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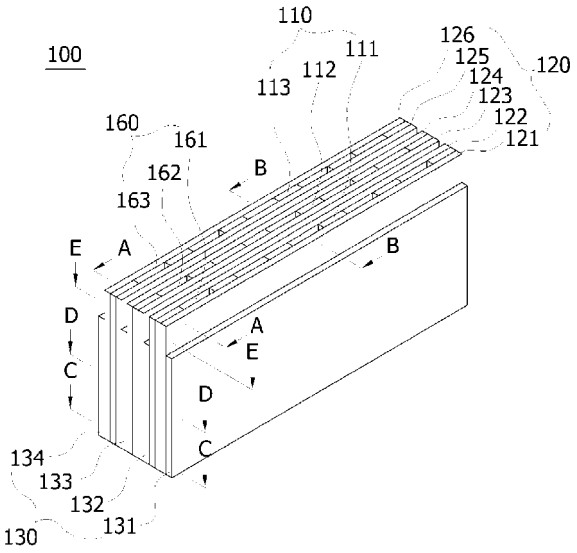
(54) FLAME HOLE UNIT STRUCTURE OF A GAS BURNER

(57) The present invention relates to a flame hole unit structure of a gas burner for simplifying, easily assembling, and manufacturing a structure of a burner flame hole unit by overlapping a plurality of plates of which portions are cut so that the cut portions may be intersected with each other, and by forming flame holes and mixture channels of gas and air through a gap between the cut portions. To realize said purpose, the flame hole unit structure of the gas burner of the present invention has a plurality of flame holes in which a mixture of gas and air is sprayed to form a flame, and the plurality of plates of which the portions are cut are overlapped together, wherein the cut portions are intersected and overlapped with each other between the adjacent plates, thereby forming the flame holes and the mixture channels of gas and air through the gap between the cut portions.

Fig. 2



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Description

Technical Field

[0001] The present invention relates to a flame hole unit structure of a gas burner, and more particularly, to a flame hole unit structure of a gas burner in which a structure of a burner flame hole unit can be simplified and the unit can be easily assembled and manufactured by overlapping cut portions of a plurality of partially-cut plates to cross each other to form a mixed gas (gas and air) flow path and a flame hole through a gap between the cut portions.

Background Art

[0002] In general, a gas burner used in a combustion device such as a boiler or a water heater may be classified as a Bunsen burner or a pre-mixed burner according to a method of mixing a combustion gas with air.

[0003] The Bunsen burner is a burner that supplies a minimum of primary air required for combustion in a nozzle unit through which a gas is injected, and supplies excessive secondary air to a portion at which a flame is formed, realizing perfect combustion, and has an advantage of good combustion stability. However, since the flame is formed by the secondary air, a flame length may be increased.

[0004] The pre-mixed burner combusts a pre-mixed gas in which a combustion gas and air are pre-mixed in a mixing chamber. Since the entire flame length can be reduced and a flame temperature can be lowered to reduce a load with respect to the same area, generation of pollutants such as carbon monoxide, nitrogen oxide, and so on, can be reduced to a minimum value.

[0005] While the Bunsen burner is mainly used in the conventional art, in recent times, a pre-mixed burner has mainly been used to reduce generation of pollutants and miniaturize a combustion chamber.

[0006] FIG. 1 is a perspective view showing an example of a conventional flame hole unit structure of a gas burner.

[0007] A conventional pre-mixed type gas burner 1 has a structure in which air supplied from a blower 30 and a combustion gas supplied through a gas supply pipe 40 are pre-mixed in a manifold 50 installed at a front surface of a burner body 20 to be supplied to a burner flame hole unit 10 installed over the burner body 20.

[0008] While the conventional burner flame hole unit 10 has a structure in which flame holes are punched in one plate having a flat or cylindrical shape, such a structure may cause imperfect combustion and backfire when a combustion surface of the burner is deformed or, in a severe case, damage to the flame holes occurs due to thermal stress.

[0009] In order to compensate for these disadvantages, a burner flame hole unit structure formed of a material such as a metal fiber mat woven of a metal fiber, a ceramic plate manufactured by sintering ceramic, or the like, has been used.

[0010] However, according to the flame hole unit structure formed of the metal fiber mat or the ceramic plate, a material cost is increased and a manufacturing method is complicated, which increases a manufacturing cost, and a structure of a pre-mixer is complicated, which increase a pressure loss so that a flame becomes unstable and noises occur.

[0011] In addition, when the metal fiber mat manufactured through weaving is used as a material for the flame hole unit, since an operator pulls and assembles the metal fiber mat upon assembly of the burner, irregular sizes of the flame holes in a local area or the entire area of the metal fiber mat may cause imperfect combustion and backfire, and flexibility in material characteristics of the metal fiber mat may cause sagging after installation, irregularly deforming the combustion surface and the flame holes.

[0012] Further, in the case in which the ceramic plate manufactured through the sintering method is used as a material for the flame hole unit, when condensation water generated from a heat exchanger upon upward combustion is dropped on the combustion surface, a surface of the flame hole unit may be damaged due to water to generate the flame holes having irregular shapes, increasing probability of generation of imperfect combustion.

Technical Problem

[0013] In order to solve the foregoing and/or other problems, it is an aspect of the present invention to provide a flame hole unit structure of a gas burner in which a structure of a burner flame hole unit can be simplified and the structure can be easily manufactured.

Technical Solution

[0014] The foregoing and/or other aspects of the present invention may be achieved by providing a flame hole unit structure of a gas burner having a plurality of flame holes through which a mixed gas of a gas and air is injected to form a flame, characterized in that a plurality of partially cut plates overlap, the cutout portions of the adjacent plates overlap across each other, and a mixed gas (the gas and air) flow path and the flame holes are formed through gaps of the cutout portions.

[0015] Here, the plurality of plates may include a plurality of overlapping sets of plates, each set including an inner plate having a partially cut upper or lower groove and outer plates overlapping at both sides of the inner plate and having partially cut upper and lower grooves corresponding to the groove formed in the inner plate to cross each other.

[0016] In addition, fixing plates may additionally overlap at both sides of the set of plates so that the plurality of flame holes are disposed at predetermined intervals.

[0017] Further, the flame hole may have a flat rectangular cross-sectional shape.

Advantageous Effects

[0018] According to the flame hole unit structure of the gas burner of the present invention, a plurality of partially-cut plates overlap to form the burner flame hole unit so that a structure of the burner flame hole unit can be simplified and the structure can be easily manufactured, and thus, time and cost consumed for manufacture of the gas burner can be reduced.

[0019] In addition, according to the present invention, as the moving path of the mixed gas and the structure in communication with the flame holes are formed in the gap between the overlapping plates, a deformation level of the flame holes due to thermal stress can be reduced to increase stability of the flame and prevent imperfect combustion.

Description of Drawings

[0020] The above and other aspects and advantages of the present invention will become apparent and more readily appreciated from the following description of exemplary embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a perspective view showing an example of a conventional flame hole unit structure of a gas burner;
FIG. 2 is a perspective view of a flame hole unit structure of a gas burner in accordance with an exemplary embodiment of the present invention;
FIG. 3 is a partially exploded perspective view of FIG. 2;
FIG. 4 is a cross-sectional view taken along line A-A of FIG. 2;
FIG. 5 is a cross-sectional view taken along line B-B of FIG. 2;
FIG. 6 is a cross-sectional view taken along line C-C of FIG. 2;
FIG. 7 is a cross-sectional view taken along line D-D of FIG. 2; and
FIG. 8 is a cross-sectional view taken along line E-E of FIG. 2.

<Description of Major Reference Numerals>

[0021]

1: Gas burner 10, 100: Burner flame hole unit
111 a, 121 a, 122a: Groove 20: Burner body
30: Blower 40: Manifold
110, 111, 112, 113: Inner plate
120, 121, 122, 123, 124, 125, 126: Outer plate
130, 131, 132, 133, 134: Fixing plate
140, 141, 142, 143, 144, 145, 146: Mixed gas inlet port
150, 151, 152, 153: Inner space
160, 161, 162, 163: Flame hole

Mode for Invention

[0022] Reference will now be made in detail to the embodiments of the present invention, examples of which are illustrated in the accompanying drawings. However, it will be apparent to those skilled in the art that the following embodiments can be readily understood and modified into various types, and the scope of the present invention is not limited to the embodiments.

[0023] FIG. 2 is a perspective view of a flame hole unit structure of a gas burner in accordance with an exemplary embodiment of the present invention, FIG. 3 is a partially exploded perspective view of FIG. 2, FIG. 4 is a cross-sectional view taken along line A-A of FIG. 2, FIG. 5 is a cross-sectional view taken along line B-B of FIG. 2, FIG. 6 is a cross-sectional view taken along line C-C of FIG. 2, FIG. 7 is a cross-sectional view taken along line D-D of FIG. 2, and FIG. 8 is a cross-sectional view taken along line E-E of FIG. 2.

[0024] A flame hole unit 100 of a gas burner in accordance with the present invention has a structure in which a plurality of thin plates overlap and are assembled, and is characterized in that a path through which a mixed gas of a gas and air moves is formed inside the overlapping plates to be in communication with upper flame holes.

[0025] Referring to FIGS. 2 and 3, a burner flame hole unit 100 in accordance with an exemplary embodiment of the present invention includes inner plates 110 (111, 112 and 113) in which a plurality of grooves 111 a having partially cut upper portions are formed at predetermined intervals, and outer plates 120 (121, 122, 123, 124, 125 and 126) in which a plurality of grooves 121 a and 122a having partially cut lower portions are formed at predetermined intervals to be vertically symmetrical to the grooves 111 a formed in the inner plates 110, and overlap and are coupled to both surfaces of the inner plates 110.

[0026] As shown, the grooves 111 a, 121 a and 122a are cut in substantially a "C" shape to be opened upward or downward so that, in a state in which the inner plates 110 and the outer plates 120 overlap, the grooves 111 a formed in the inner plates 110 are in partial communication with the grooves 121 a and 122a formed in the outer plates 120 to form a flow path of the mixed gas.

[0027] Meanwhile, as shown in FIG. 3, the inner plate 111 and the outer plates 121 and 122 disposed at both sides of the inner plate 111 to overlap configure a set of plates, and sets of plates overlap to be repeatedly disposed in a multi-stage.

[0028] In addition, solid fixing plates 130 (131, 132, 133 and 134) overlap and are coupled between the sets of plates.

[0029] The fixing plates 130 perform a function of forming gaps between flame holes 160 (161, 162 and 163) when the plates have different thicknesses, in addition

to a function of forming the flow path of the mixed gas.

[0030] Here, mixed gas inlet ports 140 (141, 142, 143, 144, 145 and 146) are formed at a lower side of the burner flame hole unit 100 by gaps of the grooves 121 a and122a of the outer plates 120 between the fixing plates 130 and the inner plates 110.

[0031] The mixed gas introduced into the mixed gas inlet ports 140 is conveyed upward to be gathered in inner spaces 151, 152 and 153 defined by the gaps of the grooves 111 a of the inner plates 110 and the grooves 121 a and 122a of the outer plates 120 between the fixing plates 130.

[0032] In addition, the mixed gas gathered in the inner spaces 151, 152 and 153 is conveyed upward to be injected upward through flame holes 160 (161, 162 and 163) formed by gaps of the grooves 111 a of the inner plates 110 between the outer plates 120.

[0033] According to the above-mentioned configuration, since the mixed gas introduced through the two mixed gas inlet ports 141 and 142 is injected through the one flame hole 161 and a cross-sectional area of the flame hole 161 is smaller than that of the inner space 151, the mixed gas can be rapidly injected through the flame hole 161.

[0034] Meanwhile, while the embodiment has been described as an example in which the grooves 111 a formed in the inner plates 110 are opened upward and the grooves 121 a and 122a formed in the outer plates 120 are opened downward, on the other hand, the grooves 111 a formed in the inner plates 110 and the grooves 121 a and 122a formed in the outer plates 120 may be opened downward and upward, respectively, in different directions. According to such a configuration, the mixed gas introduced into the one mixed gas inlet port is divided into the two flame holes to be injected.

[0035] In FIG. 6, reference numerals 141 a to 146c designate mixed gas inlet ports formed in a lateral direction, in FIG. 7, reference numerals 151a to 153c designate inner spaces formed in the lateral direction, and in FIG. 8, reference numerals 161a to 163c designate flame hole units formed in the lateral direction.

[0036] According to the flame hole unit structure of the gas burner in accordance with the present invention, since the plurality of plates overlap to form the path of the mixed gas to be in communication with the upper flame holes, deformation of the flame holes due to thermal stress can be minimized.

[0037] In addition, while the embodiment has a configuration in which the three sets of plates overlap, the number of sets of plates may be differently configured in consideration of a maximum output amount of the gas burner.

[0038] The foregoing description concerns an exemplary embodiment of the invention, is intended to be illustrative, and should not be construed as limiting the invention. The present teachings can be readily applied to other types of devices and apparatuses. Many alternatives, modifications, and variations within the scope and spirit of the present invention will be apparent to those skilled in the art.

Claims

1. A flame hole unit structure of a gas burner having a plurality of flame holes through which a mixed gas of a gas and air is injected to form a flame, **characterized in that** a plurality of partially cut plates overlap, the cutout portions of the adjacent plates overlap across each other, and a mixed gas (the gas and air) flow path and the flame holes are formed through gaps of the cutout portions.

2. The flame hole unit structure according to claim 1, wherein the plurality of plates comprise a plurality of overlapping sets of plates, each set including an inner plate having a partially cut upper or lower groove and outer plates overlapping at both sides of the inner plate and having partially cut upper and lower grooves corresponding to the groove formed in the inner plate to cross each other.

3. The flame hole unit structure according to claim 2, wherein fixing plates additionally overlap at both sides of the set of plates so that the plurality of flame holes are disposed at predetermined intervals.

4. The flame hole unit structure according to any one of claims 1 to 3, wherein the flame hole has a flat rectangular cross-sectional shape.

Fig. 1

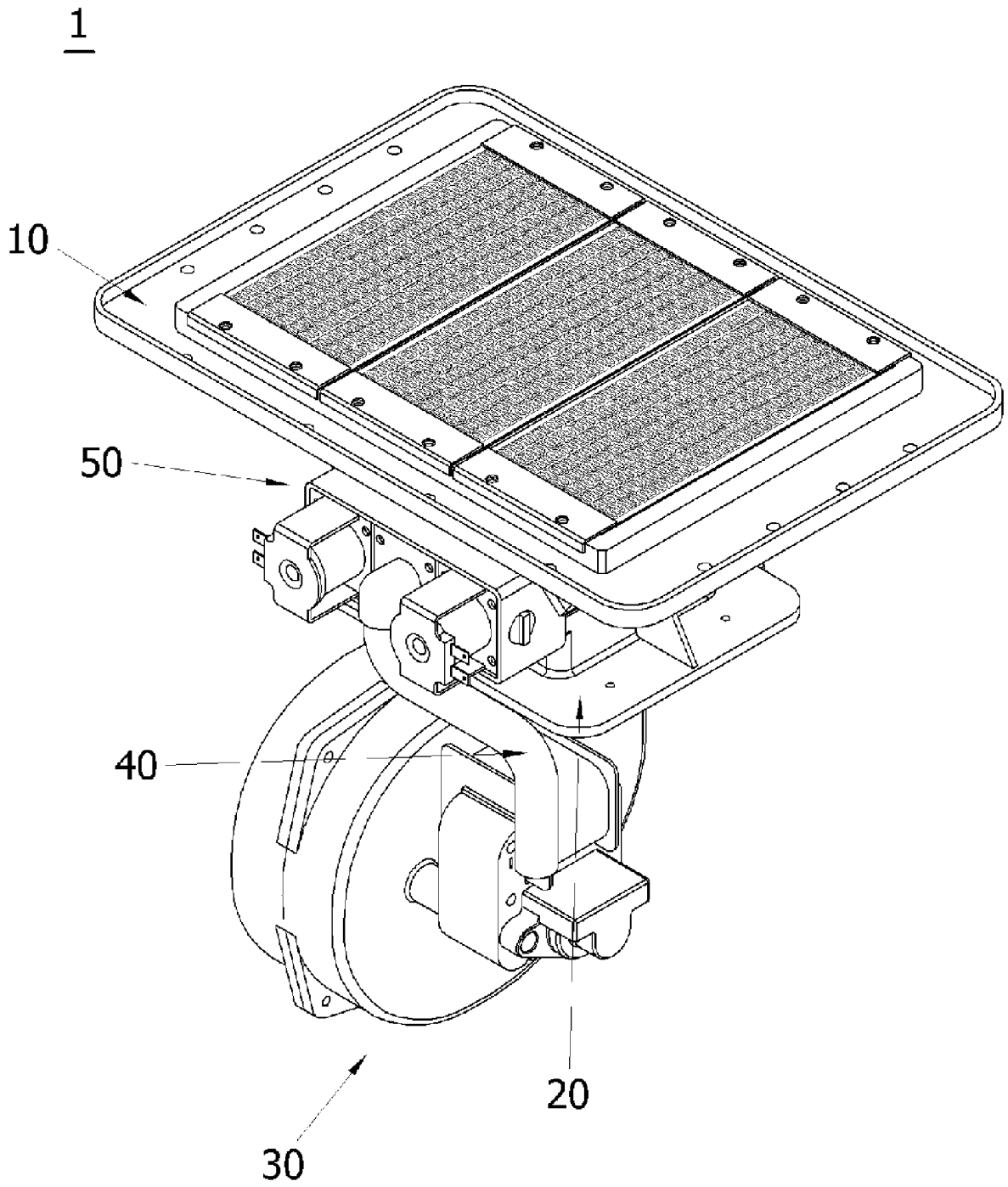

Fig. 2

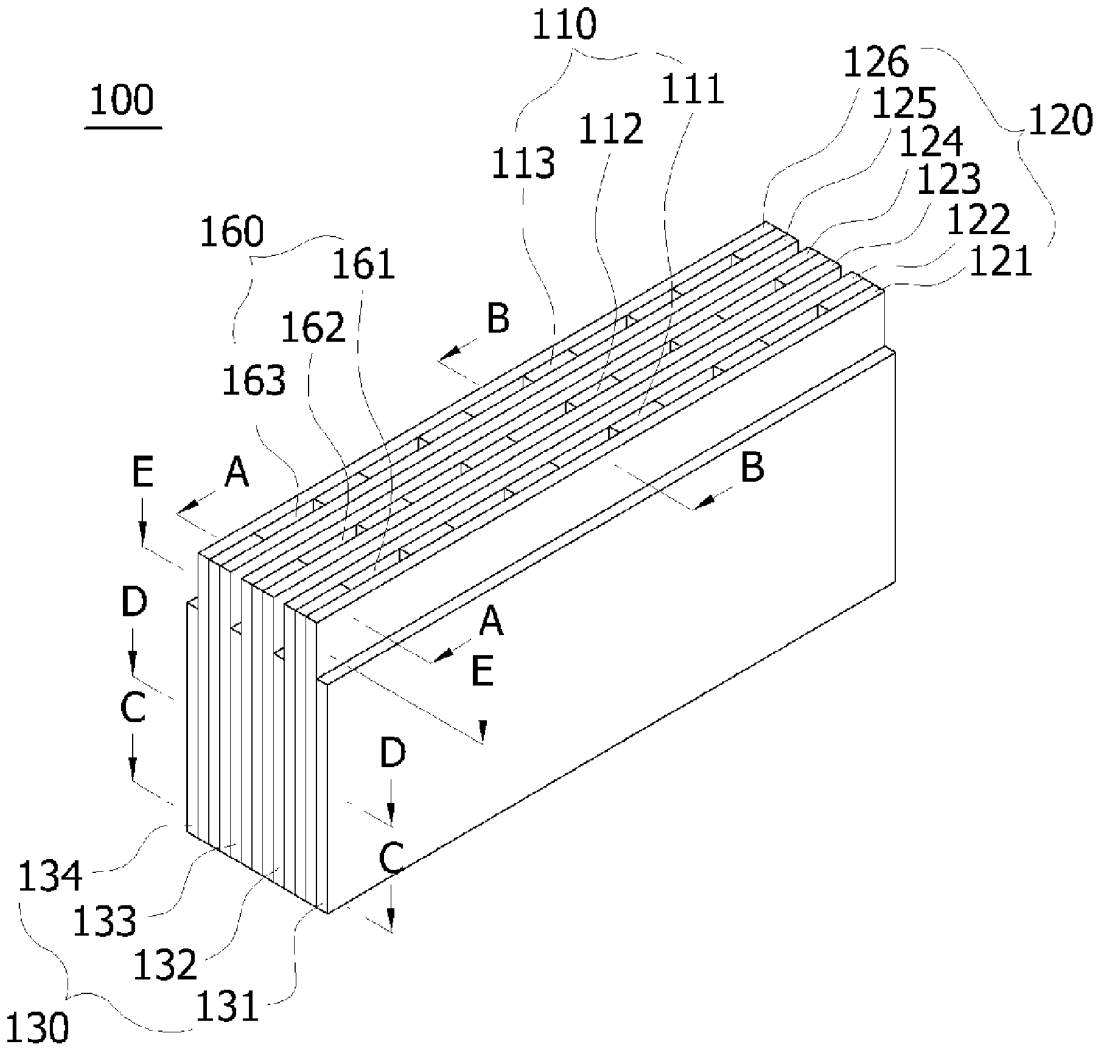
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Fig. 3

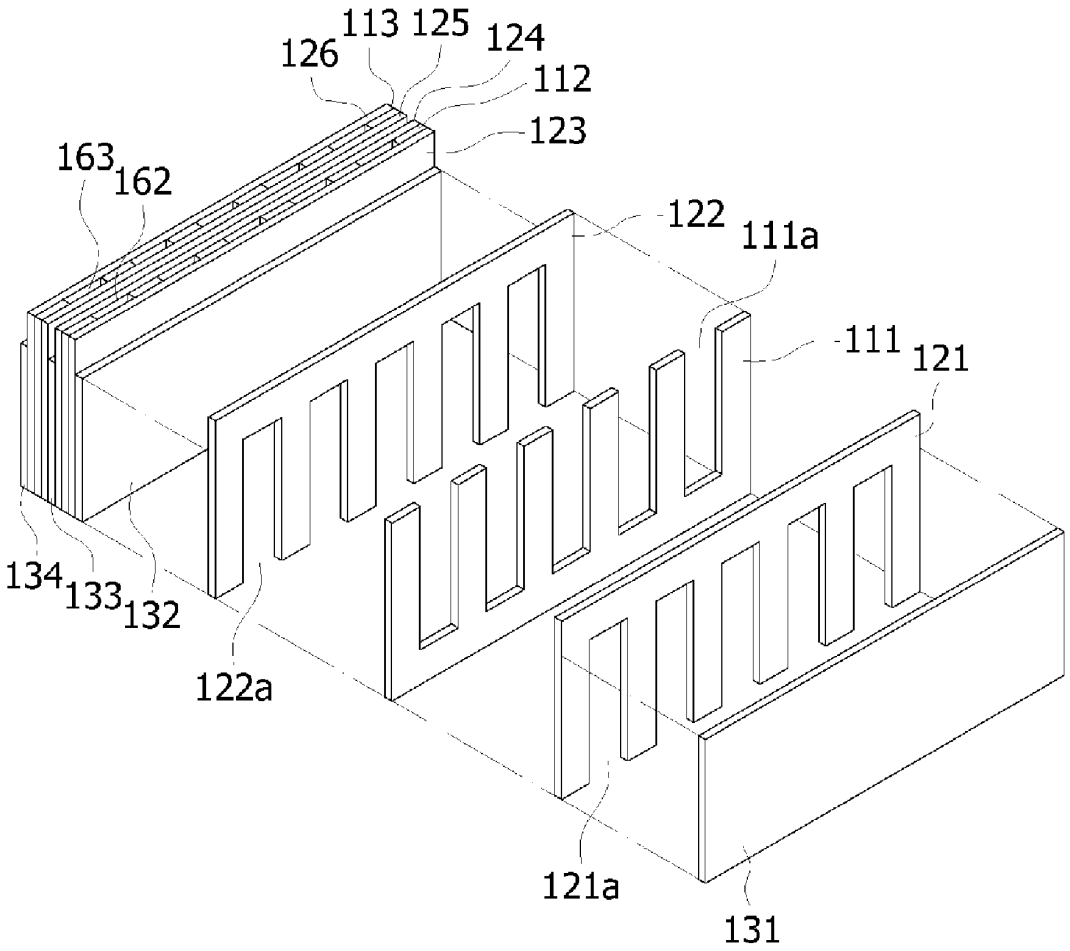
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Fig. 4

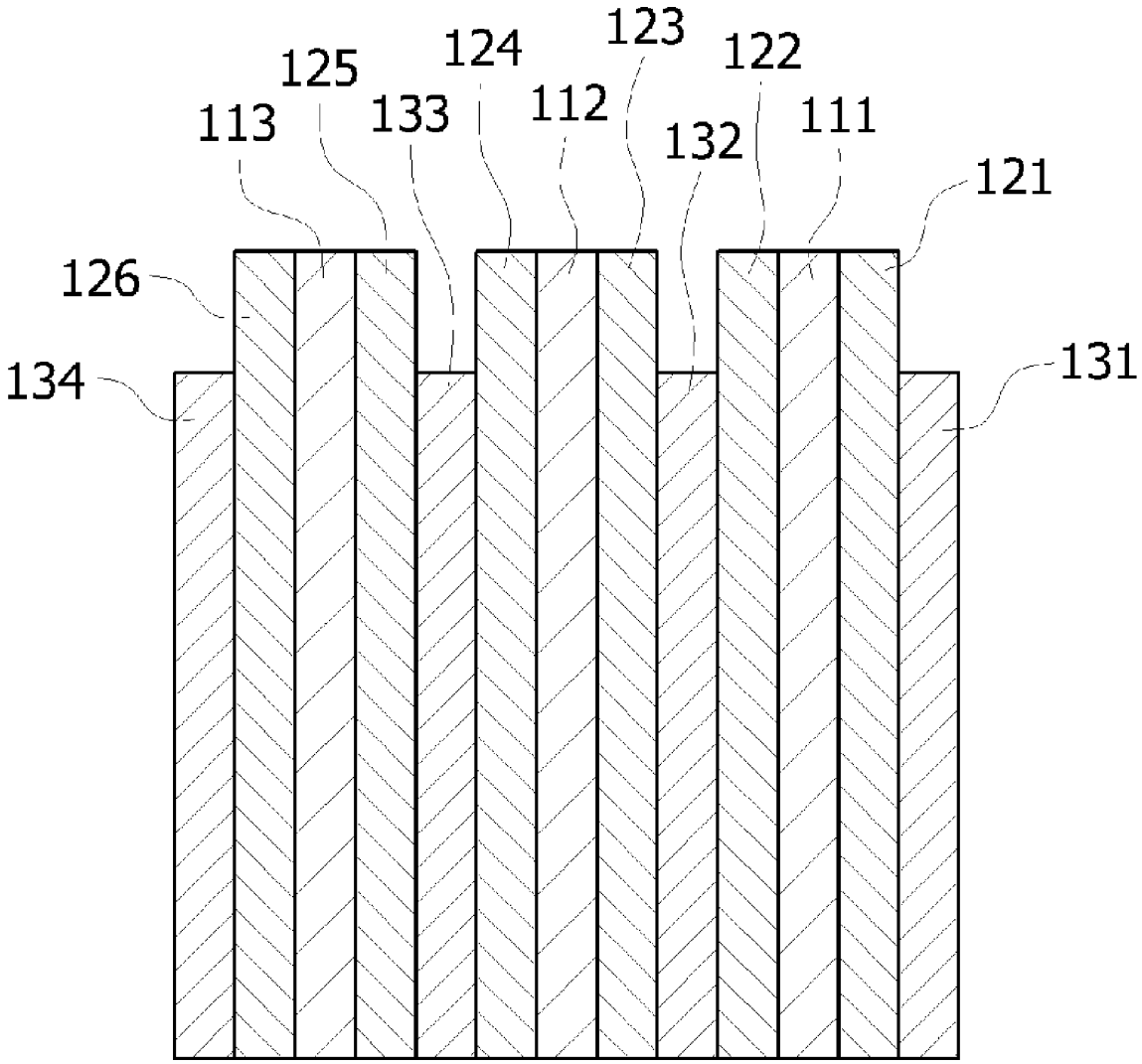

Fig. 5

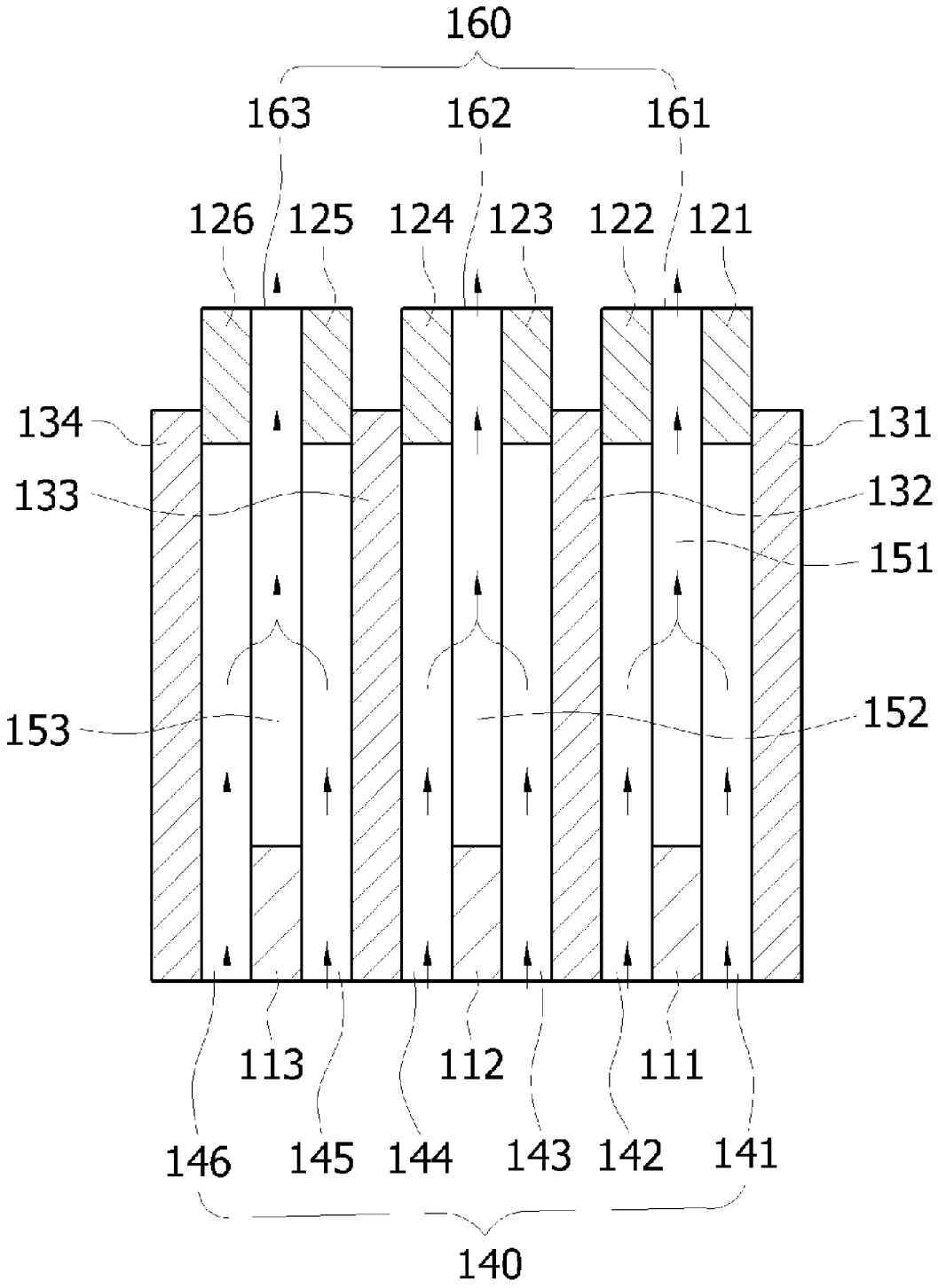
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Fig. 6

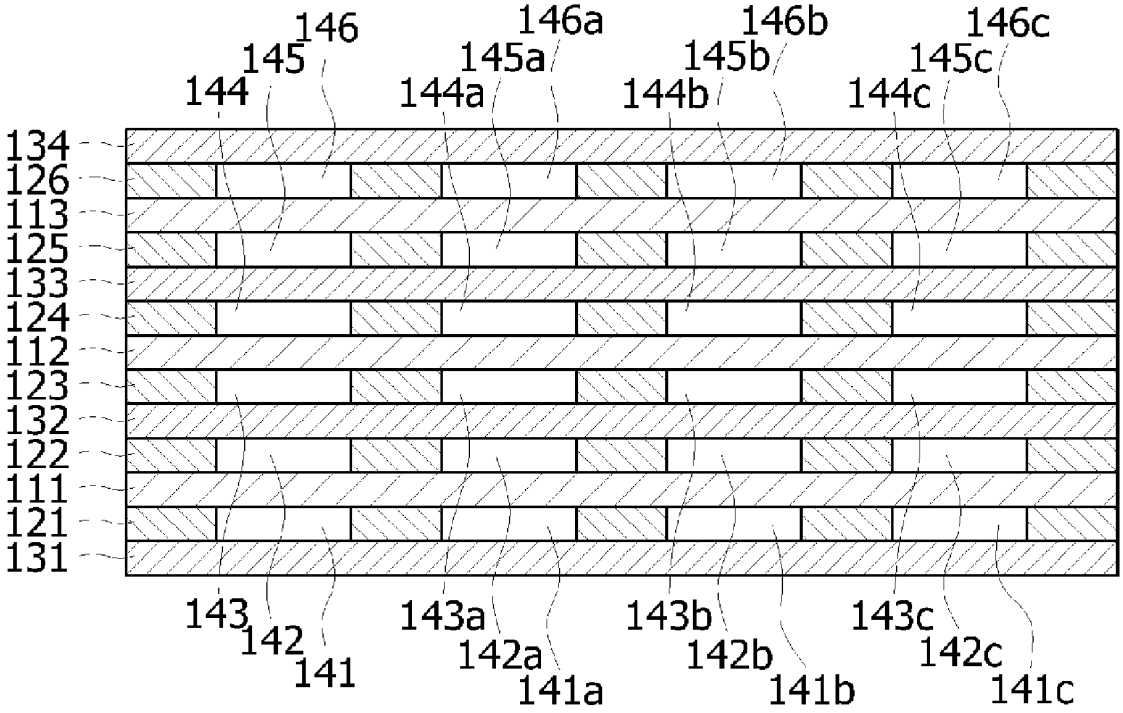
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Fig. 7

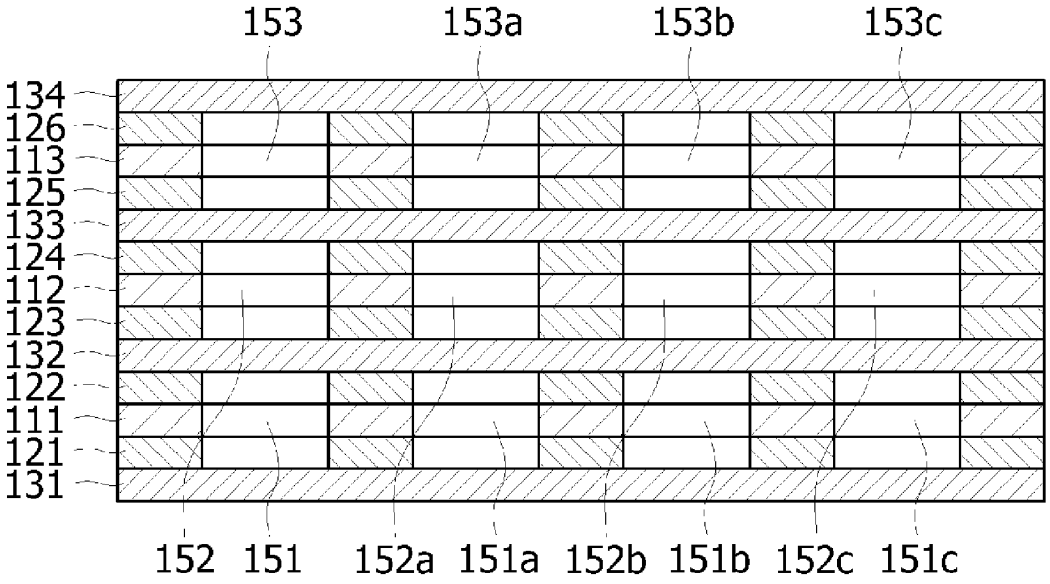
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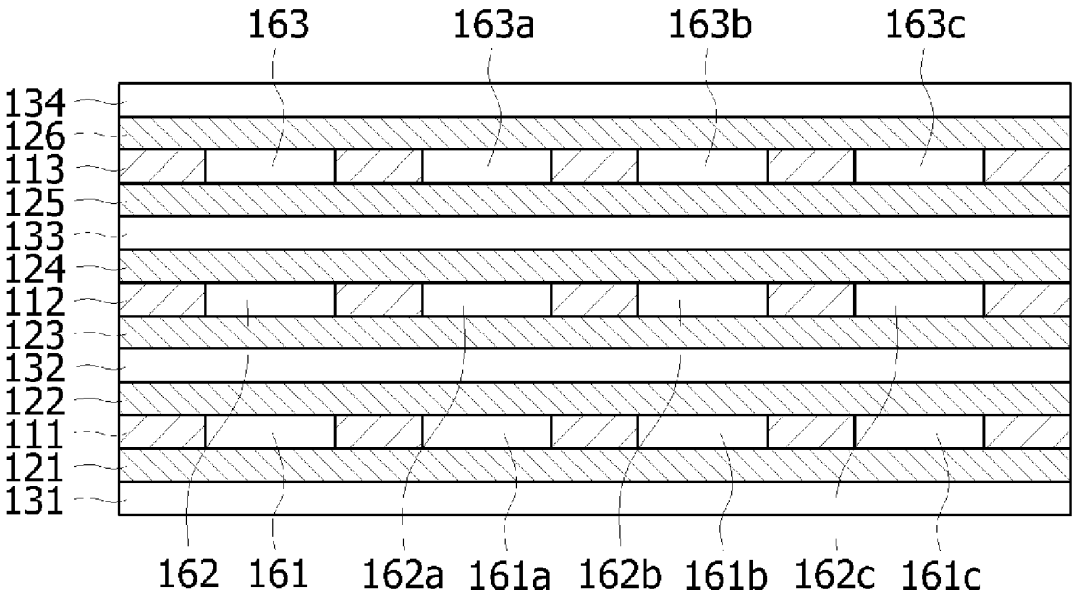
Fig. 8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