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(54) **IDENTIFICATION ICON INDICIA FOR PLUG-IN UNITS OF A POWER DISTRIBUTION SYSTEM**

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(57) **ABSTRACT**

**Related U.S. Patent Documents**

Icon indicia are provided on input, output and plug-in power processing units to permit proper matching of plug-in units with each other and with the input and output power processing units in a power distribution system. The indicia are in a co-ordinated matrix format with input icons on a designated chroma background to identify input voltages and output icons on a second designated chroma background to identify output voltages. Icons and background chroma on the plug-in power processing units are coordinated with related icons and background chroma at the same matrix position on other plug-in units and/or the input and output units to assure the compatibility of all the units. A craftsman inserting a plug-in unit onto a shelf of the power chassis need merely compare the unit's icon and chroma background indicia with the input, output, or other unit's icons and associated chroma background indicia to be assured of inserting the correct plug-in unit into the particular shelf.

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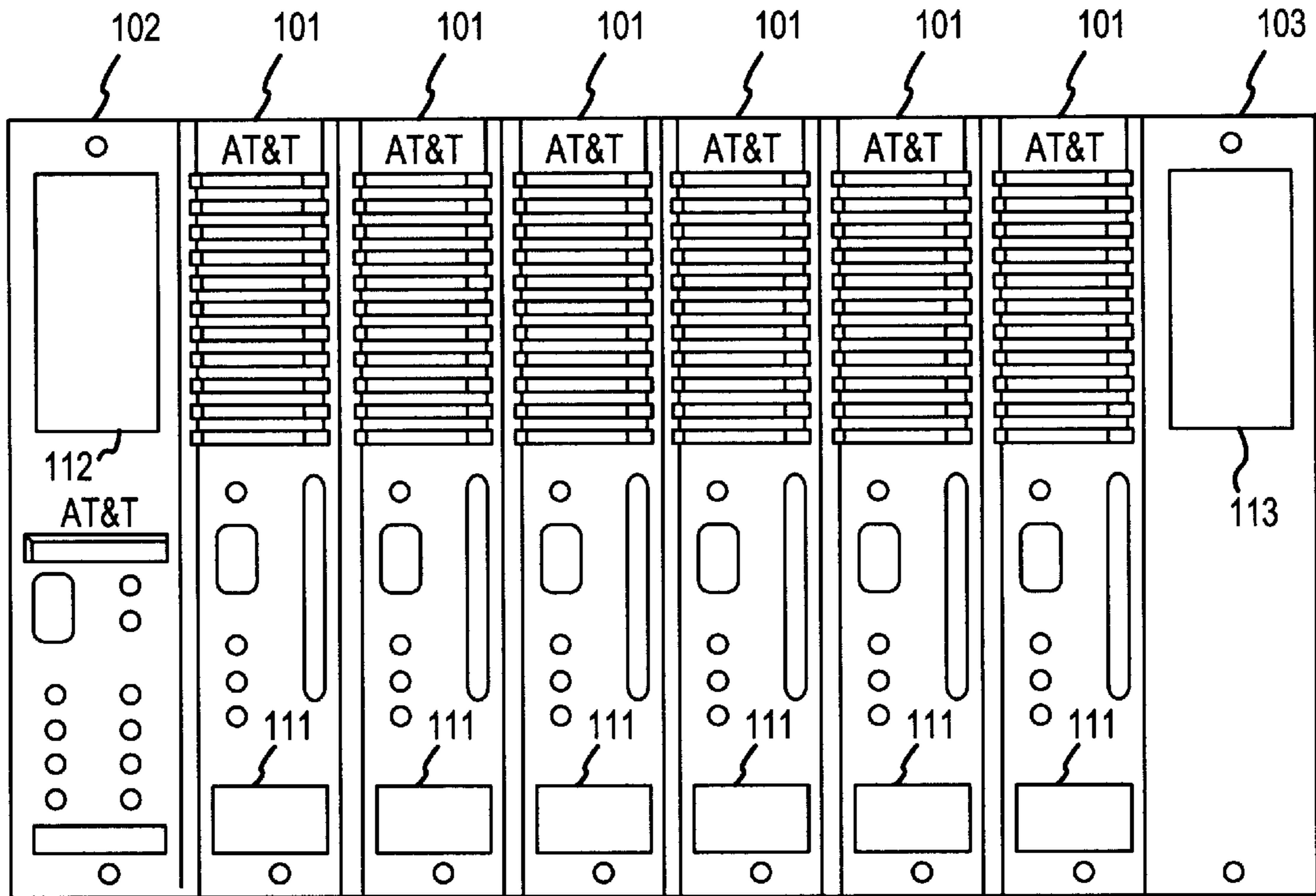
(51) **Int. Cl.**<sup>7</sup> ..... **H02B 1/26**  
(52) **U.S. Cl.** ..... **361/622; 361/725; 361/728**  
(58) **Field of Search** ..... 340/686.4, 691.1, 340/660, 815.4; 361/622, 725, 727, 728, 730, 733, 832; 439/61, 341, 709

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**40 Claims, 3 Drawing Sheets**



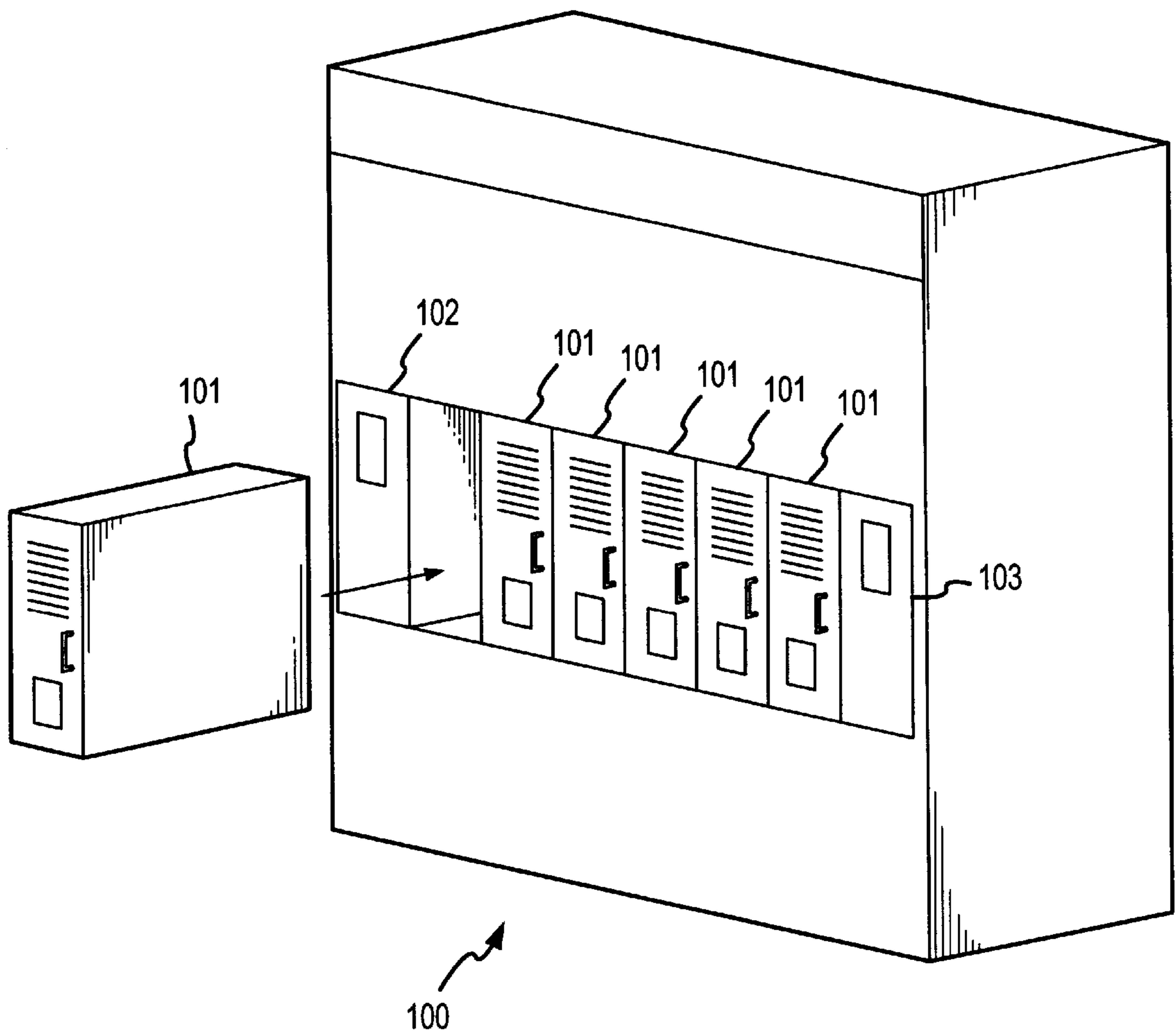


FIG. 1

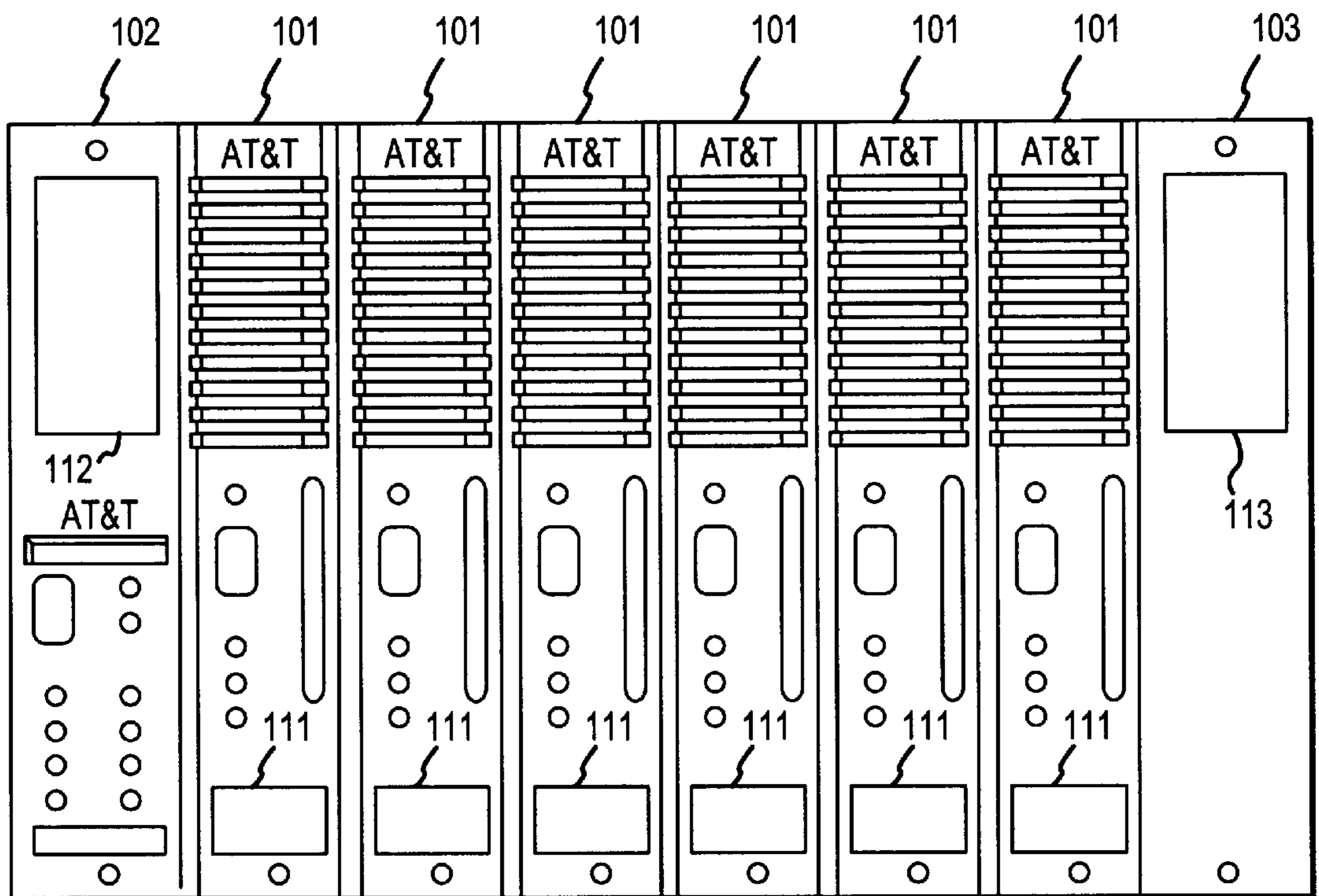


FIG.2

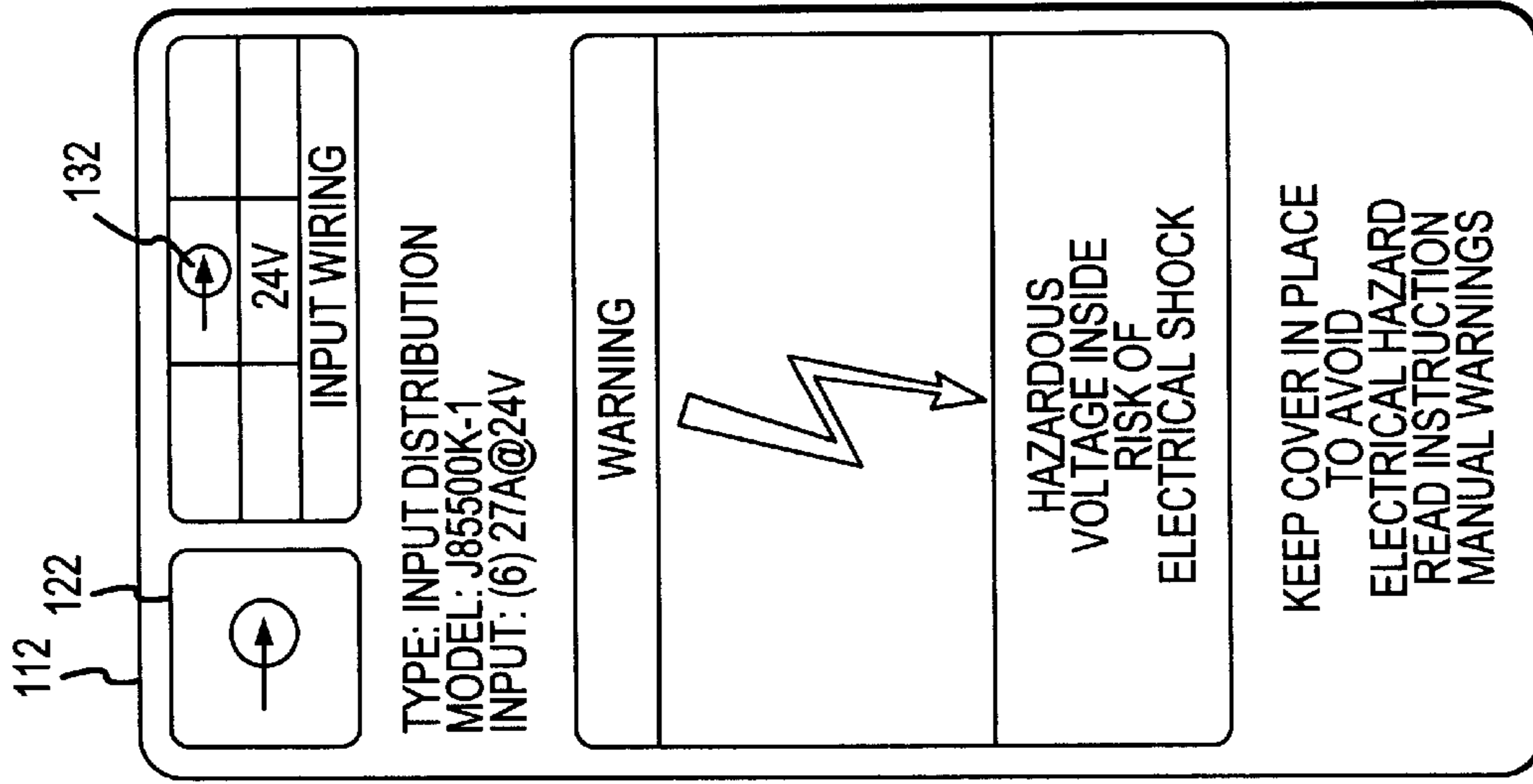


FIG.3

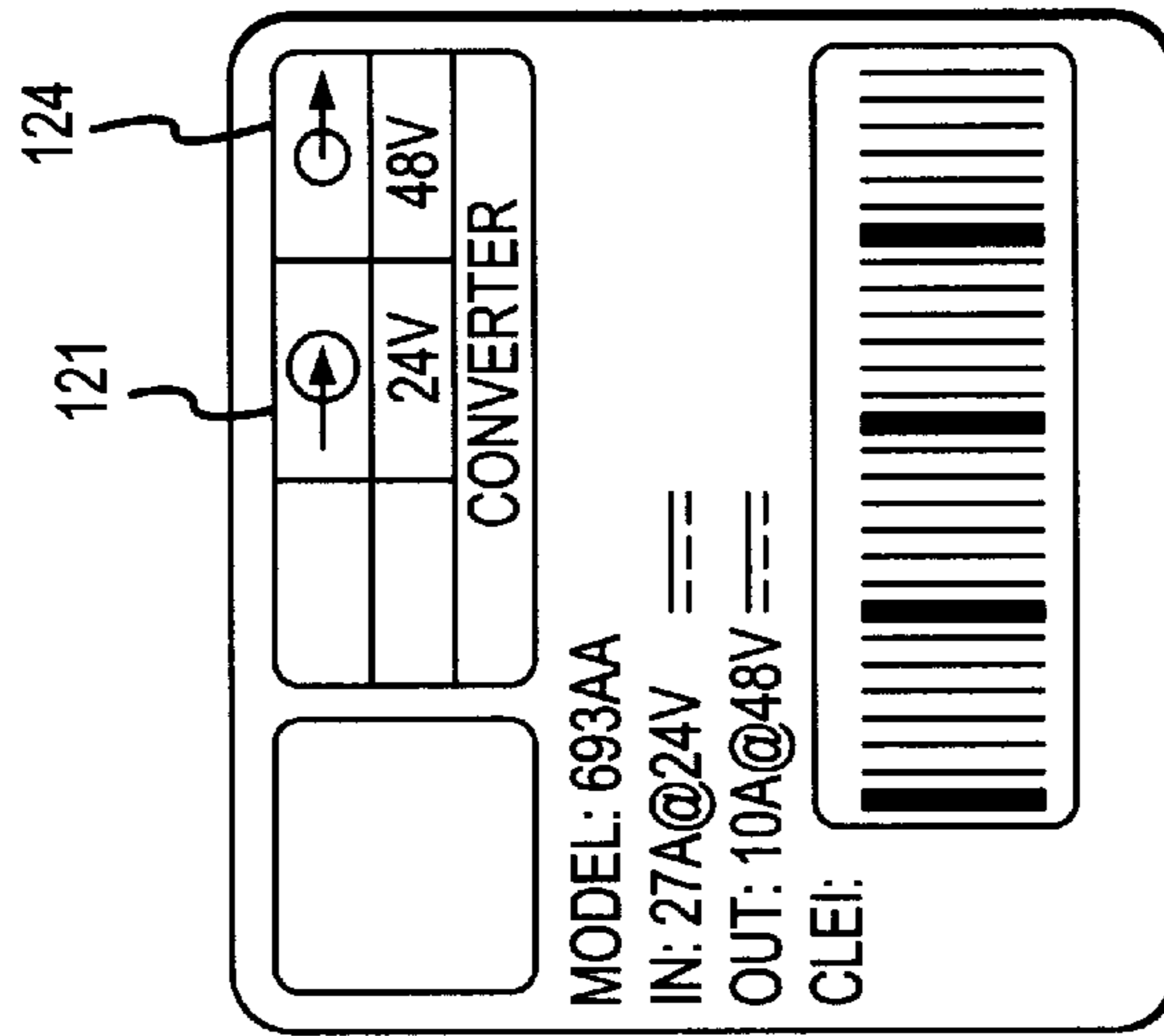


FIG.4

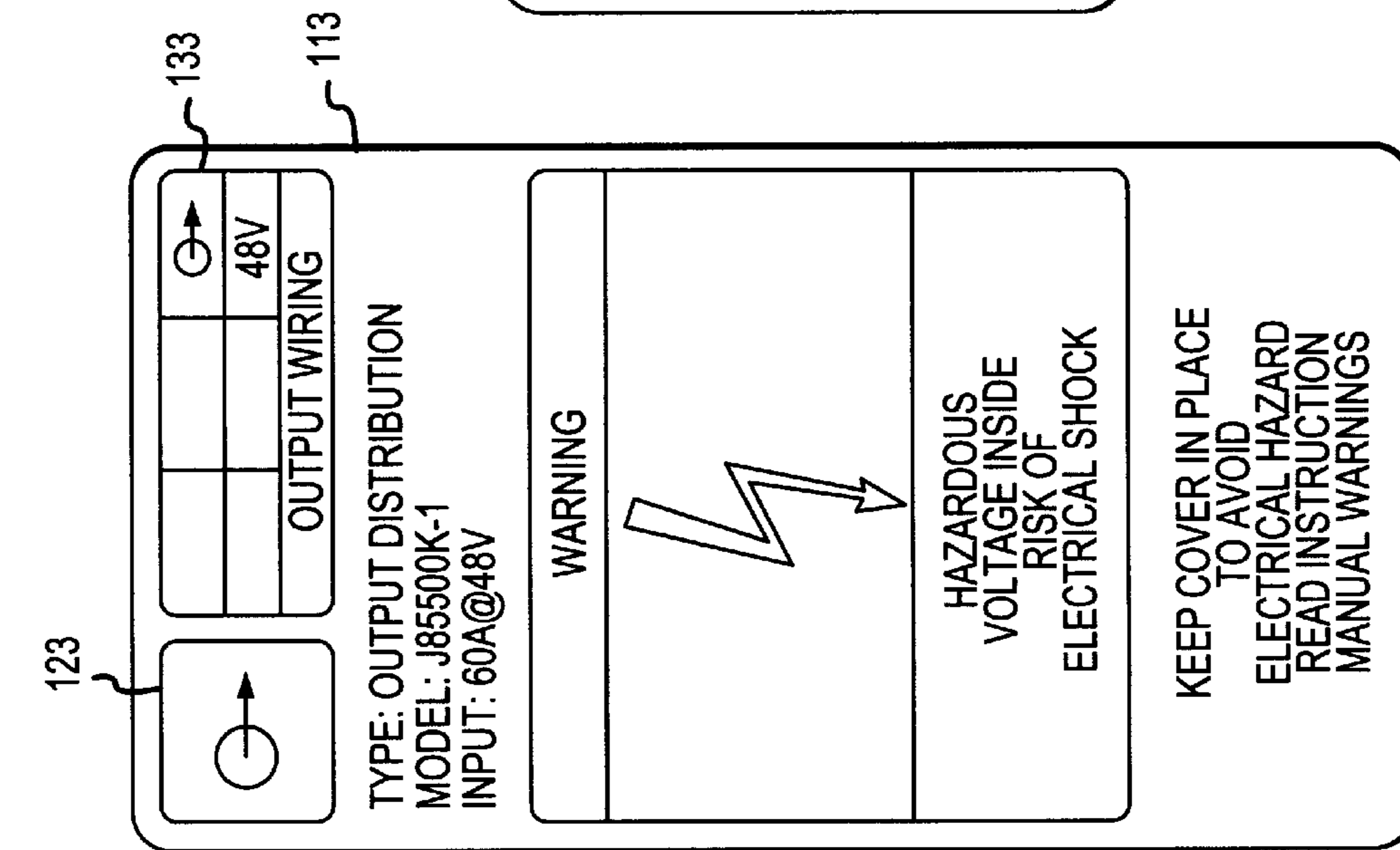


FIG.5

## IDENTIFICATION ICON INDICIA FOR PLUG-IN UNITS OF A POWER DISTRIBUTION SYSTEM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

### FIELD OF THE INVENTION

This invention relates to a power distribution system having a plurality of differing plug-in units for processing power and in particular to icon indicia attached to the plug-in units to facilitate insertion into plug-in stations included in a support chassis connected to a back plane of the power distribution system.

### BACKGROUND OF THE INVENTION

Power distribution systems normally can accommodate a variety of plug-in units which plug into various back planes and enable the distribution of various voltage and current levels of power. Given a particular power distribution scheme, the plug-in power units used must function in harmony with one another. This means that they must be properly selected for addition to the backplane. These selections are normally made by a crafts person who is familiar with the requirements of the plug-in units. It is not uncommon for an incorrect unit to be plugged in due to time and other pressures causing plug-in unit preselection to be made incorrectly. This may be due to confusing markings on the plug-in units or failure to understand the proper unit needed for a particular power distribution scheme.

### SUMMARY OF THE INVENTION

Therefore, icon and background chroma (i.e. color) indicia are provided to facilitate proper matching of plug-in units in a power processing system.

In an illustrative embodiment, the indicia are in a coordinated matrix format with unique graphical icons on a first chroma background to identify the input voltage and/or current, and further unique graphical icons on a second chroma background to identify the output voltage and/or current. Indicia on plug-in units are coordinated with related indicia on other units to assure the compatibility of all units within the power processing system.

A craftsman inserting a unit into a power distribution system need merely compare the unit's icon and chroma indicia with the indicia of adjacent units to be assured of inserting the correct plug-in unit.

### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a pictorial schematic of a power system cabinet including a plurality of plug-in units which operate in concert to process power;

FIG. 2 is a frontal view of one of the shelves of the cabinet of FIG. 1 showing the faces of the plug-in units and the input and output units of the shelf;

FIG. 3 is a label for an output unit of the power system cabinet;

FIG. 4 is a label for a plug-in power processing unit for insertion on the shelf of the power system cabinet; and

FIG. 5 is a label for an input unit of the power system cabinet.

### DETAILED DESCRIPTION

A power processing system chassis or cabinet **100** as shown in the FIG. 1 includes a plurality of power processing

units **101**, **102**, **103** which slide into a shelf of the cabinet and connect to a back plane at the rear of the shelf. Power processing units **102** and **103** at the end of the shelf provide power processing and inter connection to a power source and to equipment to be powered. One of the plug-in power processing units **101** is shown prior to being plugged into the shelf and consequent connection to the backplane. The back plane electrically connects the plug-in units **101** into the electrical system between an input power processing unit and an output power processing unit **103**, whereby the plug-in power processing units **101** are operative to provide processing of power between the input power processing unit **102** and the output power processing unit **103**. As such, the plug-in power processing units **101** must be compatible with the electrical specifications of the power processing units **102** and **103** at the opposing ends of the shelves.

To insure compatibility in selection of the plug-in power processing units **101** to other plug-in units and to the end input and output power processing units **102**, **103**, all units are marked with indicia by way of icons and background chroma, associated with the icon, that insure that craft personal select the proper plug-in units to place on the shelf of the chassis. Each input power processing unit **102** and output power processing unit **103** has identifying icon and background chroma indicia on the labels **112** and **113**, respectively, while each of the plug-in power processing units **101** has a label **111** that includes identifying icons and background chroma indicia.

The nature of the indicia marking is illustrated in the FIG. 2 which depicts a frontal view of the shelf of FIG. 1 and the individual units with the labels and associated indicia. Each label is comprised of at least an icon, a background chroma having a distinct frequency of reflected light, and alphanumeric information that provides an operational designation of the unit. The input power processing unit **102** has an identification label **112** that identifies its purpose and power/voltage ratings. The output power processing unit **103** similarly has an identification label that identifies its purpose and power/voltage ratings power processing. Each of the plug-in units **101** connects to a backplane in the power cabinet **100** and operates to process power received from the input power processing unit **102** and deliver the processed power to the output power processing unit **103**.

Exemplary labels are shown in detail in the FIGS. 3, 4 and 5. The label **112** of the input power unit **102** is shown in the FIG. 5. An exemplary output power unit **103** label **113** is shown in FIG. 3 and an exemplary label **111** for a plug-in power processing unit **101** is shown in the FIG. 4.

An exemplary input power processing unit **102** label **112**, shown in FIG. 5, includes an input icon **122** identifying it as an input circuit. Associated with the icon **122** is a matrix of information in which the icon is replicated as part of a matrix tabular format which includes the icon **132** on a background of a first chroma with a first radiant energy frequency (i.e. color) in one of the matrix positions. Immediately below the icon **132** is a designation of the input voltage and below that the designation "input wiring".

An exemplary output power processing unit **103** label **113**, shown in FIG. 3, includes an output icon **123** identifying it as an output circuit. Associated with the icon **123** is a matrix of information in which the icon is replicated as part of a tabular matrix format which includes the icon **133** on a background of a second chroma with a second radiant energy frequency (i.e. second color) in one of the matrix positions. Immediately below the icon **133** is a designation of the output voltage and below that the designation "output wiring."

An exemplary plug-in power processing unit **101** label as shown in the FIG. 4 includes the designation "converter" in a matrix setting. Above it on the left is an input icon **121**, on a chroma background keyed to the input voltage unit's rating and below it the numerical voltage ring. The input icon **121** is on the left, as is the input unit **102** as shown in FIG. 2. An output icon **124** is positioned to the right, as is the output unit **103** as shown in the FIG. 2, and below it is the numerical output voltage rating for the plug-in converter unit to which the icon **124** chroma background is keyed. As is apparent, units may be properly matched by reference to identical icon designations in identical matrix positions, by reference to identical chroma background in identical matrix positions, by comparison of numerical designations, or by combinations of the above. The specific position of indicia in the matrix matches the same indicia in the matrix of another unit to which it is compatible. In the matter of neutral background chroma in a specific position, the unit is preferably compatible with another unit having any chroma in that position.

A craftsman inserting units onto a shelf of the power housing need merely compare the common icon designations and/or related chroma background of a selected unit **102**, output unit **103**, or other unit's with the input and output unit icons and associated background chroma to be assured of inserting the correct plug-in unit into the particular shelf.

We claim:

1. A power plant, comprising:

- a supporting infrastructure including a shelf for accepting a plurality of modular power processing circuits;
- an input distribution unit;
- an output distribution unit;
- a plurality of intermediate power processing units arranged in a linear series and electrically connected intermediate the input distribution unit and the output distribution unit in order to process power supplied from the input distribution unit and deliver power to the output distribution unit;
- the input distribution unit including means for accepting power from a power source and further including a first identification indicia providing an indication of an output voltage supplied to the plurality of intermediate power processing units by a label having a first radiant energy frequency visually displaying a first color in a first specific matrix position;
- the output distribution unit including means for distributing power to a load and further including a second identification indicia providing an indication of an appropriate input voltage to be supplied to it by the plurality of intermediate power processing units by a label having a second radiant energy frequency visually displaying a second color in a second specific matrix position;
- identification indicia associated with each of the intermediate power processing units, including;
- a third identification indicia providing an indication of an acceptable input voltage accepted from the input distribution unit by including the first radiant energy frequency visually displaying the first color in the first specific matrix position, wherein a match between the voltage from the input distribution unit and the acceptable input voltage is indicated by an identity of the radiant energy frequency displayed; and
- the third identification indicia providing an indication of an output voltage of the intermediate power processing

unit supplied to the output distribution unit by including the second radiant energy frequency visually displaying the second color in the second specific matrix position, wherein a match between the output voltage of the intermediate distribution unit is indicated by an identity of the radiant energy frequency.

- 2. A power plant as recited in claim 1, further comprising;
  - a first icon associated with the acceptable input voltage for each of said plurality of intermediate processing units and appearing on the first and third identification indicia and a second icon associated with the voltage acceptable to the output distribution unit and appearing on the second and third identification indicia.
- 3. An identification scheme for enabling proper matching of the electrical specifications of a plurality of plug-in power processing units in a power chassis, including:
  - indicia affixed to each of said plug-in power processing units, said indicia displayed in a coordinated matrix format with an input icon on a first designated chroma background to identify input voltages and an output icon on a second designated chroma background to identify output voltages,
  - whereby comparison of said indicia on each of said plug-in power processing units with said indicia on adjacent ones of said plug-in power processing units facilitates proper selection of a compatible plug-in power processing unit.
- 4. An identification scheme for enabling proper electrical specification matching of plug-in power units to an input power unit and an output power unit as claimed in claim 3;
  - the input icon comprising an arrow entering a circle and the output icon comprising an arrow emerging from a circle.
- 5. An identification system for selecting a compatible plug-in power processing unit for use in a power plant system having an input power processing unit and an output power processing unit, comprising:
  - a label attached to each of said power processing units;
  - compatibility matrix on each of said labels; and
  - indicia within a first position in each of said compatibility matrix designating the compatibility of said plug-in power processing unit with said input unit and indicia within a second position in each of said compatibility matrix designating the compatibility of said plug-in power processing unit with said output unit,
  - said compatibility being designated by common indicia within each of said first and second positions in each of said compatibility matrix on each of said power processing units.
- 6. An identification system for selecting compatible components for use in a power plant system having a plurality of power processing components, comprising:
  - a label attached to each of said power processing components;
  - a compatibility matrix on each of said labels; and
  - indicia within each of said compatibility matrices designating operational characteristics of said power processing components, whereby said compatible components are easily selected by comparison of said indicia within like positions of each of said compatibility matrices.
- 7. The identification system as recited in claim 5 wherein said indicia is a graphical icon or chroma.
- 8. The identification system as recited in claim 6 wherein said indicia is a graphical icon or chroma.

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9. A power chassis having a plurality of plug-in power processing units, comprising:

indicia affixed to each of said plug-in power processing units, said indicia displayed in a coordinated matrix format with an input icon on a first designated chroma background to identify input voltages of said plug-in power processing units and an output icon on a second designated chroma background to identify output voltages of said plug-in power processing units, whereby comparison of said indicia on one of each of said plug-in power processing units with said indicia on adjacent ones of said plug-in power processing units facilitates proper selection of a compatible plug-in power processing unit.

10. A power processing system having an input power processing unit, an output power processing unit, and a plurality of slots for receiving plug-in power processing units, said power processing system comprising:

a label attached to each of said power processing units; a compatibility matrix on each of said labels; and indicia within a first position in each of said compatibility matrices designating the compatibility of said plug-in power processing unit with said input unit and indicia within a second position in each of said compatibility matrices designating the compatibility of said plug-in power processing unit with said output unit, whereby the compatibility of each of said power processing units is designated by common indicia within each of said first and second positions in each of said compatibility matrices on each of said power processing units.

11. The power processing system as recited in claim 10 wherein said indicia is a graphical icon or chroma.

12. A power plant employing an identification system for selecting one or more compatible power processing components for use in said power plant, said power plant comprising:

a label attached to each of said power processing components; a compatibility matrix on each of said labels; and indicia within each of said compatibility matrices designating operational characteristics of said power processing components, whereby said compatible power processing components are easily selected by comparison of said indicia within like positions of each of said compatibility matrices.

13. The power plant as recited in claim 12 wherein said indicia is a graphical icon or chroma.

14. An identification system for a power processing unit couplable to a backplane of a power processing system, comprising:

a label attached to the power processing unit; and a compatibility matrix, located on the label, that contains an indicium designating at least one operational characteristic of the power processing unit to facilitate proper placement of the power processing unit in the power processing system.

15. The identification system as recited in claim 14 wherein the power processing system includes a plurality of power processing units having respective labels and compatibility matrixes with indicium, respective indicium of each of the plurality of power processing units designating at least one operational characteristic thereof to facilitate proper placement of each of the plurality of power processing units in the power processing system.

16. The identification system as recited in claim 14 wherein the power processing system further includes a

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second power processing unit, the second power processing unit, comprising:

a second label, attached to the second power processing unit, and

a second compatibility matrix, located on the second label, that contains a second indicium designating at least one operational characteristic of the second power processing unit, the second indicium being compared to the indicium to facilitate proper placement of the second power processing unit with respect to the power processing unit in the proper processing system.

17. The identification system as recited in claim 14 wherein the indicium indicates a voltage of the power processing unit.

18. The identification system as recited in claim 14 wherein the compatibility matrix comprises a graphical icon or a chroma.

19. The identification system as recited in claim 14 wherein the power processing unit is locatable in a plug-in station of the power processing system.

20. For use with a power processing unit couplable to a backplane of a power processing system, a method for positioning the power processing unit in the power processing system, comprising:

determining an operational characteristic of the power processing unit;

attaching a label to the power processing unit, the label having a compatibility matrix that contains an indicium designating the operational characteristic of the power processing unit; and

inserting the power processing unit in the power processing system based on the compatibility matrix.

21. The method as recited in claim 20 wherein the power processing system includes a plurality of power processing units, further comprising:

determining an operational characteristic of each of the plurality power processing units;

attaching a label to each of the plurality of power processing units, the respective labels having a compatibility matrix that contains an indicium designating the operational characteristic of each of the respective plurality of power processing units; and

positioning each of the plurality of power processing units in the power processing system based on the respective compatibility matrixes.

22. The method as recited in claim 20 wherein the power processing system further includes a second power processing unit, further comprising:

determining an operational characteristic of the second power processing unit;

attaching a second label to the second power processing unit, the second label having a compatibility matrix that contains an indicium designating the operational characteristic of the second power processing unit; and orienting the second power processing unit in proper relation to the first power processing unit based on the compatibility matrixes.

23. The method as recited in claim 20 wherein the act of determining includes determining a voltage rating of the power processing unit and the indicium indicates the voltage rating.

24. The method as recited in claim 20 wherein the compatibility matrix comprises a graphical icon or a chroma.

25. The method as recited in claim 20 wherein the act of inserting further comprises inserting the power processing unit into a plug-in station of the power processing system.

26. For use in a power processing system that receives power from a power source, an input power processing unit, couplable to a backplane of the power processing system, that receives the power from the power source and processes the power for delivery to at least one intermediate power processing unit via the backplane, the input power processing unit, comprising:

a label attached to the input power processing unit; and  
a compatibility matrix, located on the label, that contains an indicium designating an operational characteristic of the input power processing unit, the indicium of the input power processing unit comparable to an indicium of a compatibility matrix on the at least one intermediate power processing unit to facilitate proper placement of the input power processing unit in the power processing system.

27. The input power processing unit as recited in claim 26 wherein a location of the indicium associated with the input power processing unit corresponds to a location of the indicium associated with the at least one intermediate power processing unit.

28. The input power processing unit as recited in claim 26 wherein the indicium indicates a voltage supplied to the at least one intermediate power processing unit.

29. The input power processing unit as recited in claim 26 wherein the compatibility matrix comprises a graphical icon or a chroma.

30. The input power processing unit as recited in claim 26 wherein the label comprises an input icon having an arrow entering a circle.

31. For use in a power processing system that receives power from a power source and processes the power for delivery to a load, the power processing system having an input power processing unit and an output power processing unit couplable to a backplane of the power processing system, an intermediate power processing unit that receives power from the input power processing unit, develops processed power therefrom and delivers the processed power to the output power processing unit via the backplane, comprising:

a label attached to the intermediate power processing unit; and

a compatibility matrix, located on the label, that contains first and second indicia designating first and second operational characteristics, respectively, of the intermediate power processing unit, the first indicium comparable to an indicium of a compatibility matrix on the input power processing unit and the second indicium comparable to an indicium of a compatibility matrix on the output power processing unit to facilitate proper placement of the intermediate power processing unit in the power processing system.

32. The intermediate power processing unit as recited in claim 31 wherein a location of the first indicium associated

with the intermediate power processing unit corresponds to a location of the indicium associated with the input power processing unit and a location of the second indicium associated with the intermediate power processing unit corresponds to a location of the indicium associated with the output power processing unit.

33. The intermediate power processing unit as recited in claim 31 wherein the first indicium provides an indication of a voltage supplied by the input power processing unit to the intermediate power processing unit and the second indicium provides an indication of a voltage supplied by the intermediate power processing unit to the output power processing unit.

34. The intermediate power processing unit as recited in claim 31 wherein the compatibility matrix comprises at least one graphical icon or chroma.

35. The intermediate power processing unit as recited in claim 31 wherein the label comprises an input icon having an arrow entering a circle and an output icon having an arrow emerging from a circle.

36. For use in a power processing system that receives power from a power source and processes the power for delivery to a load, the power processing system having an input power processing unit and at least one intermediate power processing unit couplable to a backplane of the power processing system, an output power processing unit that receives power from the intermediate power processing unit via the backplane and delivers the power to the load, comprising:

a label attached to the output power processing unit; and  
a compatibility matrix, located on the label, that contains an indicium designating an operational characteristic of the output power processing unit, the indicium of the output power processing unit comparable to an indicium of a compatibility matrix on the at least one intermediate power processing unit to facilitate proper placement of the output power processing unit in the power processing system.

37. The output power processing unit as recited in claim 36 wherein a location of the indicium associated with the output power processing unit corresponds to a location of the indicium associated with the at least one intermediate power processing unit.

38. The output power processing unit as recited in claim 36 wherein the indicium indicates a voltage supplied to the output power processing unit.

39. The output power processing unit as recited in claim 36 wherein the compatibility matrix comprises a graphical icon or a chroma.

40. The output power processing unit as recited in claim 36 wherein the label comprises an output icon having an arrow emerging from a circle.