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(71) Applicant: **Electrolux Home Products Corporation N.V.**
1130 Brussel (BE)

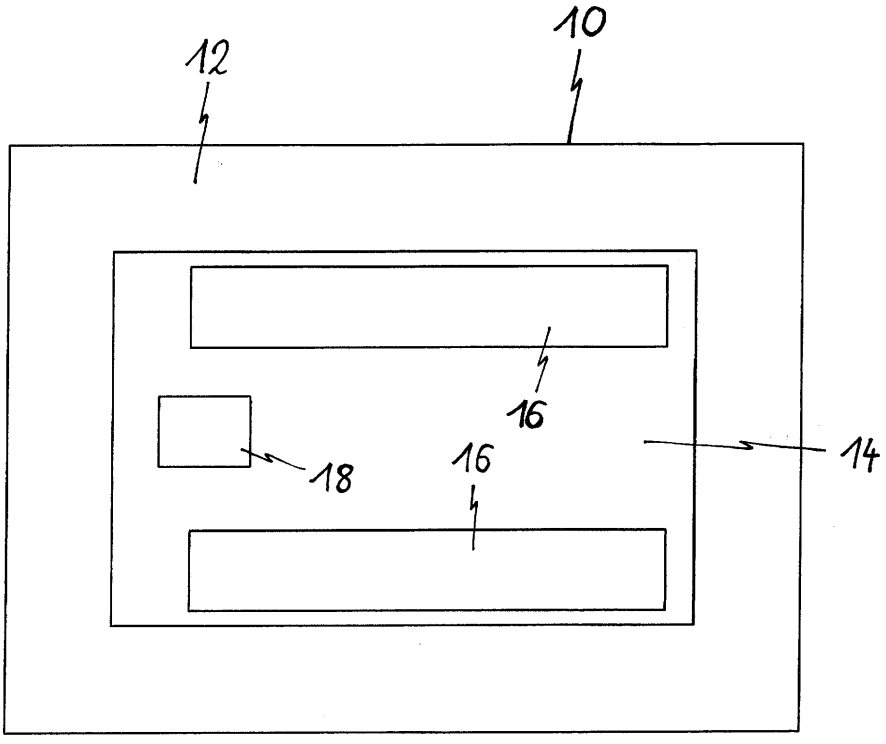
(72) Inventors:
- **Häutle, Ulrich**
  91541 Rothenburg o. d. Tauber (DE)
- **Dehnert, Thomas**
  91541 Rothenburg o. d. Tauber (DE)
- **Brahm, Rainer**
  91541 Rothenburg o. d. Tauber (DE)

(74) Representative: **Baumgartl, Gerhard Willi**
Electrolux Dienstleistungs GmbH
Group Intellectual Property
90327 Nürnberg (DE)

(54) A heating plate including at least one heating element

(57) The present invention relates to a heating plate including at least one heating element (10; 20, 22, 24, 26). The at least one heating element (10; 20, 22, 24, 26) is subdivided into a number of heating zones (12, 14, 16, 18). The heating zones (12, 14, 16, 18) are formed as one or more horizontal heating panels (34). The heating zones (12, 14, 16, 18) are arranged at the same level. The heating zones (12, 14, 16, 18) are provided for different heating powers per area according to a predetermined scheme in order to avoid or reduce hotspots on the heating plate. In particular, the present invention relates to a heating plate for cooking appliances.

FIG 1



EP 2 632 229 A1

Description

[0001] The present invention relates to a heating plate including at least one heating element. In particular, the present invention relates to a heating plate for cooking appliances.

[0002] On a conventional heating plate the distribution of the power on the upper surface is non-uniform. In the central portion of the heating plate the power is higher than in the peripheral portions of said heating plate. In the worst case, hotspots may occur on the heating plate. A uniform temperature distribution is requested.

[0003] It is an object of the present invention to provide a heating plate with an improved distribution of the heat on said heating plate.

[0004] The object of the present invention is achieved by the heating plate according to claim 1.

[0005] The heating plate according to the present invention includes at least one heating element, wherein:

- the at least one heating element is subdivided into a number of heating zones,
- the heating zones are formed as one or more horizontal heating panels,
- the heating zones are arranged at the same level, and
- the heating zones are provided for different heating powers per area according to a predetermined scheme in order to avoid or reduce hotspots on the heating plate.

[0006] The core of the present invention is the subdivision of the heating into heating zones, wherein different heating powers per area are provided. The heating powers per area are adjusted in such a way that hotspots on the heating plate are avoided or reduced.

[0007] In particular, the heating power per area of a heating zone in a border area of a single heating element is higher than or adjustable in excess of the heating power per area of a heating zone in a central portion of said heating element. In the border area of the heating element an extensive horizontal heat transfer occurs, so that the border area is clearly cooled down. The higher heating power per area in the border area compensates this effect.

[0008] Preferably, there is an intermediate space between two neighboured heating elements.

[0009] Further, the heating power per area of a heating zone besides the intermediate space may be adapted in order to avoid or reduce hotspots on the heating plate.

[0010] According to a further embodiment of the present invention at least one smaller heating zone is arranged inside a larger heating zone. The heating power per area in the smaller heating zone can be adapted in order to avoid or reduce hotspots on the heating plate.

[0011] For example, the at least one smaller heating zone is arranged in the central portion of the heating element.

[0012] Further, the heating plate comprises a top panel, wherein the heating panels are arranged below said top panel.

[0013] According to a preferred embodiment of the present invention a graphite layer is arranged between the top panel and the heating panels.

[0014] In order to obtain a sufficient heat transfer the graphite layer is pressed against the top panel.

[0015] In particular, the base area of the graphite layer extends in excess of the base area of the heating panel or heating panels, respectively, in order to allow a heat transfer to such portions of the top panel, which are spaced apart from the heating panel. This contributes to a uniform distribution of the heat on the heating plate.

[0016] For example, the heating plate comprises at least one pressing disc fixed at a bottom side of said heating plate in order to press graphite layer against the top panel.

[0017] At last, the heating plate may be provided for cooking appliances. In particular, the heating plate is provided for grilling purposes.

[0018] Novel and inventive features of the present invention are set forth in the appended claims.

[0019] The present invention will be described in further detail with reference to the drawings, in which

FIG 1 illustrates a schematic top view of a heating plate according to a first embodiment of the present invention,

FIG 2 illustrates a schematic top view of the heating plate according to a second embodiment of the present invention,

FIG 3 illustrates a schematic top view of the heating plate according to a third embodiment of the present invention, and

FIG 4 illustrates a schematic sectional side view of the heating plate according to a fourth embodiment of the present invention.

[0020] FIG 1 illustrates a schematic top view of a heating plate according to a first embodiment of the present invention. The heating plate according to the first embodiment includes one heating element 10. The heating plate and the heating element 10 are rectangular. The heating element 10 is subdivided into a number of heating zones 12, 14, 16 and 18.

[0021] A first heating zone 12 extends over the border area of the heating element 10. Thus, the first heating zone 12 forms a rectangular frame of the heating element 10.

[0022] A second heating zone 14 is arranged in a central portion of the heating element 10. The second heating zone 14 is enclosed by the first heating zone 12.

[0023] Two third heating zones 16 are arranged inside the second heating zone 14. The third heating zones 16

have rectangular forms. The third heating zones 16 are arranged inside a front portion and rear portion, respectively, of the second heating zone 14.

[0024] A number of further heating zones 18 is arranged inside the second heating zone 14. Only one further heating zone 18 is represented in FIG 1. In general, one or more further heating zones 18 may be provided on the heating element 10. The one or more further heating zones 18 are arranged between the two third heating zones 16.

[0025] The heating zones 12, 14, 16 and 18 have different powers per area. The power per area of the first heating zone 12 is relative high in order to compensate the increased thermal flow in the border area of the heating element 10. If the outer border area of the first heating zone 12 is not heated by a heating element from below, then a horizontal thermal flow from the inner area to the outer area is relative high. In this way, hotspots in the inner portion of the heating element 10 are avoided or reduced.

[0026] FIG 2 illustrates a schematic top view of the heating plate according to a second embodiment of the present invention. The heating plate according to the second embodiment includes two heating elements 20 and 22.

[0027] The heating plate and the heating elements 20 and 22 are rectangular. The heating elements 20 and 22 have the same sizes. The heating elements 20 and 22 are arranged side-by-side. An intermediate space is between said heating elements 20 and 22. Each of the heating elements 20 and 22 is subdivided into a number of rectangular heating zones 12, 14 and 18.

[0028] The first heating zone 12 of each heating element 20 and 22 extends over the bigger area of the heating element 20 and 22, respectively. The second heating zone 14 of each heating element 20 and 22, respectively, extends over an area besides the intermediate space between said heating elements 20 and 22. The further heating zones 18 are arranged inside the first heating zone 12. In FIG 2, only one further heating zone 18 is represented in each heating element 10. In general, one or more further heating zones 18 may be provided inside the first heating zone 12 of the heating element 10.

[0029] The heating zones 12, 14 and 18 have different powers per area. The power per area of the second heating zones 14 is adapted in order to avoid or reduce hotspots in those outer portions of the heating elements 20 and 22, which are beside the intermediate space between the heating elements 20 and 22.

[0030] FIG 3 illustrates a schematic top view of the heating plate according to a third embodiment of the present invention. The heating plate according to the third embodiment includes four heating elements 20, 22, 24 and 26.

[0031] The heating plate and the heating elements 20, 22, 24 and 26 are rectangular. The heating elements 20, 22, 24 and 26 have the same sizes. The heating elements 20, 22, 24 and 26 are arranged as a two-by-two matrix. An intermediate space is between the neighboured heating elements 20, 22, 24 and 26. Each of the heating elements 20, 22, 24 and 26 is subdivided into a number of heating zones 12, 14 and 18.

[0032] The first heating zone 12 of each heating element 20, 22, 24 and 26 extends over the bigger area of said heating element 20, 22, 24 and 26, respectively. The second heating zone 14 of each heating element 20, 22, 24 and 26 has an L-shaped area and is arranged besides the intermediate spaces between the neighboured heating elements 20, 22, 24 and 26, in each case. The further heating zones 18 are arranged inside the first heating zone 12. In FIG 3, only one further heating zone 18 is represented in each heating element 10. In general, one or more further heating zones 18 may be provided inside the first heating zone 12 of the heating elements 20, 22, 24 and 26.

[0033] The heating zones 12, 14 and 18 have different powers per area. The power per area of the second heating zones 14 is adapted in order to avoid or reduce hotspots in those outer portions of the heating elements 20, 22, 24 and 26, which are beside the intermediate spaces between the heating elements 20, 22, 24 and 26.

[0034] FIG 4 illustrates a schematic sectional side view of the heating plate according to a fourth embodiment of the present invention. The fourth embodiment can be combined with the other three embodiments of the present invention.

[0035] The heating plate includes a top panel 30, a graphite layer 32, a heating panel 34 and a supporting plate 36. The top panel 30, the graphite layer 32, the heating panel 34 and the supporting plate 36 are arranged one upon the other. A temperature sensor element 40 is provided for detecting the temperature on the top panel 30. The temperature sensor element 40 is pressed against the top panel 30 in order to obtain an exact detection of the temperature without latency or with a reduced latency. The heating panel 34 corresponds with the heating element 10, 20, 22, 24, 26 and/or with the heating zone 12, 14, 16, 18.

[0036] The temperature sensor element 40 is formed as a mushroom. The head of the mushroom-shaped temperature sensor element 40 is pressed against the bottom side of the top panel 30. The shaft of the mushroom-shaped temperature sensor element 40 penetrates through the heating panel 14 and the supporting plate 16. The temperature sensor element 40 is directly pressed by the heating panel 14. The temperature sensor element 40 is indirectly pressed by pressing discs 38 via the supporting plate 16 against the top panel 10. The pressing discs 18 are fastened at the supporting plate 16 by a fastening bolt 42 and a screw nut 44 in each case.

[0037] The area of the graphite layer 32 is bigger than the area of the heating panel 34. Further, the area of the graphite layer 32 is marginally smaller than the area of the top panel 30. The heating panel 34 extends below the top panel 30 only over the central portion of the top panel 30, but into the border areas of the top panel 30.

The graphite layer 32 allows a heat transfer from the central portion to the border areas below the top panel 30. The graphite layer 32 is pressed against the top panel 30 by the pressing discs 38.

[0038] Although illustrative embodiments of the present invention have been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to those precise embodiments, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0039]

10	heating element
12	first heating zone
14	second heating zone
16	third heating zone
18	further heating zone
20	first heating element
22	second heating element
24	third heating element
26	fourth heating element
30	top panel
32	graphite layer
34	heating panel
36	supporting plate
38	pressing disc
40	temperature sensor element
42	fastening bolt
44	screw nut

Claims

1. A heating plate including at least one heating element (10; 20, 22, 24, 26), wherein:
- the at least one heating element (10; 20, 22, 24, 26) is subdivided into a number of heating zones (12, 14, 16, 18),
- the heating zones (12, 14, 16, 18) are formed as one or more horizontal heating panels (34),
- the heating zones (12, 14, 16, 18) are arranged at the same level, and
- the heating zones (12, 14, 16, 18) are provided for different heating powers per area according to a predetermined scheme in order to avoid or reduce hotspots on the heating plate.

2. The heating plate according to claim 1, **characterized in, that** the heating power per area of a heating zone (12) in a border area of a single heating element (10) is higher than or adjustable in excess of the heating power per area of a heating zone (14) in a central portion of said heating element (10).

3. The heating plate according to claim 1 or 2, **characterized in, that** there is an intermediate space between two neighboured heating elements (10; 20, 22, 24, 26).

4. The heating plate according to claim 3, **characterized in, that** the heating power per area of a heating zone (14) besides the intermediate space is adapted in order to avoid or reduce hotspots on the heating plate.

5. The heating plate according to any one of the preceding claims, **characterized in, that** at least one smaller heating zone (16, 18) is arranged inside a larger heating zone (12, 14).

6. The heating plate according to any one of the preceding claims, **characterized in, that** the at least one smaller heating zone (16, 18) is arranged in the central portion of the heating element (10).

7. The heating plate according to any one of the preceding claims, **characterized in, that** the heating plate comprises a top panel (30), wherein the heating panels (34) are arranged below said top panel (30).

8. The heating plate according to claim 7, **characterized in, that** a graphite layer (32) is arranged between the top panel (30) and the heating panels (34).

9. The heating plate according to claim 8, **characterized in, that**

the graphite layer (32) is pressed against the top panel (30).

10. The heating plate according to claim 8 or 9,
characterized in, that
the base area of the graphite layer (32) extends in excess of the base area of the heating panel (34) or heating panels (34), respectively, in order to allow a heat transfer to such portions of the top panel (30), which are spaced apart from the heating panel (34).

11. The heating plate according to any one of the claims 8 to 10,
characterized in, that
the heating plate comprises at least one pressing disc (38) fixed at a bottom side of said heating plate in order to press graphite layer (32) against the top panel (30).

12. The heating plate according to any one of the preceding claims,
characterized in, that
the heating plate is provided for cooking appliances.

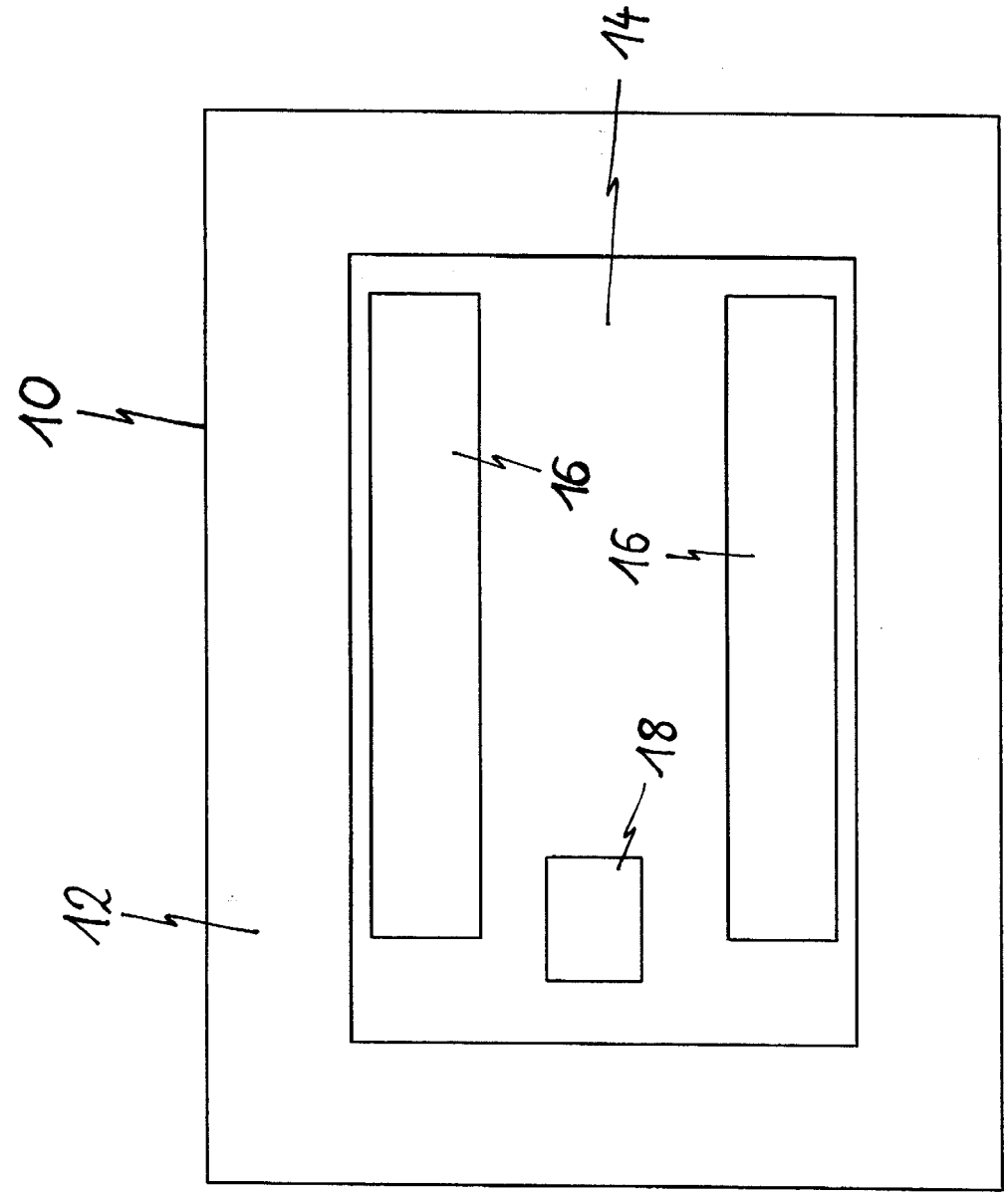


FIG 1

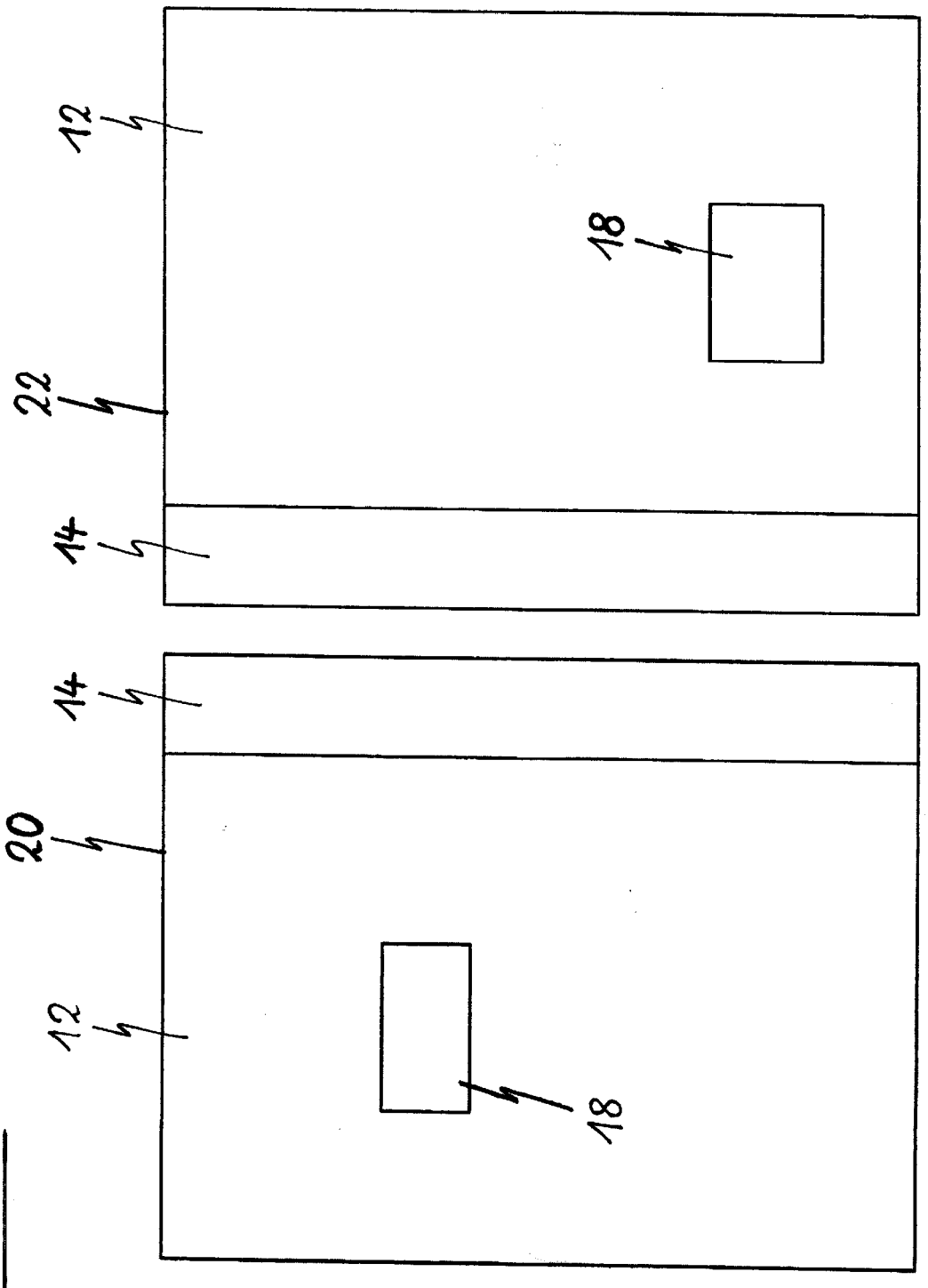


FIG 2

FIG 3

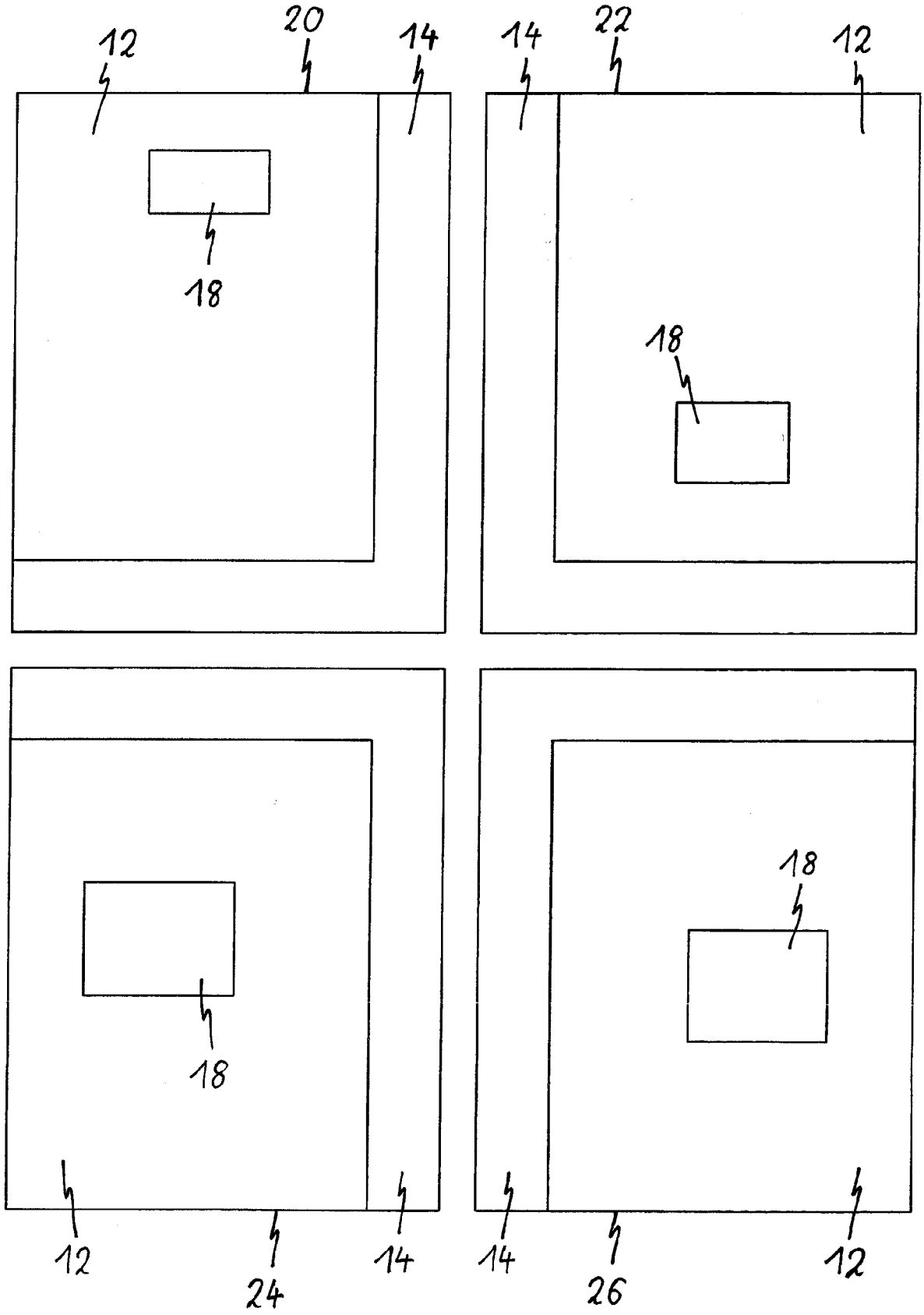
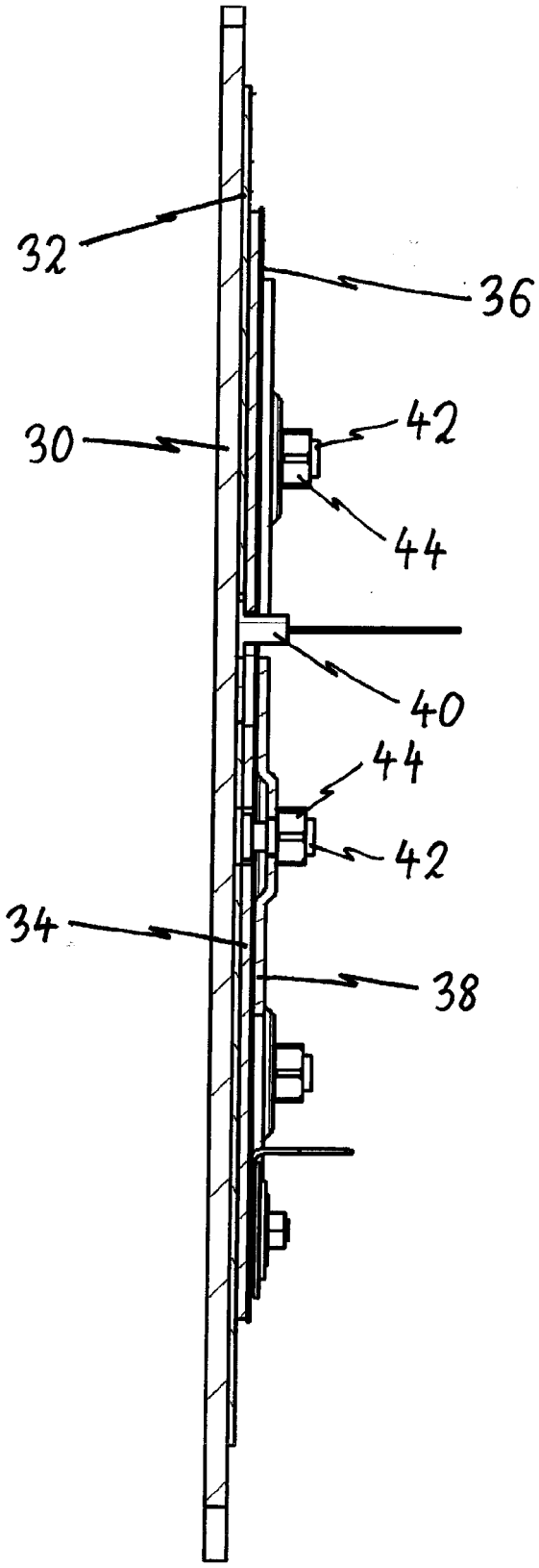


FIG 4



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EUROPEAN SEARCH REPORT

Application Number
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H05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 July 2012	Gea Haupt, Martin

CATEGORY OF CITED DOCUMENTS

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