each of the spaced apart channels is configured to receive a quick connector through the first end. An interference tab extends outwardly from the second end and is positioned such that the interference tab contacts the isolation ridge when the housing body is incorrectly aligned with the terminals. The quick connectors are thereby prevented from contacting one of the terminals.

BRIEF DESCRIPTION

[0008] Reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of one embodiment of a wiring connector housing;

FIG. 2 is an elevation view of a conventional female quick connector and a conventional male quick connector tab located on a relay on which the quick connector may be placed;

FIG. 3 is a perspective view of the first end of the wiring connector housing of FIG. 1;

FIG. 4 is a perspective view of the second end of the wiring connector housing of FIG. 1; and

FIG. 5 illustrates a relay contrasting a correct positioning of a wiring connector housing with an incorrect positioning of the wiring connector housing.

DETAILED DESCRIPTION

[0009] Referring initially to FIG. 1, illustrated is a perspective view of one embodiment of a wiring connector housing 100 constructed according to the principles discussed herein. As explained below, the wiring connector housing 100 is designed to receive and retain a quick connector therein that is often used to make connection to electrical components, such as a relay, that have one or more corresponding male terminals located thereon.

In many HVAC applications, various components have to be electrically connected or serviced in the field. In such instances, the service technician must make the appropriate connections when either assembling the HVAC system or servicing an in-place unit. Often in rooftop units, the wiring schemes can be very complicated, which increases the chance of a wrong electrical connection being made. The wiring connector housing 100 is designed to reduce the number of erroneous connections being made during installation or servicing.

[0010] The wiring connector housing 100 comprises a housing body 110, spaced apart channels 121, 122, 123, interference tabs 130, and terminal registration slots 141, 142, 143. The housing body 110 has first and second ends 111, 112, respectively. In this embodiment, the interference tabs 130 are a plurality of tabs extending outwardly from a side of the housing body 110 at the second end 112 that will prevent the connection of the wiring connector housing 100 to an electrical component having quick connect male terminals or tabs thereon, if not correctly aligned with those male tabs. However, in other embodiments, the interference tab may be a single tab that extends along a portion of the side of the housing 110. The wiring connector housing 100 may be manufactured from suitable plastic materials using an injection molding process.

[0011] FIG. 2 illustrates a conventional quick connector 200 and a conventional relay 210 that includes male quick connector tabs 210a, which are often used in HVAC applications. In one embodiment, the quick connector 200 may include a flat portion 201 with sides 202, 203 that are bent around to near contact with an inside surface 204 of the flat portion 201. The quick connector 200 has a connecting end 205 that can receive one of the male connector tabs 210a. As explained below, the quick connector 200 is housed within one of the spaced apart channels 121, 122, 123 of the device of FIG. 1.

[0012] The conventional male quick connector tabs 210 are representative of male quick connector tabs as found on electrical equipment, such as electrical relays. One who is skilled in the art will readily recognize how the female quick connector 200 will removably couple to the male quick connector tabs 210a. Further, it should be understood that the relay 210 may have three or more male quick connector tabs 210a located on each side of the relay 210. In the illustrated embodiment, the relay 210 also includes opposing isolation ridges 212. As explained below, the isolation ridges 212 in cooperation with the interference tabs 130 prevent incorrect connection of the wiring connector housing 100 (FIG. 1) to the relay 210.

[0013] FIG. 3 illustrates the first end 111 of the wiring connector housing 100 of FIG. 1. In this view, it can be seen that the spaced apart channels 121-123 extend through the entire length of the housing body 110. The spaced apart channels 121-123 are configured to each receive the quick connector 200, discussed above. Each spaced apart channel has a quick connector securing device 310 therein proximate the second end 112. Each quick connector securing device 310 comprises a central guide ridge 311, two connector spring tabs 312, and a quick connector stop 313. The central guide ridge 311 and connector spring tabs 312 are located on a first wall 321 of the spaced apart channels 121-123, whereas the quick connector stop 313 is located on a second wall 322 opposite the first wall 321 at the second end 112 of each spaced apart channel 121-123.

[0014] Referring now to FIG. 2 with continuing reference to FIG. 3. The central guide ridge 311 acts to center the quick connector 200 by fitting over the inside surface 204 and between the left and right sides 202, 203 as the quick connector 200 is inserted into a one of the spaced apart channels 121-123. As the quick connector 200 is inserted into the first end 111, the quick connector spring tabs 312 are depressed slightly by the left and right sides 202, 203 of the quick connector 200 until the connecting end 205 of the quick connector 200 touches the quick connector stops 313 and the quick connector spring tabs 312 slip in behind ends 206 of the left and right sides 202, 203 of the quick connector 200, thereby securely locking the quick connector 200 in place within the wiring connector housing 100. This prevents a service technician from removing a wire and connector from the wiring connector housing 100 and incorrectly reinserting the connector in the wrong location. Therefore, once the wiring harness is equipped with the appropriate wiring connector housing 100, the wiring harness cannot be easily changed.

[0015] FIG. 4 illustrates a perspective view of the second end 112 of the wiring connector housing 100 of FIG. 1. To the left and right of the wiring connector housing 100 are partial views of two male connector layouts 410, 420, respectively, as may be found on a typical electrical HVAC component. The left and right male connector layouts 410, 420 have male connectors 441-443 and 451-453, respectively, extending therefrom in patterns that align with the terminal registration slots 141-143 insofar as spacing is concerned. The left and right male connector layouts 410, 420 have isolation ridges 444, 454, respectively.

[0016] In the following discussion, it must be remembered that the wiring connector housing 100 must be inverted to enable it to be placed on the connector layouts 410, 420 because of the spacing relationship of the male connectors 441-443 and 451-453 and the terminal registration slots 141-143. Therefore, if a technician attempts to place the wiring connector housing 100 on the right male connector layout 420, which in this case is the wrong connector, the interference tabs 130 will contact the isolation bar 454; and the technician will not be able to properly seat the wiring connector housing 100 on the male connector layout 420. Thus, incorrect electrical contact will be prevented from occurring. However, if the technician places the wiring connector housing 100 on the left male connector layout 410, which in this case are the correct components, the interference tabs 130 will be

located on the outside edge (indicated by straight lines) of the male connector layout 410, and the isolation bar 444 will not interfere with the proper seating of the wiring connector housing 100 onto the male connectors 441-443. Thus, correct electrical contact is made. Therefore, it should be understood that even though the spacing of the male and female connectors agree, the wiring connector housing 100 can only be placed upon the correct terminals because the interference tabs 130 will prevent proper seating on any incorrect terminals.

[0017] FIG. 5 further illustrates the application of the wiring connector housing 100 from a different perspective. This view illustrates the application of how the wiring connector housing 100 can be seated onto the male connectors 210a when properly oriented (left side configuration) but cannot be seated when improperly oriented (right side configuration). As seen here, the wiring connector housings 100 have the female quick connectors 200 located therein that are configured to slip onto the male connectors 210a. In the right side of this view, it can be seen that, since the wiring connector housing 100 is improperly oriented, the interference tabs 130 contact the isolation bar 212, which prevents the wiring connector housing 100 from being fully seated on the male connector 210a. Thus, improper electrical connection is prevented and will be readily apparent to the technician. In contrast, the left side of this view illustrates the wiring connector housing 100 properly oriented such that the interference tabs 130 extend outwardly from the side of the housing body 110 at the outside edge of the component 210. As such, they do not contact an isolation bar 212, which allows the quick connector 200 to fully engage the male connector 210a on the left side of the component 210; thereby providing complete seating of the wiring connector housing 100 and proper electrical connection to be made.

[0018] Thus, a wiring connector housing 100 has been described that locks a plurality of female connectors within the housing in a pre-set order to correctly interface to a matching plurality of male connectors on an electrical device, e.g., an electrical relay. The housing is configured in such a manner that even if the spacing between male connectors and female connectors have the same pattern and spacing, the housing will only properly couple to the correct electrical contacts having an isolation bar thereon.

[0019] One who is of skill in the art can readily understand that the above described invention may be used with a variety of electrical relays such as are commonly used in air conditioning systems to control operation of the various system components.

[0020] Those skilled in the art to which this application relates will appreciate that other and further additions, deletions, substitutions and modifications may be made to the described embodiments.

Claims

1. A wiring connector housing, comprising:

a housing body having first and second ends and spaced apart channels located through said housing body and extending from said first end to said second end, said first end of said channels each configured to receive a quick connector therein;
each of said second ends of said spaced apart channels being located to register with and receive corresponding quick connect terminals therein; and
at least one interference tab extending outwardly from a side of said housing body at said second end that is configured to contact an isolation ridge of an electrical relay and thereby prevent said second ends of said spaced apart channels from being improperly registered with said corresponding quick connect terminals.

2. The wiring connector housing as recited in Claim 1 wherein each of said spaced apart channels comprises a quick connector securing device therein proximate said second end.

3. The wiring connector housing as recited in Claim 2 wherein each of said securing devices comprise a central guide ridge on a first wall of each of said spaced apart channels.

4. The wiring connector housing as recited in Claim 2 wherein each of said securing devices further comprise a connector spring tab on said first wall.

5. The wiring connector housing as recited in Claim 2 wherein each of said securing devices further comprise a quick connector stop on an opposite second wall at said second end of said spaced apart channels.

6. The wiring connector housing as recited in Claim 1 further comprising terminal registration slots at said second end of said spaced apart channels.

7. An air conditioning system, comprising:

an air handler;
a controller;
a chassis having an electrical relay mounted thereon, said electrical relay having at least one isolation ridge and terminals thereon;
a wiring connector housing having first and second ends and spaced apart channels therethrough, each of said spaced apart channels configured to receive a quick connector through said first end; and

an interference tab extending outwardly from said second end and positioned such that said interference tab contacts said isolation ridge when said housing body is incorrectly aligned with said terminals, said quick connectors thereby prevented from contacting a one of said terminals.

8. The air conditioning system as recited in Claim 7 wherein said housing body has a second through channel configured to receive a second quick connector through said first end.

9. The air conditioning system as recited in Claim 8 wherein a first center of said first through channel and a second center of said second through channel are spaced apart in said housing body at a distance substantially equal to a distance between a first terminal and a second terminal of said electrical relay.

10. The air conditioning system as recited in Claim 7 wherein said first through channel comprises a first quick connector securing device therein and a quick connector stop on an opposite second wall of said first through channel at said second end.

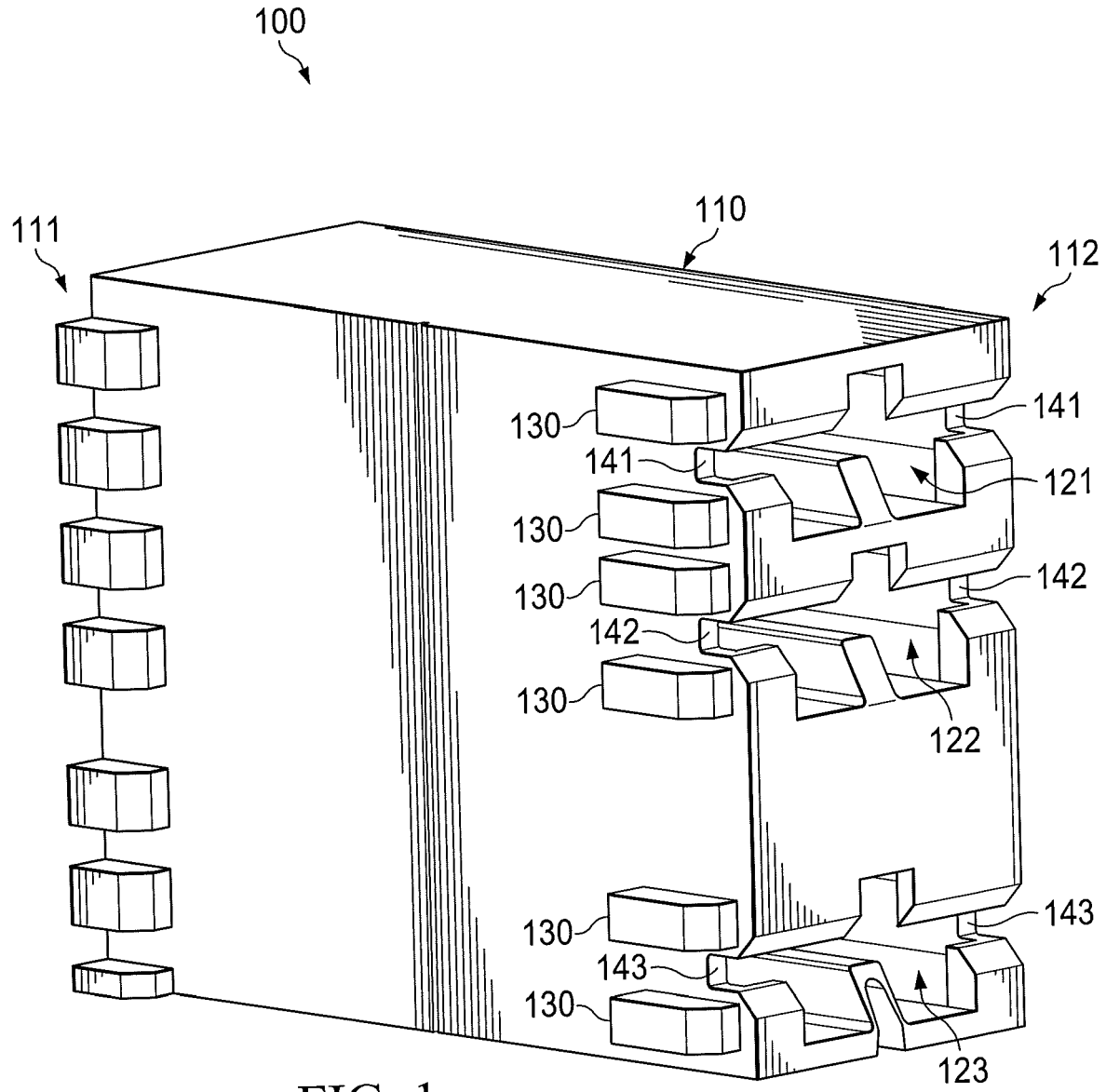
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FIG. 1

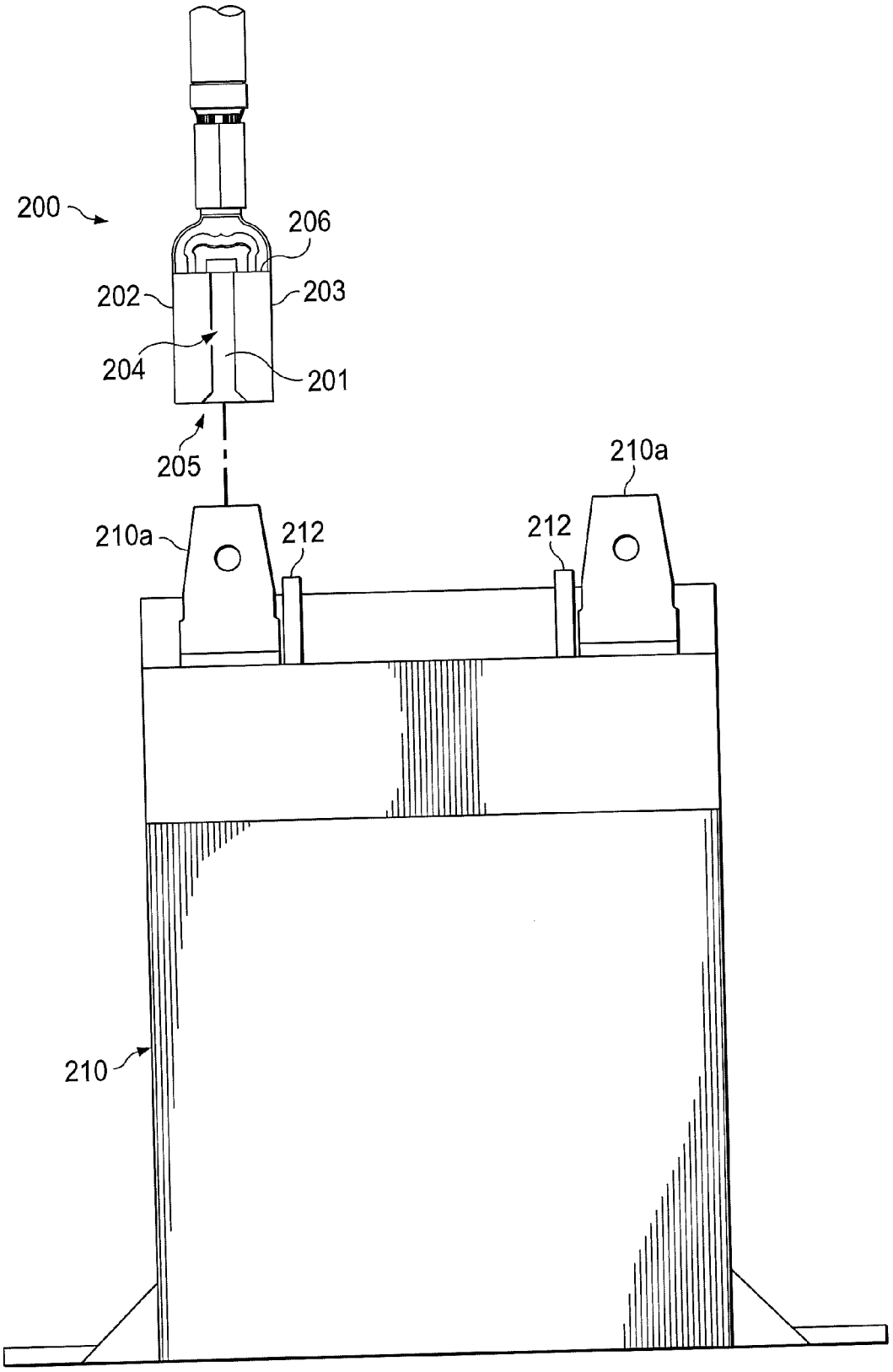

FIG. 2
(PRIOR ART)

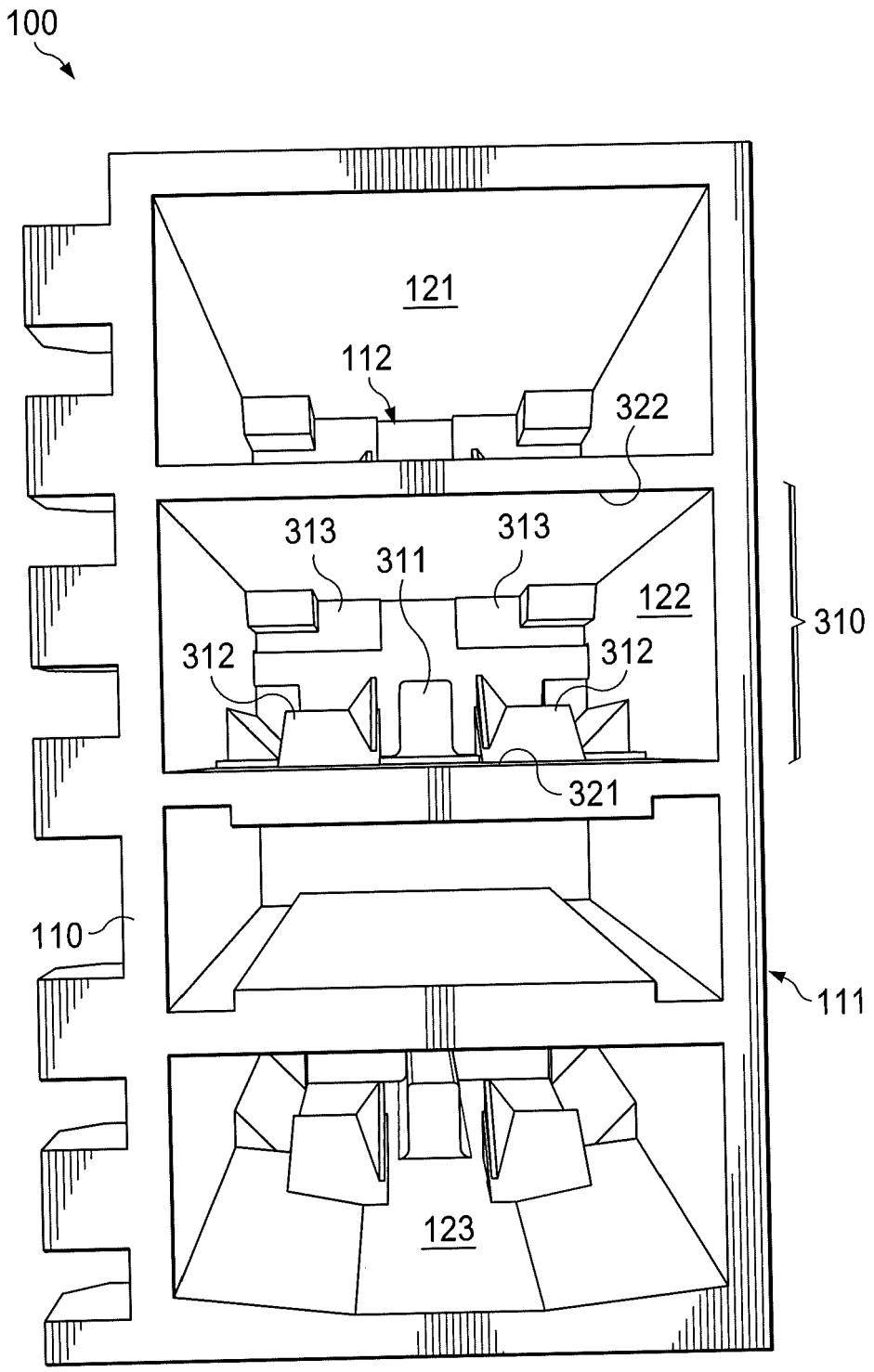

FIG. 3

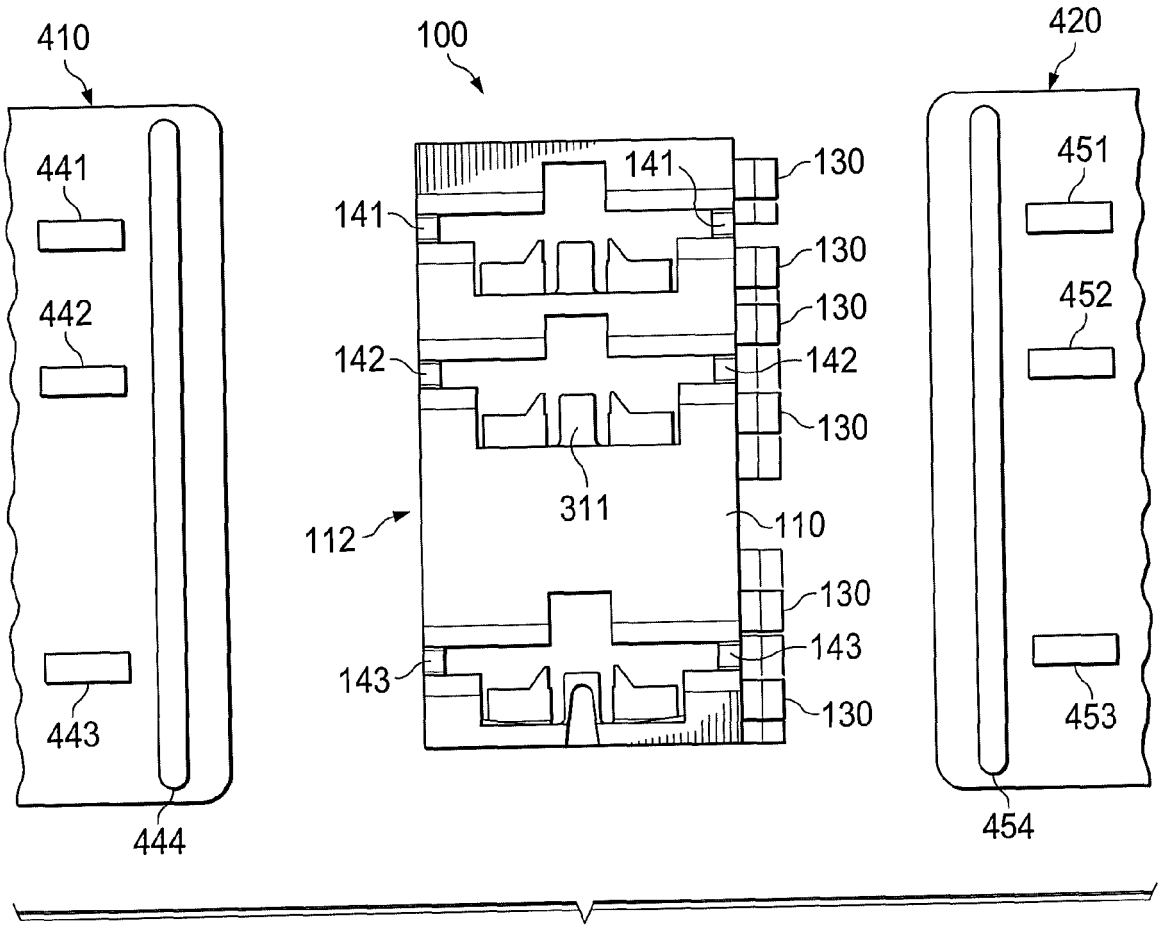
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FIG. 4

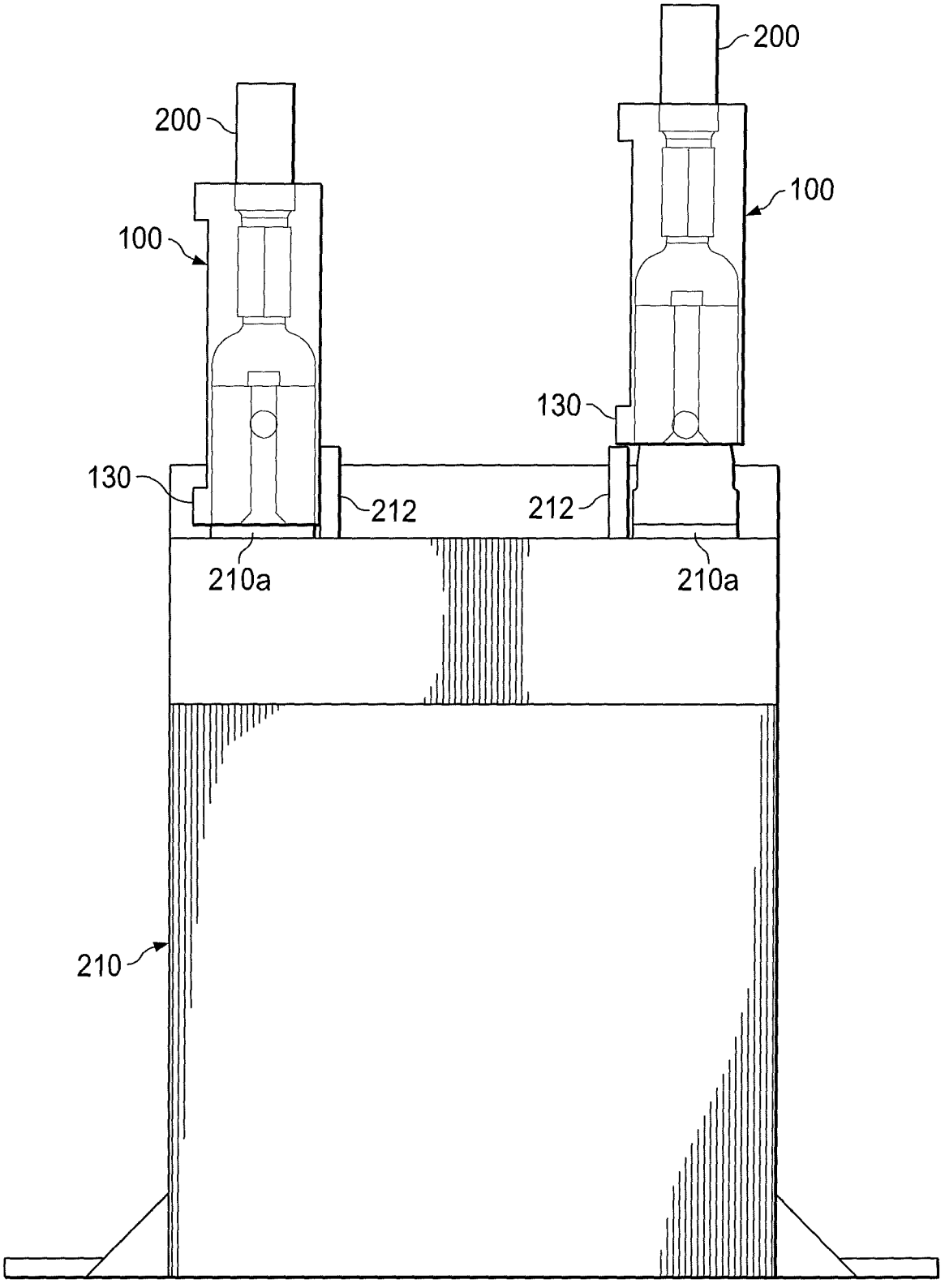

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 10 18 8810

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 March 2011	Chelbosu, Liviu

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 18 8810

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29-03-2011

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REFERENCES CITED IN THE DESCRIPTION

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