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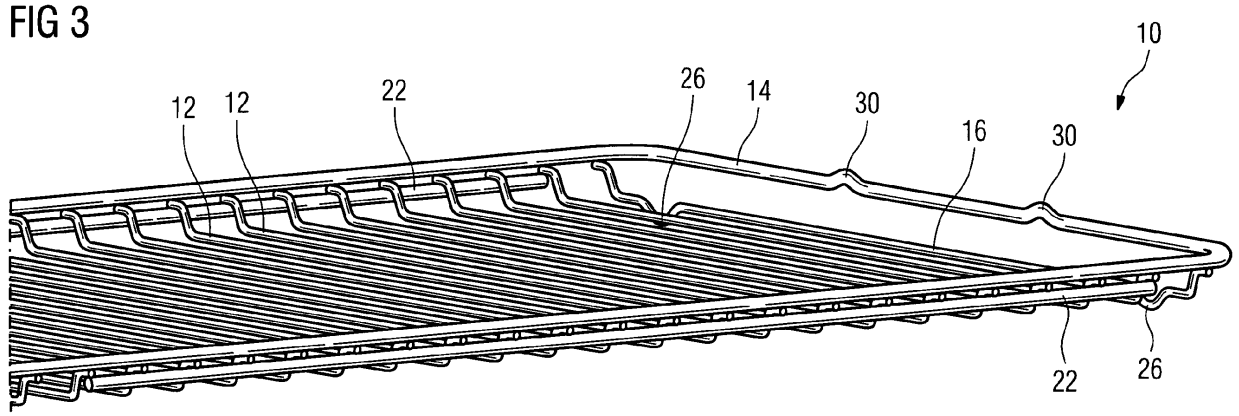
(54) A shelf for a cooking oven

(57) The present invention relates to a shelf for a cooking oven, in particular for a domestic cooking oven, with at least one oven cavity. The shelf (10) is extricable from the oven cavity and comprises a plurality of parallel bars (12) extending along the direction of the extraction. The bar (12) comprises a straight central portion and two S-shaped end portions. The straight central portions are arranged at a first level of the shelf (10) and extend within one plane. The shelf (10) comprises a frame (14) enclosing said shelf (10) and arranged at a second level of the shelf (10). The end portions of the bars (10) are attached at the front and rear portions, respectively, of the frame (14). The shelf (10) comprises at least one strengthening (22; 28; 34) extending along a front side (18) of the shelf (10).

FIG 3



EP 2 362 151 A1

Description

[0001] The present invention relates to a shelf for a cooking oven, in particular for a domestic cooking oven, with at least one oven cavity. Further, the present invention relates to a cooking oven, in particular a domestic cooking oven, with at least one shelf.

[0002] The shelf for a cooking oven requires a sufficient stability and stiffness. When the shelf is withdrawn from an oven cavity, said shelf may not tilt more than a maximum angle. In particular, there is IEC-Standard 60-2-6 Ed 5.2, which limits said maximum angle. When the shelf is loaded by a weigh of 80 N, then in the withdrawn state the maximum tilt angle is limited to 6°. This requires a sufficient stability and stiffness.

[0003] US 2009/0071464 A1 discloses a shelf for cooking ovens. The shelf is withdrawable from an oven cavity. The shelf comprises a rectangular frame and a plurality of parallel bars. The bars extend parallel to the motion direction of the shelf. An additional front crossbar is arranged at the front side of the shelf and spaced from a cross member of the frame. Most of the bars extend between the cross members of the frame. Some strengthening bars extend between a rear cross members of the frame and the additional front crossbar.

[0004] JP 2-282624 A discloses a shelf withdrawable from the oven cavity. The shelf comprises a rectangular frame and a plurality of parallel bars extending parallel to the motion direction of the shelf. Two strengthening crossbars are arranged perpendicular to the bars and within the frame.

[0005] DE 1 767 199 U discloses a shelf withdrawable from the oven cavity. The shelf comprises a frame and a plurality of parallel bars extending parallel to the motion direction of the shelf. The side edges of the frame are arranged at a lower level and the crossbars of the frame are arranged at a higher level. The outer bars are thicker than the other bars.

[0006] It is an object of the present invention to provide a shelf for a cooking oven, which satisfy the above requirements, where the raw materials and supplies are not too complex.

[0007] The object of the present invention is achieved by the shelf for a cooking oven according to claim 1.

[0008] According to the present invention the shelf for a cooking oven, in particular for a domestic cooking oven, includes at least one oven cavity, wherein:

- the shelf is extricable from an oven cavity and comprises a plurality of parallel bars extending along the direction of the extraction,
- the bar comprises a straight central portion and two S-shaped end portions,
- the straight central portions are arranged at a first level of the shelf and extend within one plane,
- the shelf comprises a frame enclosing said shelf and arranged at a second level of the shelf,
- the end portions of the bars are attached at the front and rear portions, respectively, of the frame, and
- the shelf comprises at least one strengthening (or: enforcement, strengthening or enforcing part) extending along a front side of the shelf.

[0009] The core of the present invention is the at least one strengthening extending along the front side of the shelf in combination with the structure of the bars and the frame. The strengthening along the front side allows a sufficient stability and stiffness by low complexity.

[0010] According to a preferred embodiment of the present invention the shelf comprises a further strengthening extending along a rear side of the shelf. The strengthening along the rear side allows an additional stiffness by low complexity.

[0011] In particular, the first level is a lower level of the shelf and the second level is a higher level of the shelf. Thus, the frame extends at the higher level and the central portions of the bars are at the lower level.

[0012] Preferably, the frame is rectangular and comprises curved corners. Thus, the shelf may be provided without sharp edges.

[0013] Further, the shelf may comprise at each side at least one outer bar arranged between the plurality of bars and the corresponding side portions of the frame. The outer bar may be attached at lower sides of the curved corners of the frame.

[0014] Additionally, the outer bar may comprise at least one downward-facing portion acting as a stopper. The downward-facing portion prevents a falling out or down of the shelf.

[0015] According to a first embodiment of the present invention the strengthening is formed by an additional bar attached at lower sides of at least a part of the end portions of the bars.

[0016] According to a second embodiment of the present invention the additional bar at the front side of the shelf may comprise a handle formed in a central portion of said additional bar. According to third and fourth embodiments of the present invention the strengthening is formed by a portion of the frame, wherein said portion comprises a vertically oval cross section.

[0017] According to the third embodiment of the present invention the frame is made of a wire with an oval cross section, so that the front portion of the frame comprise the vertically oval cross section, the side portions of the frame comprise horizontally oval cross sections and the rear portion of the frame comprises a vertically or horizontally oval cross section.

[0018] According to the fourth embodiment of the present invention the frame is made of a wire with a round cross section, wherein the front portion of the frame comprises a vertically squeezed cross section. Optionally, the rear portion of the frame comprises the vertically squeezed cross section.

[0019] In order to obtain a safe attachment the bars, the outer bars, the at least one additional bar and/or the frame are connected by a weld joint.

[0020] The present invention relates further to a cooking oven, in particular a domestic cooking oven, with at least one shelf as described above.

[0021] Novel and inventive features of the present invention are set forth in the appended claims.

[0022] 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 shelf for a cooking oven according to a first embodiment of the present invention,

FIG 2 illustrates a schematic front view of the shelf for the cooking oven according to the first embodiment of the present invention,

FIG 3 illustrates a schematic perspective view of a part of the shelf for the cooking oven according to the first embodiment of the present invention,

FIG 4 illustrates a schematic detailed side view of a part of the shelf for the cooking oven according to the first embodiment of the present invention,

FIG 5 illustrates a schematic top view of the shelf for the cooking oven according to a second embodiment of the present invention,

FIG 6 illustrates a schematic perspective view of the shelf for the cooking oven according to the second embodiment of the present invention,

FIG 7 illustrates a schematic front view of the shelf for the cooking oven according to the second embodiment of the present invention,

FIG 8 illustrates a schematic detailed side view of a part of the shelf for the cooking oven according to the second embodiment of the present invention,

FIG 9 illustrates a schematic top view of the shelf for the cooking oven according to a third embodiment of the present invention,

FIG 10 illustrates a schematic perspective view of the shelf for the cooking oven according to the third embodiment of the present invention,

FIG 11 illustrates a schematic front view of the shelf for the cooking oven according to the third embodiment of the present invention,

FIG 12 illustrates a schematic side view of the shelf for the cooking oven according to the third embodiment of the present invention,

FIG 13 illustrates a schematic detailed partially perspective view of the shelf for the cooking oven according to the third embodiment of the present invention,

FIG 14 illustrates a schematic top view of the shelf for the cooking oven according to a fourth embodiment of the present invention,

FIG 15 illustrates a schematic perspective view of the shelf for the cooking oven according to the fourth embodiment of the present invention,

FIG 16 illustrates a schematic detailed side view of a part of the shelf for the cooking oven according to the fourth embodiment of the present invention,

FIG 17 illustrates a schematic detailed front view of a part of the shelf for the cooking oven according to the fourth embodiment of the present invention, and

FIG 18 illustrates a schematic detailed top view of a corner of the shelf for the cooking oven according to the fourth embodiment of the present invention.

FIG 1 illustrates a schematic top view of a shelf 10 for a cooking oven according to a first embodiment of the present invention. The shelf 10 comprises a plurality of parallel bars 12 and a frame 14.

[0023] The frame 14 is rectangular and includes four curved corners. The bars 12 are arranged within the frame 14. The end portions of the bars 12 are fastened at the lower sides of the front portion 18 and rear portion 20 of the frame 14. In this example, the end portions of the bars 12 are welded at the lower sides of the two opposite parts of the frame 14. The bars 12 are equally spaced from each other. Two outer bars 16 are arranged beside and parallel to the side portions of the frame 14.

[0024] FIG 2 illustrates a schematic front view of the shelf 10 for the cooking oven according to the first embodiment of the present invention. FIG 2 clarifies that the frame 14 is arranged at a higher level. Central portions of the bars 12 and the outer bars 16 are arranged at a lower level. The both end portions of each bar 12 and each outer bar 16 are S-shaped and form the connection between the higher and lower levels.

[0025] Two additional bars 22 are arranged at the front portion and rear portion, respectively, of the shelf 10. The additional bars 22 are attached at the S-shaped end portions of the bars 12. In particular, the additional bars 22 are welded at the S-shaped end portions of the bars 12.

[0026] In this example, at the front portion as well as at the rear portion of the shelf 10 one additional bar 22 is arranged in each case. Alternatively, only the front portion of the shelf 10 comprises the additional bar 22.

[0027] FIG 3 illustrates a schematic perspective view of a part of the shelf 10 for the cooking oven according to the first embodiment of the present invention. FIG 3 clarifies the arrangement of the two additional bars 22 at

the S-shaped end portions of the bars 12. The additional bars 22 are attached at the lower sides of the bars 12, i.e. in concave parts of the S-shaped end portions.

[0028] The outer bars 16 include two downward-facing portions 26 in each case. The side portions of the frame 14 include two upward-facing portions 30 in each case. The downward-facing portions 26 and upward-facing portions 30 may act as stoppers in order to limit the motion of the shelf 10.

[0029] FIG 4 illustrates a schematic detailed side view of a part of the shelf 10 for the cooking oven according to the first embodiment of the present invention. The detailed side view relates to the front portion of the shelf 10. Further, said detailed side view may also relate to the rear portion of the shelf 10, if the additional bars 22 are attached at the front as well as at the rear portion of the shelf 10.

[0030] FIG 4 clarifies the geometric relationships of the frame 14, the bars 12, the outer bars 16 and the additional bar 22. In this example the frame 14 and the additional bar 22 have greater thicknesses than the bars 12 and outer bars 16. The ends of the bars 12 are between the additional bar 22 and the front portion of the frame 14.

[0031] FIG 5 illustrates a schematic top view of the shelf 10 for the cooking oven according to a second embodiment of the present invention. The bars 12, the frame 14 and the outer bars 16 of the second embodiment have the same structure as in the first embodiment.

[0032] The shelf 10 of the second embodiment comprises one additional bar 22 at its front portion. The additional bar 22 includes a handle 24 in its central portion. The handle 24 is provided for gripping the shelf 10. The handle 24 is formed as a curved central portion of the additional bar 22.

[0033] FIG 6 illustrates a schematic perspective view of the shelf 10 for the cooking oven according to the second embodiment of the present invention. FIG 6 clarifies the geometric structure of the additional bar 22 with the integrated handle 24. The additional bar 22 with the handle 24 allows an increased stiffness of the shelf 10 on the one hand and provides a gripping element on the other hand.

[0034] In this example, the additional bar 22 with the handle 24 is arranged only at the front portion of the shelf 10. Alternatively, a second additional bar 22 without handle 24 may be arranged at the rear portion of the shelf 10.

[0035] FIG 7 illustrates a schematic front view of the shelf 10 for the cooking oven according to the second embodiment of the present invention. FIG 7 shows that the handle 24 extends also downwards from the additional bar 22.

[0036] FIG 8 illustrates a schematic detailed side view of a part of the shelf 10 for the cooking oven according to the second embodiment of the present invention. FIG 8 clarifies that the handle 24 is forward-turned as well as downward-turned from the additional bar 22.

[0037] FIG 9 illustrates a schematic top view of the shelf 10 for the cooking oven according to a third embodiment of the present invention. The bars 12 and the outer bars 16 of the third embodiment have the same structure as in the first and second embodiments.

[0038] Instead of the additional bar 22 or additional bars 22, respectively, the shelf 10 according to the third embodiment comprises a frame 14 with oval cross sections 28 and 32. The frame 14 is made of a wire with said oval cross sections 28 and 32. At the front and rear portions the frame 14 comprises vertically oval cross sections 28. At the side portions the frame 14 comprises horizontally oval cross sections 32. Thus, the wire with the oval cross section comprises torsions in the corners of the frame 14, wherein the angles of torsions are about 90°. The vertically oval cross sections 28 at the front and rear portions of the frame 14 allow an increased stiffness of the shelf 10.

[0039] FIG 10 illustrates a schematic perspective view of the shelf 10 for the cooking oven according to the third embodiment of the present invention. FIG 10 clarifies the arrangement of the vertically oval cross sections 28 at the front and rear portions of the frame 14 and the horizontally oval cross sections 32 at the side portions of the frame 14.

[0040] FIG 11 illustrates a schematic front view of the shelf 10 for the cooking oven according to the third embodiment of the present invention. In FIG 11 the relationship of the major and minor axes of the oval cross sections 28 and 32 are clarified. In this example the major axes is twice as much as the minor axes of the oval cross sections 28 and 32. In general, other relationship of the major and minor axes of the oval cross sections 28 and 32 are possible according to the present invention.

[0041] FIG 12 illustrates a schematic side view of the shelf 10 for the cooking oven according to the third embodiment of the present invention. FIG 12 also shows the relationship of the major and minor axes of the oval cross sections 28 and 32.

[0042] FIG 13 illustrates a schematic detailed partially perspective view of the shelf 10 for the cooking oven according to the third embodiment of the present invention. One corner of the shelf 10 is shown laterally from the bottom. The portion of a corner with the vertically oval cross section 28 and the neighbouring horizontally oval cross section 32 is shown.

[0043] FIG 14 illustrates a schematic top view of the shelf 10 for the cooking oven according to a fourth embodiment of the present invention. The bars 12 and the outer bars 16 of the fourth embodiment have the same structure as in the former embodiments. The frame 14 is made of a wire having a round cross section. At the front side 18 of the shelf 10 the frame 14 comprises a vertically squeezed portion 34. Said vertically squeezed portion 34 allows an increased stiffness of the shelf 10.

[0044] FIG 15 illustrates a schematic perspective view of the shelf 10 for the cooking oven according to the fourth embodiment of the present invention. FIG 15 clarifies the structure of the shelf 10 with the vertically squeezed portion 34. In this example only the front side 18 of the shelf

10 comprises the vertically squeezed portion 34. Alternatively, the front side 18 as well as the rear side 20 of the shelf 10 may comprise the vertically squeezed portion 34 in each case.

[0045] FIG 16 illustrates a schematic detailed side view of a part of the shelf 10 for the cooking oven according to the fourth embodiment of the present invention. The vertically squeezed portion 34 of the frame 14 comprises an oval cross section.

[0046] FIG 17 illustrates a schematic detailed front view of a part of the shelf 10 for the cooking oven according to the fourth embodiment of the present invention. The vertical diameter of the squeezed portion 34 is one and half time thicker than the vertical diameter of the other portions of the frame 14.

[0047] FIG 18 illustrates a schematic detailed top view of a corner of the shelf 10 for the cooking oven according to the fourth embodiment of the present invention. The horizontal diameter of the squeezed portion 34 has about the half thickness of the horizontal diameter of the other portions of the frame 14.

[0048] Although illustrative embodiments of the present invention has been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to that 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.

[0049] List of reference numerals

10	shelf
12	bar
14	frame
16	outer bar
18	front side of the shelf
20	rear side of the shelf
22	additional bar
24	handle
26	downward-facing portion
28	vertically oval cross section
30	upward-facing portion
32	horizontally oval cross section
34	vertically squeezed portion

Claims

1. A shelf for a cooking oven, in particular for a domestic cooking oven, with at least one oven cavity, wherein:

- the shelf (10) is extricable from an oven cavity and comprises a plurality of parallel bars (12) extending along the direction of the extraction,
- the bar (12) comprises a straight central portion and two S-shaped end portions,
- the straight central portions are arranged at a first level of the shelf (10) and extend within one plane,
- the shelf (10) comprises a frame (14) enclosing said shelf (10) and arranged at a second level of the shelf (10),
- the end portions of the bars (10) are attached at the front and rear portions, respectively, of the frame (14), and
- the shelf (10) comprises at least one strengthening (22; 28; 34) extending along a front side (18) of the shelf (10).

2. The shelf according to claim 1, **characterized in, that** the shelf (10) comprises a further strengthening (22; 28; 34) extending along a rear side (20) of the shelf (10).

3. The shelf according to claim 1 or 2, **characterized in, that** the first level is a lower level of the shelf (10) and the second level is a higher level of the shelf (10).

4. The shelf according to any one of the preceding claims, **characterized in, that** the frame (14) is rectangular and comprises curved corners.

5. The shelf according to any one of the preceding claims, **characterized in, that** the shelf (10) comprises at each side at least one outer bar (16) arranged between the plurality of bars (10) and the corresponding side portions of the frame (14).

6. The shelf according to claim 4 and 5, **characterized in, that** the outer bar (16) is attached at lower sides of the curved corners of the frame (14).

7. The shelf according to claim 5 or 6, **characterized in, that** the outer bar (16) comprises at least one downward-facing portion (26) acting as a stopper.

8. The shelf according to any one of the preceding claims, **characterized in, that**

the strengthening (22) is formed by an additional bar (22) attached at lower sides of at least a part of the end portions of the bars (10).

9. The shelf according to claim 8, **characterized in, that** the additional bar (22) at the front side (18) of the shelf (10) comprises a handle (24) formed in a central portion of said additional bar (22).

10. The shelf according to any one of the preceding claims, **characterized in, that** the strengthening (28; 34) is formed by a portion of the frame (14), wherein said portion comprises a vertically oval cross section (28; 34).

11. The shelf according to claim 10, **characterized in, that** the frame (14) is made of a wire with an oval cross section, so that the front portion of the frame (14) comprise the vertically oval cross section (28), the side portions of the frame (14) comprise horizontally oval cross sections (32) and the rear portion of the frame (14) comprises a vertically (28) or horizontally (32) oval cross section.

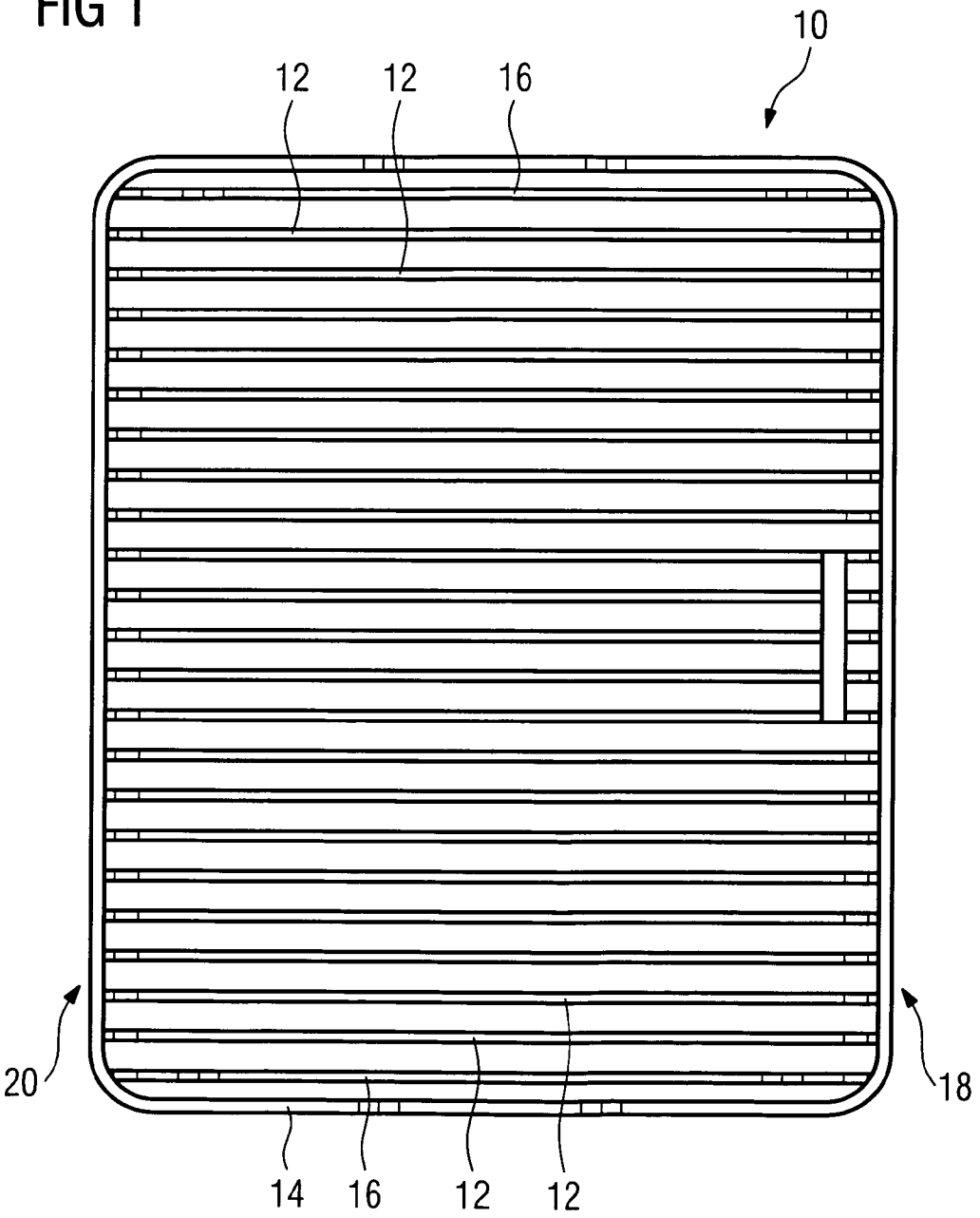
12. The shelf according to claim 10, **characterized in, that** the frame (14) is made of a wire with a round cross section, wherein the front portion of the frame (14) comprises a vertically squeezed cross section (34).

13. The shelf according to claim 12, **characterized in, that** the rear portion of the frame (14) comprises the vertically squeezed cross section (34).

14. The shelf according to any one of the preceding claims, **characterized in, that** the bars (12), the outer bars (16), the at least one additional bar (22) and/or the frame (14) are connected by a weld joint.

15. A cooking oven, in particular a domestic cooking oven, with at least one shelf, **characterized in, that** the cooking oven comprises at least one shelf (10) according to any one of the claims 1 to 14.

FIG 1



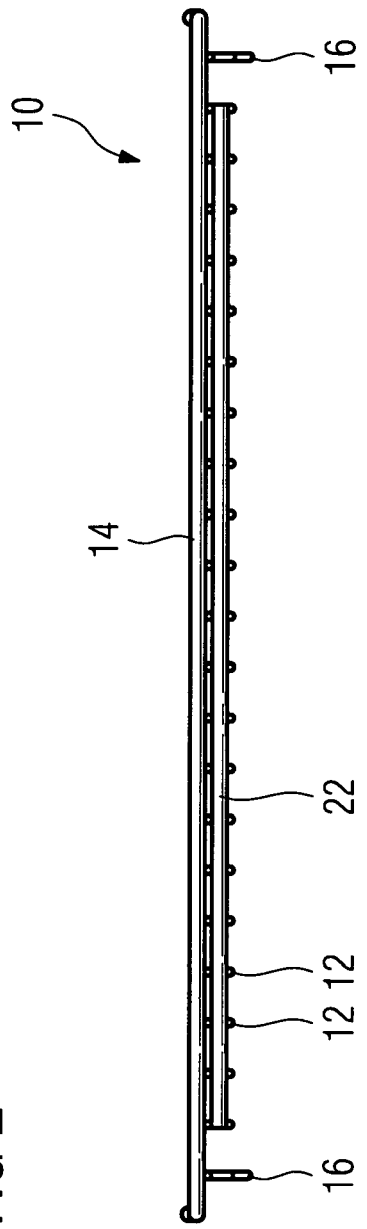


FIG 2

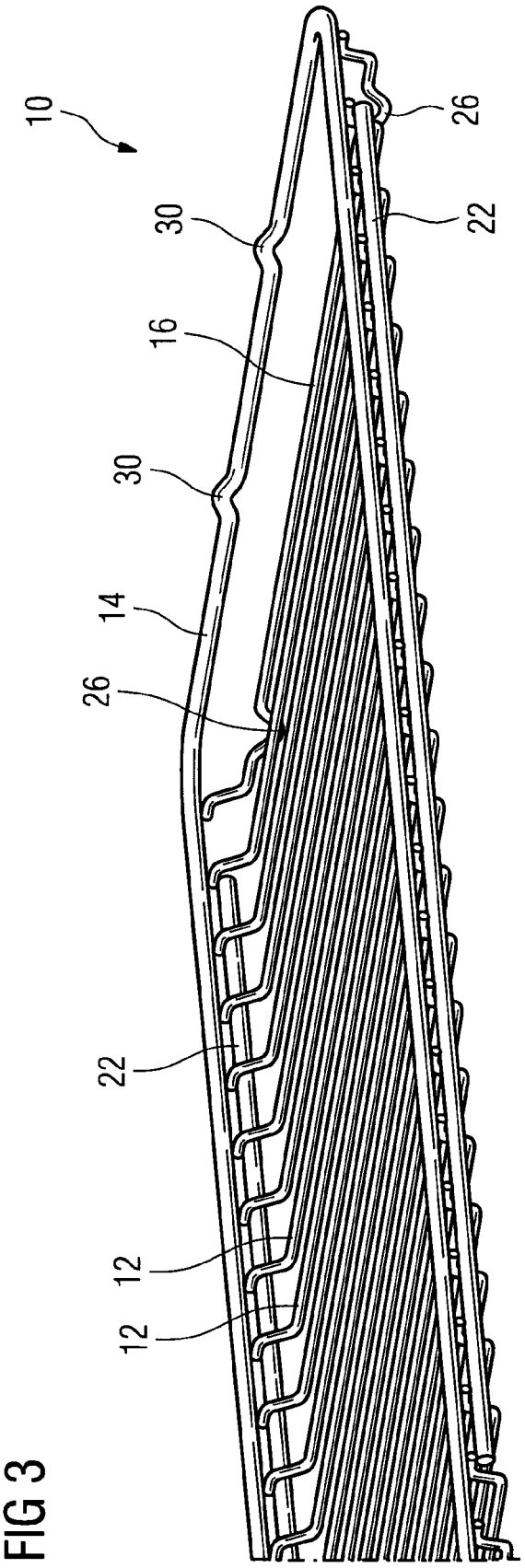


FIG 3

FIG 4

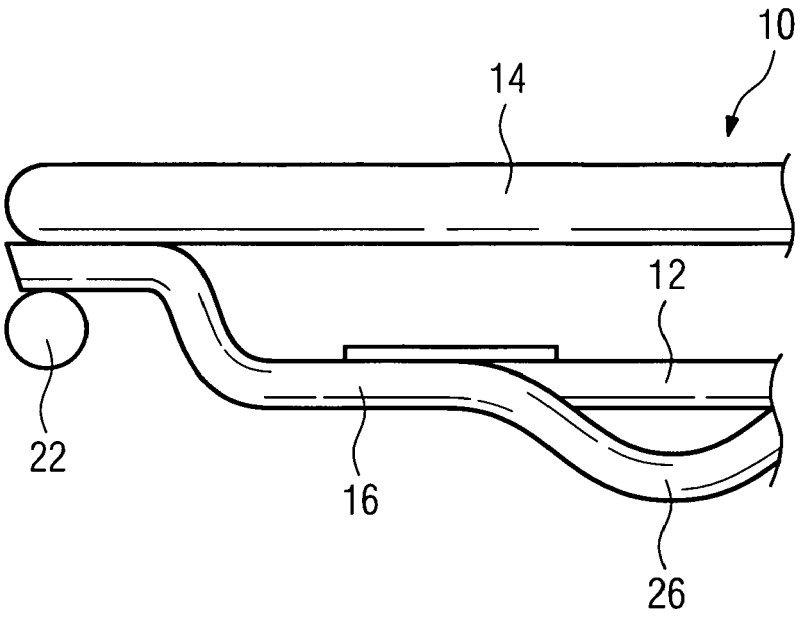
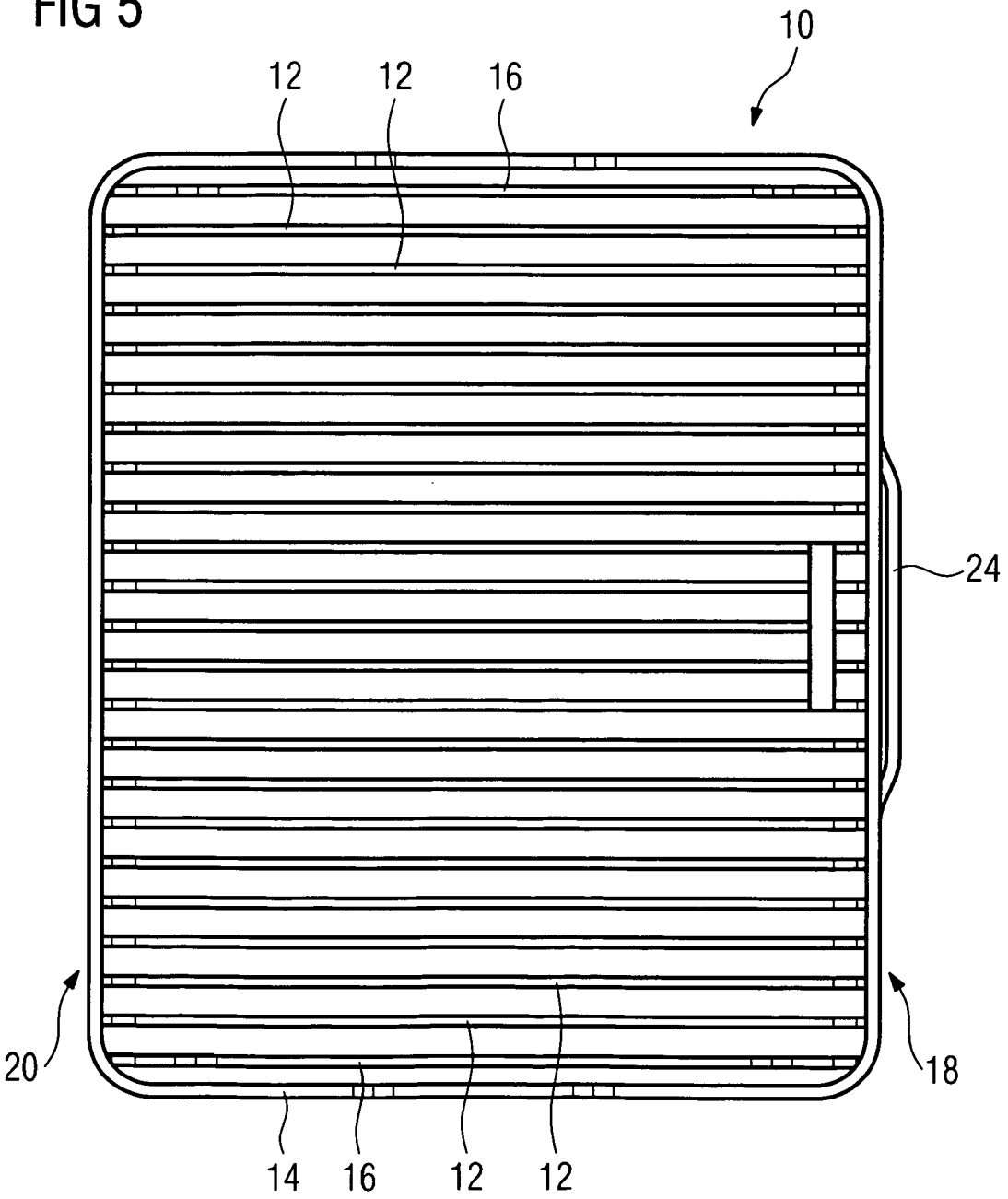


FIG 5



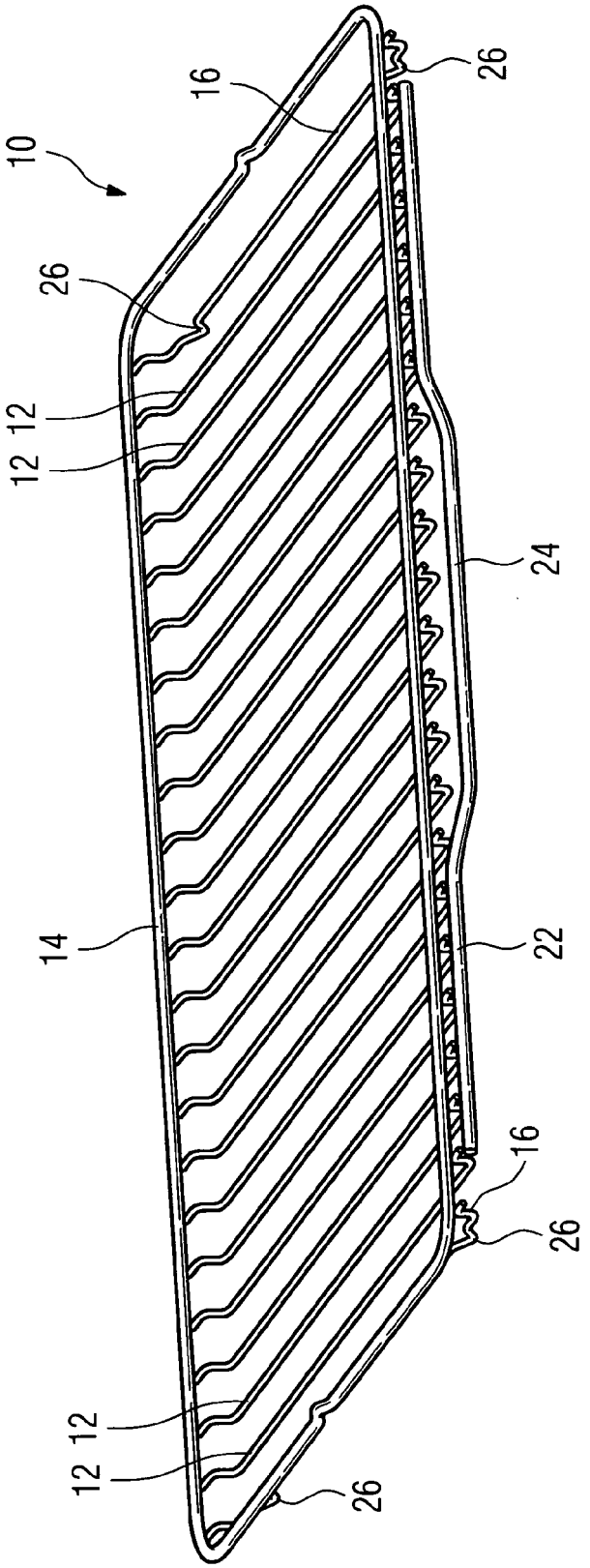


FIG 6

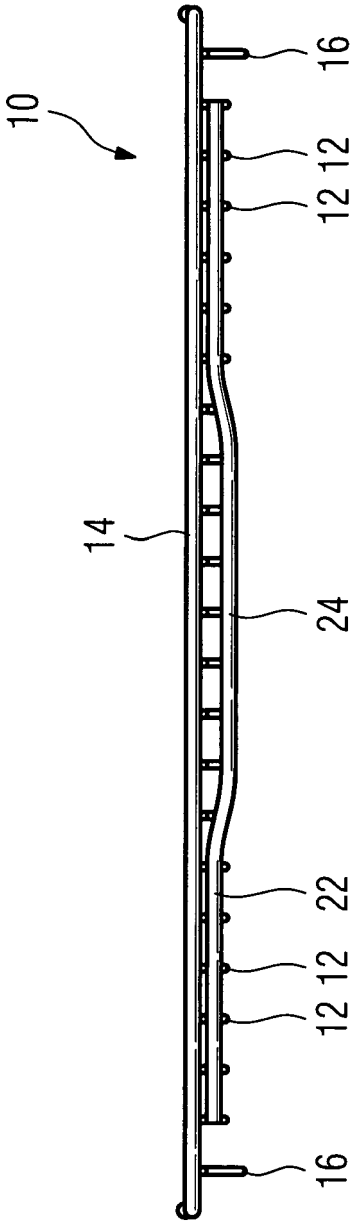
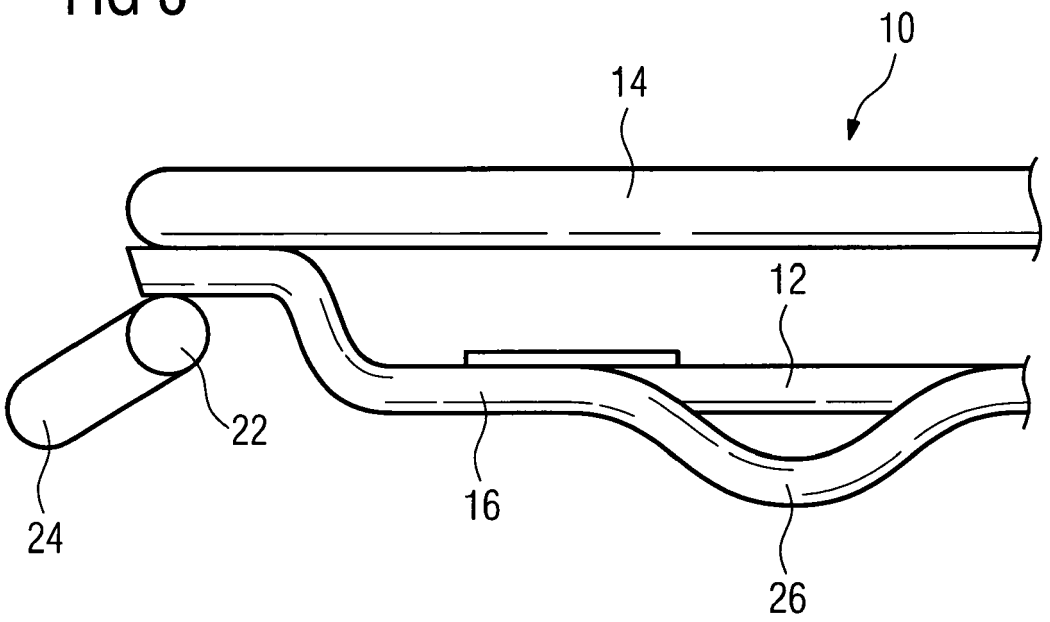


FIG 7

FIG 8



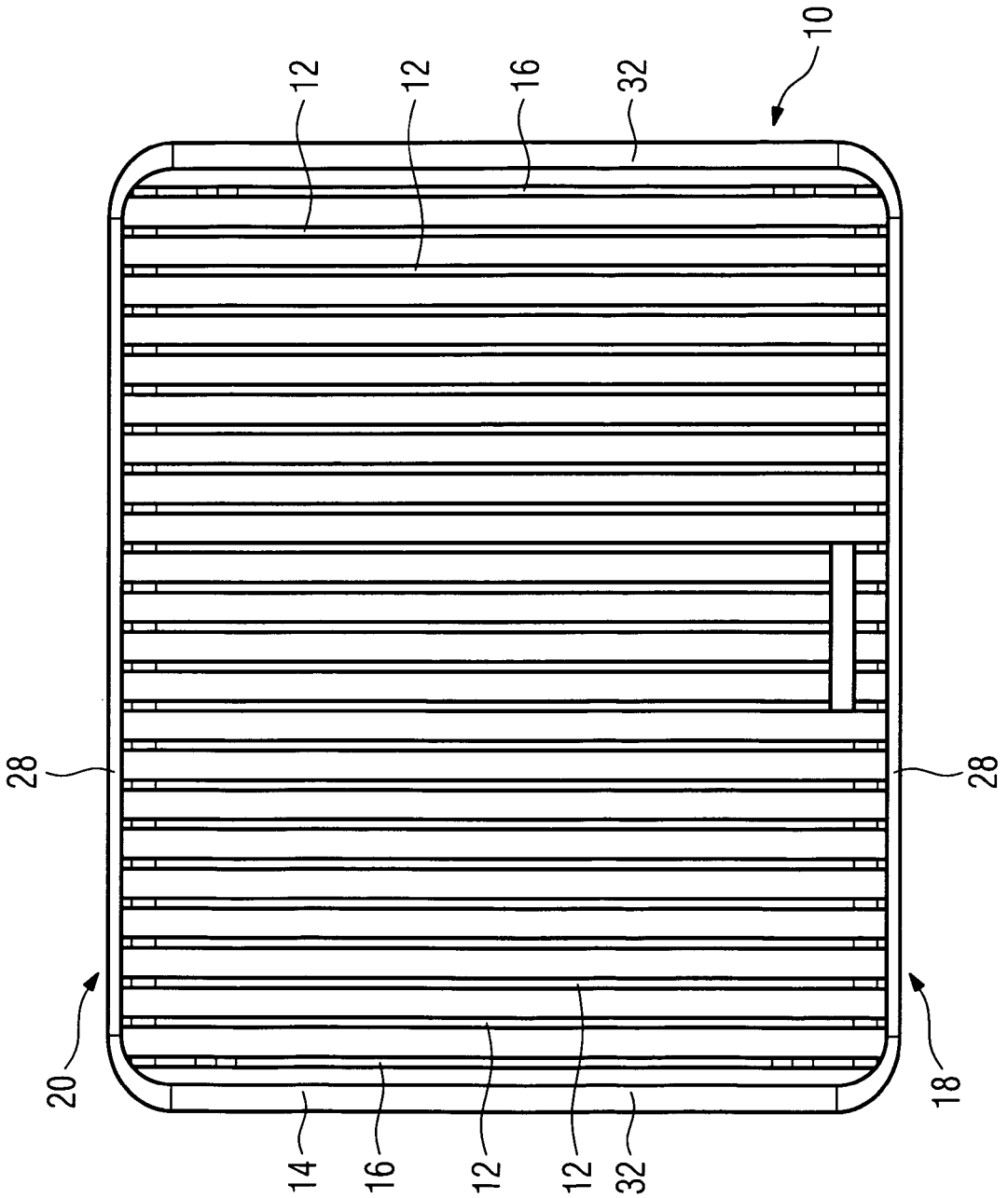


FIG 9

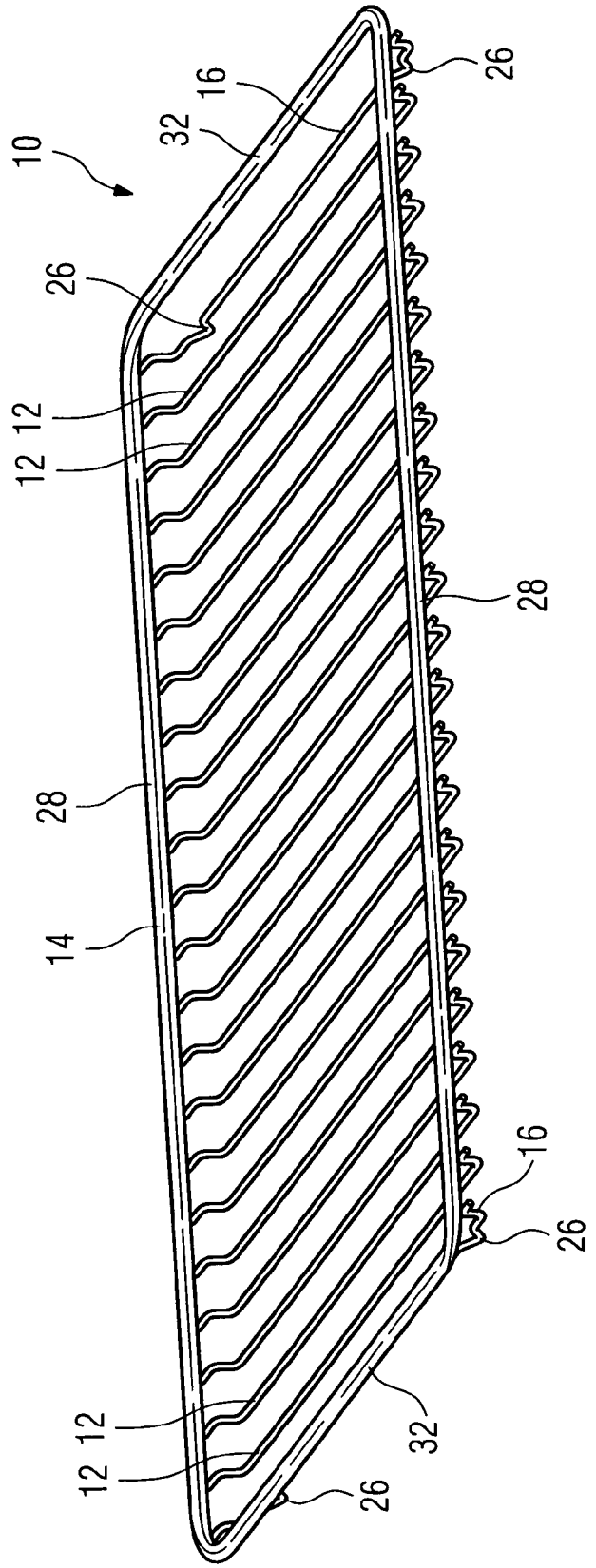


FIG 10

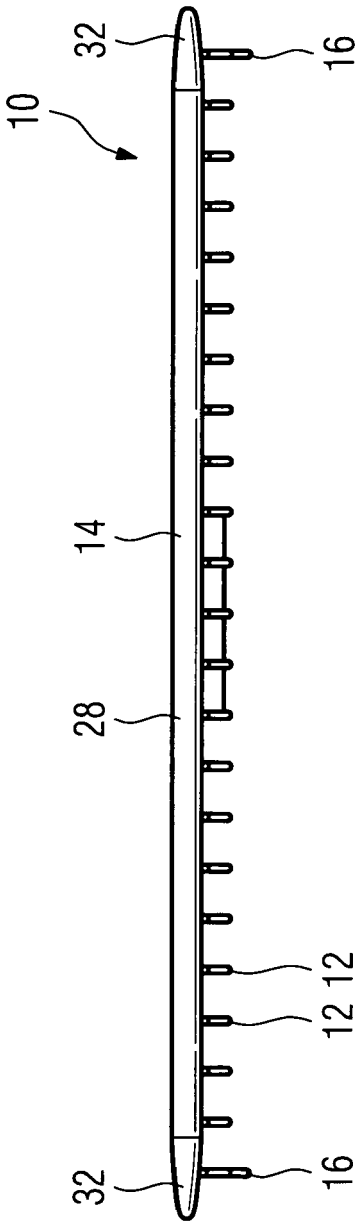


FIG 11

FIG 12

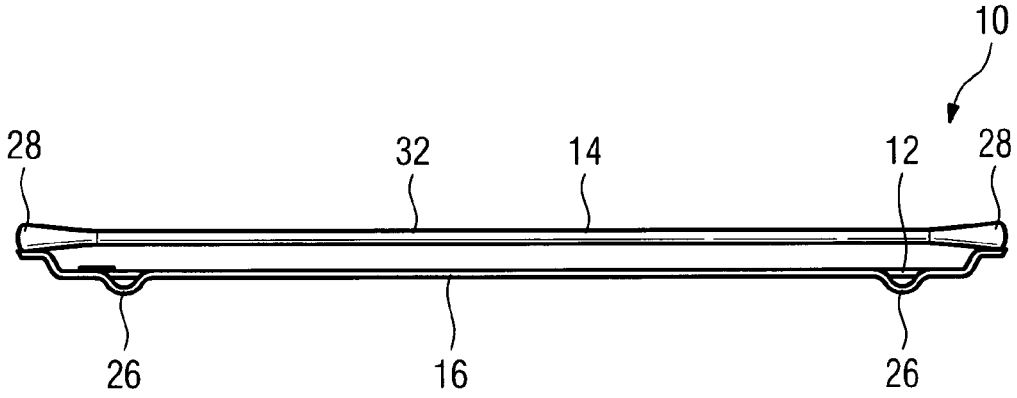


FIG 13

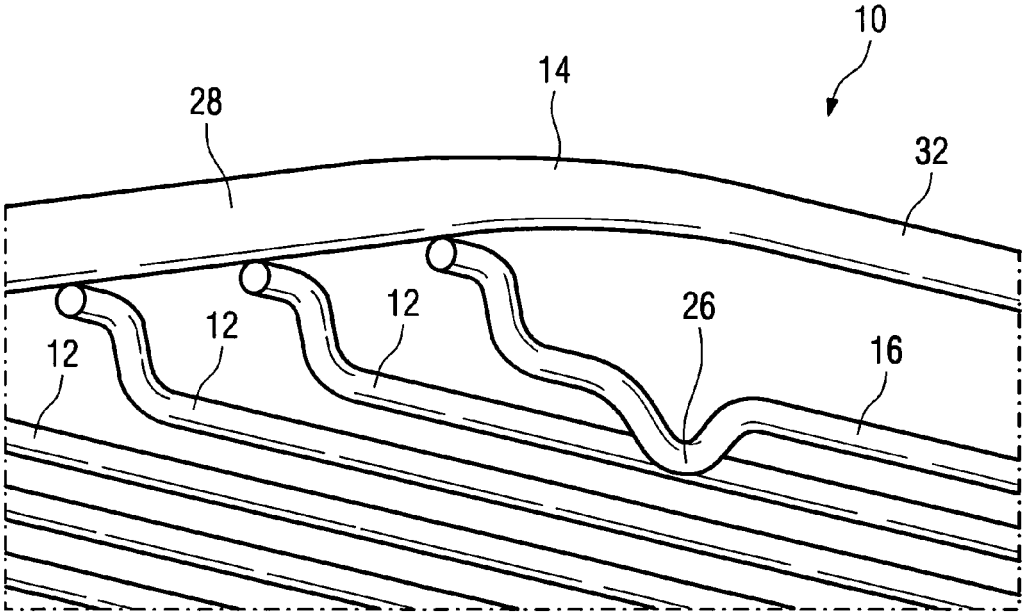


FIG 14

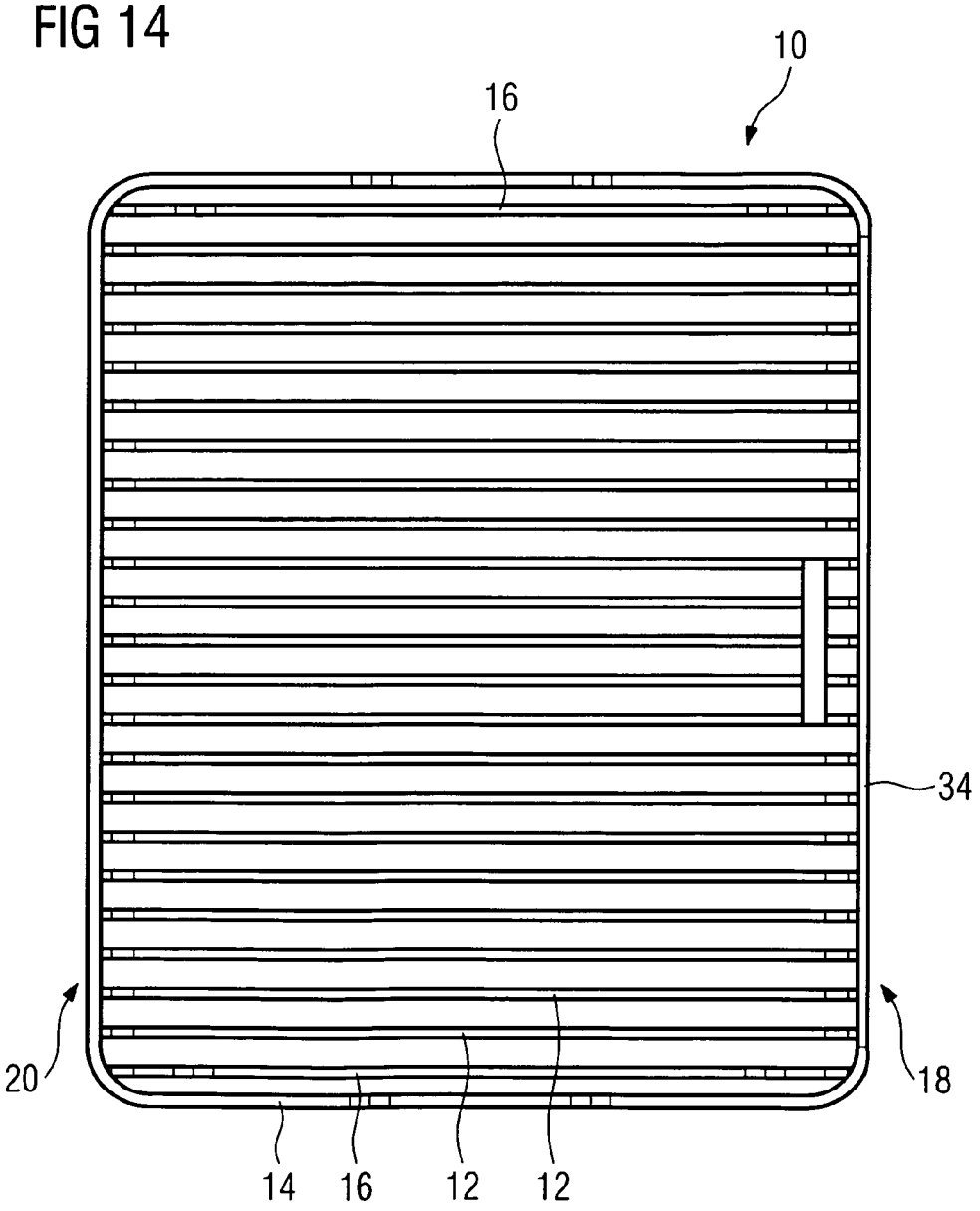


FIG 15

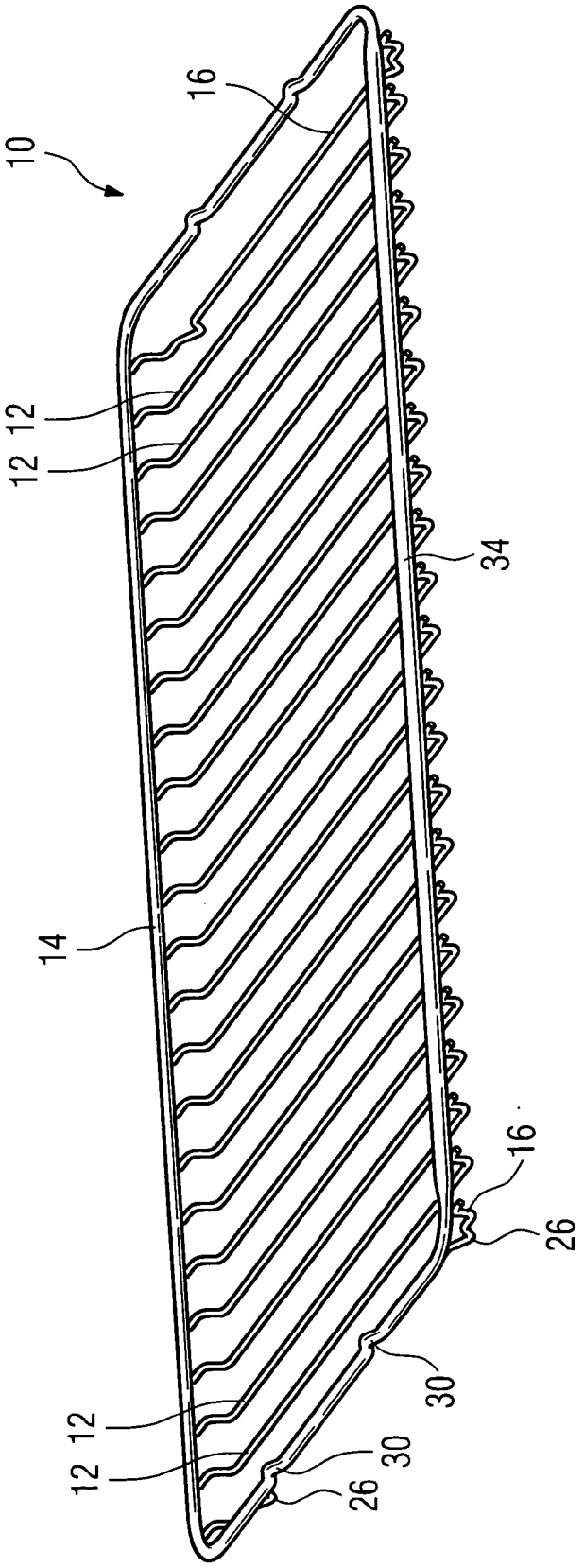


FIG 16

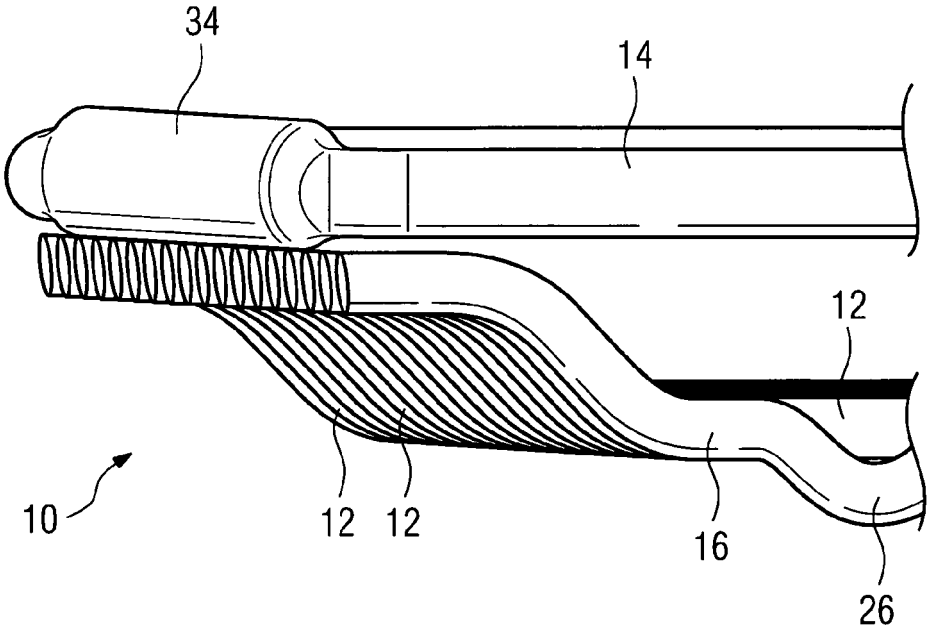


FIG 17

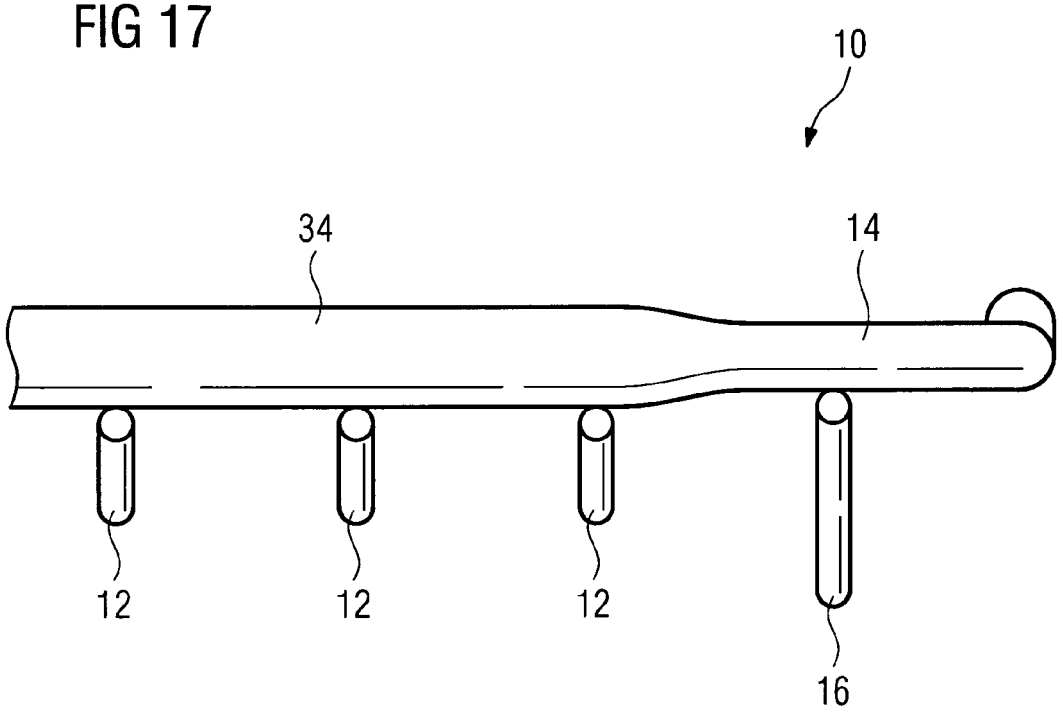
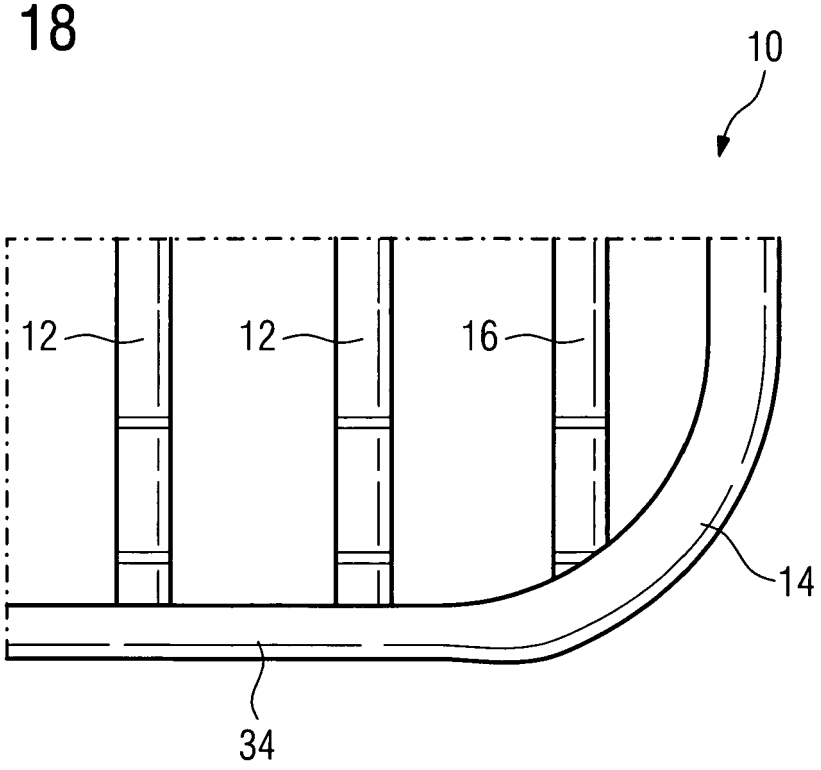


FIG 18



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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 1744

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	EP 1 892 477 A2 (ELECTROLUX HOME PRODUCTS INC A [US]) 27 February 2008 (2008-02-27) * paragraphs [0020] - [0022], [0037]; figures 1,8 *	1-6, 10-15 7-9	INV. F24C15/16
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