(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 757 322 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
F24C 15/16 *(2006.01)*

(21) Application number: **14151410.9**

(22) Date of filing: **16.01.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **18.01.2013 EP 13151767**

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

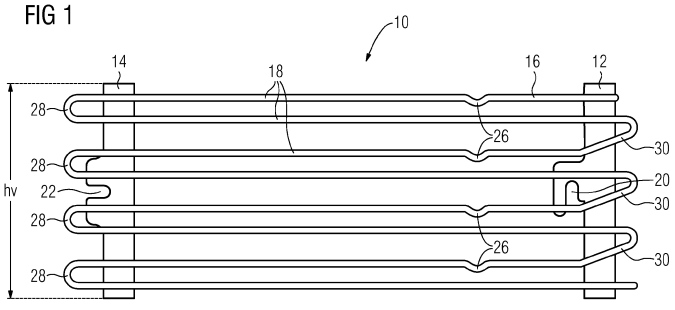
(72) Inventors:
- **Lehmann, Gerhard**
  91541 Rothenburg ob der Tauber (DE)
- **Schütz, Tobias**
  91541 Rothenburg ob der Tauber (DE)
- **Meissner, Heiko**
  91541 Rothenburg ob der Tauber (DE)
- **Militzer-Keil, Marian**
  07907 Schleiz (DE)
- **Wittmann, Michael**
  91541 Rothenburg ob der Tauber (DE)
- **Schröter, Daniel**
  36137 Großenlüder (DE)

(74) Representative: **Röder, Richard**
Electrolux Dienstleistungs GmbH
Group Patents
90327 Nürnberg (DE)

(54) A side grid system for an oven cavity

(57) The present invention relates to a side grid system adapted for use in an oven cavity of a microwave oven, wherein said side grid system is provided for supporting one or more slidable foodstuff carriers. The side grid system comprises a pair of side grid elements (10) and at least four holding elements (32, 34). Each side grid element (10) is attachable by at least two holding elements (32, 34) at one of two opposing metal side walls (36) of the oven cavity. The holding elements (32, 34) are permanently or removably fixable at the metal side walls (36) of the oven cavity. Each side grid element (10) includes a front metal plate (12) and a rear metal plate (14) that extends essentially along the vertical height (hv) of the side grid element (10). The side grid element (10) includes a plurality of horizontal elongated rod sections (18) interconnecting the front metal plate (12) and the rear metal plate (14). The horizontal elongated rod sections (18) of each side grid element (10) are arranged one upon the other within said side grid element (10). The front metal plate (12) is engageable with at least one front holding element (32) by an essentially vertical movement along a plane defined by the first metal plate (12). The rear metal plate (14) is engageable with at least one rear holding element (34) by an essentially, horizontal movement along a plane defined by the rear metal plate (14). At least one of the front metal plate (12) and the rear metal plate (14) is adapted for being stably held by respectively a single front holding element (32) or a single rear holding element (34) at a sparkle-safe distance from the metal cavity side wall (36) at which electrical sparkle formation during microwave operation of the oven is avoided.

FIG 1



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Description

[0001] The present invention relates to a side grid system adapted for use in an oven cavity of a microwave oven or of an oven with a microwave heating function according to the preamble of claim 1. Further, the present invention relates to a microwave oven or an oven with a microwave heating function, wherein said oven comprises a side grid system.

[0002] Side grids are used to hold one or more foodstuff carriers, e.g. baking trays or wire shelves, in an oven cavity. The side grids are fixed at a side wall of the oven cavity. The side grids are removable for cleaning the oven cavity. Usually, the side grids are fixed by screwing or clipping. Typical side grids have several levels for inserting the foodstuff carrier, so that the position of the foodstuff carrier may be adapted to the kind of cooking process. The side grids are usually suspended on holders. Further, distance pieces are provided in order to obtain a predetermined distance between the side grid and side wall of the oven cavity.

[0003] It is an object of the present invention to provide a side grid system for an oven cavity of a cooking or baking oven, also suitable for an oven cavity of a microwave oven or of an oven with a microwave heating function, wherein the side grid is attachable at the side wall of the oven cavity in a suitable position by low complexity.

[0004] According to the present invention, at least one of the front metal plate and the rear metal plate is adapted for being stably held by respectively a single front holding element or a single rear holding element that comprises an electrically insulating material at a sparkle-safe distance from the metal cavity side wall at which electrical sparkle formation during microwave operation of the oven is avoided.

[0005] According to an important aspect the present invention provides the side grid element with the front metal plate, the rear metal plate and the horizontal elongated rod sections interconnecting said front metal plate and rear metal plate on the one hand, and the holding elements at the metal side wall of the oven cavity in the sparkly-safe distance on the other hand, wherein the front and rear metal plate are engageable by the movement along a plane defined respectively by said front or rear metal plate. The side grid element can be easily removed from the side wall of the oven cavity. The side grid element and holding element are realized by low complexity. The distance of the front metal plate and the rear metal plate from the metal side wall defined by the front holding element or rear holding element, respectively that comprises an electrically isolating material, avoids electrical sparkle formation during microwave operation. The front metal plate and the rear metal plate have a stiffness that ensures a sufficient gap between said metal plates and the metal side wall of the oven cavity along the entire length of said metal plates, so that the generation of sparks is avoided, even if the side grids carry the allowed maximum weight and number of food trays.

[0006] Thus, the invention provides an economical solution to fasten a side grid in a stable way at a safe distance from a metal side wall of a microwave oven or oven with microwave heating function. It can be used also in ovens with enamel-coated metal side walls, since it has been observed that an enamel coating cannot itself prevent sparkle formation during microwave operation. With an important cost advantage, the present invention allows to limit the number of isolating material-comprising holding elements to two per side grid for stable arrangement of a side grid at a safe distance from the metal side wall even when the side grids are fully loaded with baking trays carrying food. In that way considerable material costs can be saved, because holding elements that comprise an electrically insulating material, such as e.g. Teflon or a suitable ceramic material, are expensive. Also, a Teflon material or ceramic material-containing holding element often requires a comparably expensive colour coating, if the holding element shall be matched in colour to the enamel of the oven cavity for esthetical reasons.

[0007] Preferably, at least one of the front metal plate and the rear metal plate has a stiffness, in particular provided by at least one of its width, thickness or material composition, that is adapted for said metal plate being held respectively by said single front holding element or by said single rear holding element at said safe distance from the metal cavity side wall.

[0008] Moreover, at least one of, preferably each of the front metal plate and the rear metal plate each may comprise a single recess, cut-out or key hole that is adapted for the bearing interaction with the respective single front and rear holding element.

[0009] Furthermore, said single front or rear holding element may comprise at least one of a ceramic material or a Teflon material. Preferably, it is dimensioned to define said sparkle-safe distance between the metal plate and the metal side wall of the oven cavity. In this case, a complete electrically decoupling of the side grid and the side wall of the cavity is achieved.

[0010] In particular, at least one of said single front or rear holding element may comprise a holding plate and a holding bolt, wherein the holding plate is dimensioned to define the sparkle-safe distance between the metal plate and the metal side wall of the oven cavity, and wherein the holding bolt is engageable with the recess, cut-out or key hole of the corresponding front or rear metal plate. The holding plate is arranged or arrangeable between the metal plate and the side wall of the oven cavity.

[0011] In this case, the holding bolt is provided for penetrating a hole in the holding plate and for intruding into a hole in the metal side wall of the oven cavity.

[0012] For example, the holding plate and the holding bolt can each be made of at least one electrically insulating material, wherein the holding plate is preferably made of Teflon and the holding bolt is preferably made of ceramic.

[0013] Alternatively, the holding plate can be made of

an electrically insulating material and the holding bolt is made of a metal and that the holding bolt is engageable to a fixation means, such as for example a threaded nut, for fixing the holding bolt by bearing against the outer face of the metal cavity side wall and wherein the fixation means is adapted for suitably abutting against the outer face of the metal cavity side wall to form a substantially effective wave trap against microwaves that migrate along the holding bolt.

[0014] According to a preferred embodiment of the present invention the rear metal plate includes at least one horizontal recess, wherein an open side of said horizontal recess is directed rearwards, so that the rear metal plate is engaged or engageable with the at least one rear holding element by a rearward movement of the side grid element, and/or the front metal plate may include at least one vertical recess, wherein an open side of said vertical recess is directed downwards, so that the front metal plate is engaged or engageable with the at least one front holding element by a downward movement of the side grid element.

[0015] In particular, the front metal plate may include at least one cut-out, preferably formed as a key hole, wherein a lower area of said cut-out is bigger than an upper area of said cut-out, so that the front metal plate is engaged or engageable with the at least one front holding element by a downward movement of the side grid element.

[0016] Preferably, the side grid element is attachable by engaging the rear metal plate with the at least one rear holding element at first and then by engaging the front metal plate with the at least one front holding element .

[0017] For example, two or more horizontal elongated rod sections are formed as a single-piece part, in particular wherein the plurality of horizontal elongated rod sections of one side grid element is formed by at least one serpentine rod, wherein the serpentine rod is formed as a single-piece part. This allows an easy production of the side grid element.

[0018] For example, the horizontal elongated rod sections of the serpentine rod are arranged pairwise on top of each other, wherein two neighboured horizontal elongated rod sections form a guide rail for the foodstuff carrier, preferably wherein a pull-out stop for the foodstuff carrier may be formed as a buckling in an upper horizontal elongated rod section of the guide rail, and/or wherein an end-stop for the foodstuff carrier is formed by a curvature between two horizontal elongated rod sections of one guide rail in the rear end of said horizontal elongated rod sections. The pull-out stop prevents a too far moving out of the food stuff carrier.

[0019] Additionally, a further chamfer may be formed in a front portion of the lower horizontal elongated rod section of the guide rail, so that the distance between the horizontal elongated rod sections of one guide rail is increased at the front end of said guide rail. Thus, a funnel shaped opening is formed between the chambers for an easy receiving of the foodstuff carrier.

[0020] Further, the present invention relates to a microwave oven or an oven with a microwave heating function, wherein the oven comprises a side grid system mentioned 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 accompanied drawings, in which

FIG 1 illustrates a side view of a side grid element of the side grid system according to a first embodiment of the present invention,

FIG 2 illustrates a side view of a side grid element arranged at a side wall of an oven cavity according to the first embodiment of the present invention,

FIG 3 illustrates a front view of the side grid element arranged at the side wall of the oven cavity according to the first embodiment of the present invention,

FIG 4 illustrates a perspective view at an inner side of the side grid element of the side grid system according to a second embodiment of the present invention,

FIG 5 illustrates a perspective view at the inner side of the side grid element of the side grid system according to a third embodiment of the present invention,

FIG 6 illustrates a side view of the side grid element of the side grid system according to the third embodiment of the present invention,

FIG 7 illustrates a side view of the side grid element arranged at the side wall of the oven cavity according to the third embodiment of the present invention,

FIG 8 illustrates a front view of the side grid element arranged at the side wall of the oven cavity according to the third embodiment of the present invention,

FIG 9 illustrates a perspective view at an outer side of the side grid element and holding devices of the side grid system according to the third embodiment of the present invention,

FIG 10 illustrates a perspective view of a holding device for the side grid element of the side grid system according to the third embodiment of the present invention,

FIG 11 illustrates a perspective exploded view of the holding device for the side grid element of the side grid system according to the third embodiment of the present invention, and

FIG 12 illustrates a front view of the side grid element arranged at the side wall of the oven cavity according to a fourth embodiment of the present invention.

[0023] FIG 1 illustrates a side view of a side grid element 10 of the side grid system according to a first embodiment of the present invention. The side grid system comprises two side grid elements provided for metal side walls 36 of an oven cavity of a cooking or baking oven. The side grid system is also suitable for a microwave oven or an oven with a microwave heating function. Preferably, the two side grid elements are symmetric. In this example, the side grid element is formed as a single-piece part.

[0024] The side grid element 10 includes a front metal plate 12, a rear metal plate 14 and serpentine rod 16. The front metal plate 12 and the rear metal plate 14 are provided for fastening the side grid element 10 at the metal side wall 36 of the oven cavity, wherein outer sides of the front metal plate 12 and rear metal plate 14 turn towards the metal side wall 36 of the oven cavity. The serpentine rod 16 is attached at inner sides of the front metal plate 12 and rear metal plate 14. The serpentine rod 16 interconnects the front metal plate 12 and rear metal plate 14. The serpentine rod 16 includes a number of horizontal elongated rod sections 18. Said horizontal rod sections 18 are arranged one upon the other. In this example, the serpentine rod 16 is made of a single-piece wire. The front metal plate 12 and the rear metal plate 14 are elongated and extend substantially vertically. In this example, the vertical heights hv of the front metal plate 12 and the rear metal plate 14 corresponds with the height of the side grid element 10.

[0025] The front metal plate 12 includes a vertical recess 20, wherein an open side of said vertical recess 20 is directed downwards. In a similar way, the rear metal plate 14 includes a horizontal recess 22, wherein an open side of said horizontal recess 22 is directed rearwards. The vertical recess 20 and the horizontal recess 22 are provided for being engaged with corresponding holding elements 32 and 34 that comprise an electrically insulting material.

[0026] The horizontal rod sections 18 of the serpentine rod 16 are arranged pairwise, i.e. two neighboured horizontal rod sections 18 form a guide rail for a foodstuff carrier, e.g. a baking tray or wire shelf in each case. In this example, the distances between the rod sections 18 of one guide rail are smaller than the distances between the rod sections 18 of two neighboured guide rails. The upper rod sections 18 of each guide rail comprise a pull-out stop 26 in each case. The pull-out stop 26 is arranged in a front portion of said upper rod sections 18. The pull-out stops 26 are realized by bucklings extending downward. The pull-out stops 26 prevent a completely extraction of the foodstuff carrier.

[0027] Each curvature between the upper and lower rod sections 18 of one guide rail at the rear end of the side grid element 10 forms an end-stop 28. Said end-stop 28 is provided for stopping the rearward movement of the foodstuff carrier inside the oven cavity.

[0028] Further, the side grid element 10 includes three chamfers 30. The chamfers 30 are formed in the front portions of the upper rod sections 18 of the three lower guide rails. The chamfers 30 allow an easy inserting of the foodstuff carrier into the guide rails.

[0029] FIG 2 illustrates a side view of a side grid element 10 arranged at the metal side wall 36 of the oven cavity according to the first embodiment of the present invention. The side grid element 10 is fastened at the metal side wall 36 of the oven cavity by two holding elements 32 and 34. In this example, the side grid element 10 is fastened at the metal side wall 36 of the oven cavity by a front holding element 32 and a rear holding element 34.

[0030] The holding elements 32 and 34 are permanently or removably fixed at the metal side wall 36 of the oven cavity. Each holding element 32 and 34 comprises a circumferential groove. The circumferential grooves of the holding elements 32 and 34 extend in parallel to the plane of the metal side wall 36 of the oven cavity. The front holding element 32 is partially complementary to the vertical recess 20 of the front metal plate 12. In a similar way, the rear holding element 34 is complementary to the horizontal recesses 22 of the rear metal plate 14. The rear metal plate 14 is fixable at the rear holding element 34 by a horizontal and rearward movement of the side grid element 10. In a similar way, the front metal plate 12 is fixable at the front holding element 32 by a vertical and downward movement of the side grid element 10. When the side grid element 10 is fastened at the metal side wall 36, at first the horizontal recess 22 of the rear metal plate 14 is engaged with the rear holding element 34 and then the vertical recess 20 of the front metal plate 12 is engaged with the front holding element 32. In other words, the side grid element 10 is firstly pushed rearwards and then pushed downwards, when said side grid element 10 is fastened at the metal side wall 36 of the oven cavity.

[0031] In this example, the front holding element 32 and the rear holding element 34 are identical. Alternatively, the front holding element 32 and rear holding element 34 may be different and especially adapted to the vertical recess 20 of the front metal plate 12 and the horizontal recesses 22 of the rear metal plate 14, respectively.

[0032] FIG 3 illustrates a front view of the side grid element 10 arranged at the metal side wall 36 of the oven cavity according to the first embodiment of the present invention.

[0033] In this example, each of the holding elements 32 and 34 is a single-piece part formed of three circular

disks having different diameters. An outer disk of each holding element 32 and 34 is directly attached at the metal side wall 36 of the oven cavity. A central disk of each holding element 32 and 34 is partially enclosed by the vertical recess 20 of the front metal plate 12 or the horizontal recess 22 of the rear metal plate 14, respectively. An inner disk of each holding element 32 and 34 is arranged at the inner side of the front metal plate 12 or rear metal plate 14, respectively. The outer disk has the biggest diameter and an axial length that is suitably chosen to define the sparkle-safe distance of the front metal plate (12) or respectively the rear metal plate (14) from the metal side wall (36). The central disk has the smallest diameter, and the inner disk has a medium diameter of the holding elements 32 and 34. Thus, the inner disk and the central disk form a mushroom. In general, the holding elements 32 and 34 may have arbitrary forms, which are at least partially complementary to the vertical recess 20 of the front metal plate 12 or to the horizontal recess 22 of the rear metal plate 14, respectively, and are adapted to provide said sparkle-safe distance between the side grid element 10 and the metal side wall 36.

[0034] The thickness of the outer disk of the holding elements 32 and 34 defines the distance between the metal plates 12 and 14 on the one hand and the metal side wall 36 of the oven cavity on the other hand. In this example, the distance between the metal plates 12 and 14 and the metal side wall 36 is at least 3 mm in order to prevent sparking. In general, the distance between the metal plates 12 and 14 and the metal side wall 36 may be also have other values.

[0035] Further, the holding elements 32 and 34 are made of an electrically insulating material. Thus, the side grid elements 10 are electrically insulated from the metal side walls 36 of the oven cavity.

[0036] FIG 4 illustrates a perspective view of the side grid element 10 of the side grid system according to a second embodiment of the present invention.

[0037] The side grid element 10 includes the front metal plate 12, the rear metal plate 14 and the horizontal elongated rod sections 18. In this example, two adjacent horizontal elongated rod sections 18 are formed as single-piece U-shaped parts. The front metal plate 12 and the rear metal plate 14 are provided for fastening the side grid element 10 at the metal side wall 36 of the oven cavity, wherein outer sides of the front metal plate 12 and rear metal plate 14 turn towards the metal side wall 36 of the oven cavity. The horizontal elongated rod sections 18 are attached at inner sides of the front metal plate 12 and rear metal plate 14.

[0038] Instead of the curvatures, the end-stop 28 may be realized by a vertical rod 38 at the rear end of the side grid element 10. In this example, the vertical rod 38 is connected to the horizontal elongated rod sections 18 of the side grid element 10. Alternatively, the vertical rod 38 may by connected to a part of the horizontal elongated rod sections 18 of the side grid element 10. Further, two or more vertical rods may be attached at the rear ends of the horizontal elongated rod sections 18 of the side grid element 10, wherein said vertical rods may be arranged one upon the other.

[0039] Instead of the vertical recess 20, the front metal plate 12 includes a key hole 40. A lower area of the key hole 40 is bigger than an upper area of said key hole 40, so that the front metal plate 12 is engaged or engageable with the at least one front holding element 32. In general, the front metal plate 12 may include at least one cut-out, wherein a lower area of said cut-out is bigger than its upper area, so that the front metal plate 12 is engaged or engageable with the at least one front holding element 32.

[0040] FIG 5 illustrates a perspective view at the inner side of the side grid element 10 of the side grid system according to a third embodiment of the present invention.

[0041] The side grid element 10 of the third embodiment includes the front metal plate 12, the rear metal plate 14 and the horizontal elongated rod sections 18. In this embodiment, two adjacent horizontal elongated rod sections 18 are formed as single-piece U-shaped parts. The open ends of said single-piece U-shaped parts are arranged at the rear side of the side grid element 10. The front metal plate 12 and the rear metal plate 14 are provided for fastening the side grid element 10 at the metal side wall 36 of the oven cavity, wherein the outer sides of the front metal plate 12 and rear metal plate 14 turn towards the metal side wall 36 of the oven cavity. The horizontal elongated rod sections 18 are attached at inner sides of the front metal plate 12 and rear metal plate 14.

[0042] The vertical rod 38 at the rear end of the side grid element 10 acts as end-stop. In this embodiment, the vertical rod 38 is connected to the horizontal elongated rod sections 18 of the side grid element 10. Alternatively, the vertical rod 38 may by connected to a part of the horizontal elongated rod sections 18 of the side grid element 10. Further, two or more vertical rods may be attached at the rear ends of the horizontal elongated rod sections 18 of the side grid element 10, wherein said vertical rods may be arranged one upon the other.

[0043] The rear metal plate 14 includes the vertical recess 20, while the front metal plate 12 includes the key hole 40. The lower area of the key hole 40 is bigger than then upper area of said key hole 40, so that the front metal plate 12 is engaged or engageable with the at least one front holding element 32 or another holding device. In general, the front metal plate 12 may include at least one cut-out, wherein a lower area of said cut-out is bigger than its upper area, so that the front metal plate 12 is engaged or engageable with the at least one front holding element 32 or another holding device.

[0044] Further, the side grid element 10 includes the three chamfers 30. The chamfers 30 are formed in the front portions of the upper rod sections 18 of the three lower guide rails. The chamfers 30 allow the easy inserting of the foodstuff carrier into the guide rails.

[0045] Additionally, the side grid element 10 includes four further chamfers 42 formed in the front portions of

the lower rod sections 18 of the four guide rails. The chamfers 30 and 42 allow the easy inserting of the foodstuff carrier into the guide rails. Thus, the upper chamber 30 and the lower chamfer 42 form a funnel shaped opening for receiving the foodstuff carrier.

FIG 6 illustrates a side view of the side grid element 10 of the side grid system according to the third embodiment of the present invention. The side view of the side grid element 10 clarifies the slopes of the chamfers 30 and 42. The upper chamber 30 and the lower chamfer 42 form a funnel shaped opening for receiving the foodstuff carrier.

FIG 7 illustrates a side view of the side grid element 10 arranged at the metal side wall 36 of the oven cavity according to the third embodiment of the present invention. The side grid element 10 in FIG 7 is the same as in FIG 6.

[0046] The side grid element 10 is attached at the metal side wall 36 of the oven cavity by two holding devices. The front metal plate 12 of the side grid element 10 is attached by the one holding device, while the rear metal plate 14 is attached by the other holding device of the same type. The holding device comprises two elements, namely a holding plate 44 and a holding bolt 46. The holding plates 44 are arranged between the metal plates 12 and 14 on the one side and the metal side wall 36 of the oven cavity on the other side. The holding bolt 46 penetrates holes in the holding plate 44 and in the metal side wall 36 of the oven cavity. The holding device in FIG 7 comprises two elements, i.e. the holding plate 44 and the holding bolt 46, while the front holding element 32 and rear holding element 34 in FIG 2 and FIG 3 are formed as single-piece parts.

[0047] FIG 8 illustrates a front view of the side grid element 10 arranged at the metal side wall of the oven cavity according to the third embodiment of the present invention. FIG 8 clarifies the geometric structure of the side grid element 10 and the positions of the chamfers 30 and 42.

[0048] The holding plate 44 has a similar function as the outer disk of the holding element 32 and 34 in FIG 3. The holding plate 44 is directly attached at the metal side wall 36 of the oven cavity. The holding bolt 46 includes an inner disk similar to the inner disk of the holding element 32 and 34. The inner disk has the biggest diameter of the holding bolt 46. However, the inner disk of the holding bolt 46 is not concentric with the residual parts of said holding bolt 46. The inner disk of the holding bolt 46 is displaced upwards from the residual parts of the holding bolt 46. The inner disk of the holding bolt 46 abuts on the inner side of the front metal plate 12 or rear metal plate 14, respectively. The holding device comprises a partial circumferential groove. The partial circumferential groove is formed between the holding plate 44 and the holding bolt 46.

[0049] In general, the holding plate 44 and the holding bolt 46 may have arbitrary forms, which are at least partially complementary to the key hole 40 of the front metal plate 12 or to the horizontal recess 22 of the rear metal plate 14, respectively.

[0050] The holding bolt 46 penetrates the hole in the holding plate 44. Further, the holding bolt 46 is provided for penetrating a corresponding hole 48 in the metal side wall 36 of the oven cavity. The holding bolt 46 may be fixed by a suitable fixation means against the outer side of the metal side wall 36 of the oven cavity. The holding bolt 46 may be formed as or similar to a screw. For example, the holding bolt 46 may include a cutting thread, so that the holding bolt 46 is directly fixable at the metal side wall 36 of the oven cavity. The thickness of the holding plate 44 defines the distance between the metal plates 12 and 14 on the one hand and the metal side wall 36 of the oven cavity on the other hand. In this example, the distance between the metal plates 12 and 14 and the metal side wall 36 is at least 3 mm in order to prevent sparking. In general, the distance between the metal plates 12 and 14 and the metal side wall 36 may also have other values.

[0051] Further, the holding plate 44 and holding bolt 46 are made of one or more electrically insulating materials. Thus, the side grid elements 10 are electrically insulated from the metal side walls 36 of the oven cavity.

[0052] FIG 9 illustrates a perspective view at an outer side of the side grid element 10 and holding devices of the side grid system according to the third embodiment of the present invention.

[0053] The holding bolt 46 penetrates the hole in the holding plate 44. Further, the holding bolt 46 is provided for penetrating the corresponding hole 48 in the metal side wall 36 of the oven cavity. The holding bolt 46 may be fixed by a fixation means against the outer side of the metal side wall 36 of the oven cavity.

[0054] FIG 10 illustrates a perspective view of a holding device for the side grid element 10 of the side grid system according to the third embodiment of the present invention. According to FIG 7 to FIG 9 said holding device is used for fastening the side grid element 10 of the third embodiment. Of course, this holding device is also suitable for the side grid element 10 of the first and second embodiment.

[0055] The holding device comprises the holding plate 44 and the holding bolt 46. In contrast, the front holding element 32 and rear holding element 34 in FIG 2 and FIG 3 are formed as single-piece parts. The holding bolt 46 penetrates a hole in the holding plate 44. The holding bolt 46 may be permanently or removably fixed at the metal side wall 36 of the oven cavity. The holding device comprises the partial circumferential groove. The partial circumferential groove is formed between the holding plate 44 and the holding bolt 46. The partial circumferential groove is obtained by the non-concentric arrangement between the inner disk and the residual parts of the holding bolt 46. The inner disk of the holding bolt 46 is

displaced upwards from the residual parts of the holding bolt 46. The holding device is at least partially complementary to the key hole 40 of the front metal plate 12 and to the horizontal recess 22 of the rear metal plate 14.

[0056] The rear metal plate 14 is fixable at a corresponding rear holding bolt 46 by a horizontal and rearward movement of the side grid element 10. In a similar way, the front metal plate 12 is fixable at a corresponding front holding bolt 46 by a vertical and downward movement of the side grid element 10. When the side grid element 10 is fastened at the metal side wall 36, at first the horizontal recess 22 of the rear metal plate 14 is engaged with the rear holding bolt 46 and then the key hole 40 of the front metal plate 12 is engaged with the front holding bolt 46. In other words, the side grid element 10 is firstly pushed rearwards and then pushed downwards, when said side grid element 10 is fastened at the metal side wall 36 of the oven cavity.

[0057] In this example, the front and rear holding devices are identical. Alternatively, the front and rear holding devices may be different and especially adapted to the key hole 40 of the front metal plate 12 and the horizontal recesses 22 of the rear metal plate 14, respectively.

[0058] The holding plate 44 and the holding bolt 46 are made of one or more electrically non-conductive materials. Preferably, the holding plate 44 is made of or coated by Teflon. The holding plate 44 forms an electric insulator between the front metal plates 12 or 14, respectively, on the one side and the metal side wall 36 of the oven cavity on the other side. For example, the holding bolt 46 is made of Teflon or ceramic. In a special embodiment, the holding plate 44 made of Teflon may include upper and lower ribs defining friction areas against the front metal plate 12 and rear metal plate 14 of the side grid element 10.

[0059] FIG 11 illustrates a perspective exploded view of the holding device for the side grid element 10 of the side grid system according to the third embodiment of the present invention.

[0060] According to a further embodiment, the holding bolt 46 is made of metal. Surprisingly, the use of the holding bolt 46 made of metal avoids any spark formation. However, it is necessary to fix the holding bolt 46 at the external side of the metal side wall 36 of the oven cavity by a nut having a special geometry. The geometric properties of the nut ensure that the nut acts as an effective wave trap for the microwaves, which are guided by the metallic nut through the hole in the metal side wall 36 of the oven cavity. The nut may include either a flat shim or flange of suitable dimensions at its surface that abuts against the outside of the metal side wall 36 of the oven cavity.

[0061] The side grid system according to the present invention is suitable for an oven cavity of a microwave oven or a cooking oven with a microwave heating function. The side grid elements 10 of all embodiments according to the present invention are attached or attachable by only two carriers at the metal side wall 36 of the oven cavity. The side grid system of the present invention provides a sufficient distance between the side grid element 10 and the metal side wall 36 of the oven cavity, so that spark generation during microwave heating is avoided.

[0062] The principle of the two-point fixations of the side grid elements 10 at the metal side wall 36 of the oven cavity allows a simple engagement by only two holding elements 32 and 24 or holding devices 44 and 46 in order to avoid any further direct contacts of the side grid element 10 to the metal side wall 36 of the oven cavity, so that the enamel of the metal side wall 36 is not scratched during installation.

[0063] The side grid elements 10 according to the present invention include instead of vertical rods at the front end and rear end the front metal plate 12 and the rear metal plate 14, respectively, which have a sufficient stiffness adapted to ensure the necessary distance between said metal plates 12 and 14 on the one hand and the metal side wall 36 of the oven cavity on the other hand along the entire length of the metal plates 12 and 14 and hence of the side grid element 10. The stiffness of the front metal plate 12 and the rear metal plate 14 avoids surely any spark generation, even when the side grid elements 10 carry the allowed maximum number and weight of food trays.

[0064] The vertical recess 20, the horizontal recess 22 and/or the key hole 40 and the corresponding holding elements 32 and 34 or holding device may be adapted to be engaged with each other by a sufficient friction. This avoids effectively any unintentional change of the distance between the metal plates 12 and 14 and the metal side wall 36 of the oven cavity, so that no spark generation occurs. Further, said sufficient friction avoids any unintentional disengagement of the frontal part of the side grid element 10, i.e. disengagement of the vertical recess 20 from the holding element 32, when pulling out a tray with a downward tilting movement.

[0065] FIG 12 illustrates a front view of the side grid element 10 arranged at the metal side wall 36 of the oven cavity according to the fourth embodiment of the present invention. The fourth embodiment is similar to the third embodiment, wherein the holding bolt 46 is made of metal, while the holding plate 44 is made of the electrically insulating material.

[0066] The holding bolt 46 is engaged to a fixation means 47. In this example, the fixations means 47 is a threaded nut. The fixations means 47 bears against an outer face 50 of the metal side wall 36 in order to fix the holding bolt 46. The fixations means 47 is adapted for abutting against the outer face 50 of the metal side wall 36. The fixations means 47 forms a wave trap against microwaves that migrate along the holding bolt 46. This wave trap is substantially effective.

[0067] The holding plate 44 is directly attached at the metal side wall 36 of the oven cavity. The holding bolt 46 penetrates the hole 48 in the metal side wall 36 and is

connected to the fixations means 47. In this embodiment, the holding bolt 46 may be formed as a screw or similar to a screw. In this case, the holding plate 44 may be made of Teflon. Although an illustrative embodiment 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 embodiment, 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

[0068]

10	side grid element
12	front metal plate
14	rear metal plate
16	serpentine rod
18	horizontal rod section
20	vertical recess
22	horizontal recess
26	pull-out stop
28	end-stop
30	chamfer
32	front holding element
34	rear holding element
36	metal side wall
38	vertical rod
40	key hole, cut-out
42	chamfer
44	holding plate
46	holding bolt
47	fixation means, threaded nut
48	hole in the metal side wall 36
50	outer face of metal side wall 36
hv	vertical height of the side grid element

Claims

1. A side grid system adapted for use in an oven cavity of a microwave oven or of an oven with a microwave heating function, wherein said side grid system is provided for supporting one or more slidable foodstuff carriers, the side grid system comprises a pair of side grid elements (10) and at least four holding elements (32, 34)), each side grid element (10) is attachable by at least two holding elements (32, 34) at one of two opposing metal side walls (36) of the oven cavity, the holding elements (32, 34) are permanently or removably fixable at the metal side walls (36) of the oven cavity, each side grid element (10) includes a front metal plate (12) and a rear metal plate (14) that extend essentially along the vertical height (hv) of the side grid element (10),the side grid element (10) includes a plurality of horizontal elongated rod sections (18) interconnecting the front metal plate (12) and the rear metal plate (14),the horizontal elongated rod sections (18) of each side grid element (10) are arranged one upon the other within said side grid element (10),the front metal plate (12) is engageable with at least one front holding element (32) by an essential vertical movement along a plane defined by the front metal plate (12), and the rear metal plate (14) is engageable with at least one rear holding element (34) by an essential horizontal movement along a plane defined by the rear metal plate (14),
characterized in that
at least one of the front metal plate (12) and the rear metal plate (14) is adapted for being stably held by respectively a single front holding element (32) or a single rear holding element (34) that comprises an electrically insulting material at a sparkle-safe distance from the metal cavity side wall (36) at which electrical sparkle formation during microwave operation of the oven is avoided.

2. The side grid system of claim 1, wherein at least one of the front metal plate (12) and the rear metal plate (14) has a stiffness, in particular provided by at least one of its width, thickness or material composition, that is adapted for said metal plate (12, 14) being held respectively by said single front holding element (32) or by said single rear holding element (34) at said safe distance from the metal cavity side wall (36).

3. The side grid system of claim 1 or 2, wherein at least one of the front metal plate (12) and the rear metal plate (14) comprises a single recess (20, 22), cut-out (40) or key hole (40) that is adapted for a bearing interaction with the respective single front or rear holding element (32, 34), and wherein said single recess 20, 22), cut-out (40) or key hole (40) is formed essentially in middle of the vertical height (hv) of the respective side grid element (10), preferably wherein said single recess 20, 22), cut-out (40) or key hole (40) is formed essentially in middle of the vertical height (hv) of said front metal plate (12) and/or said rear metal plate (14).

4. The side grid system of claim 3, wherein both of the front metal plate (12) and the rear metal plate (14) each comprises a single recess (20, 22), cut-out (40) or key hole (40) that is adapted for the bearing interaction with the respective single front and rear holding element (32, 34) .

5. The side grid system according to any one of the preceding claims,

characterized in that
at least one, preferably both of said single front or rear holding elements (32, 34) comprises at least of a ceramic material or a Teflon material, and is dimensioned to define said sparkle-safe distance between the metal plate (12, 14) and the metal side wall (36) of the oven cavity.

6. The side grid system according to any one of the preceding claims,
characterized in that
at least one of said single front or rear holding element (32, 34) comprises a holding plate (44) and a holding bolt (46), wherein the holding plate (44) is dimensioned to define the sparkle-safe distance between the metal plate (12, 14) and the metal side wall (36) of the oven cavity, and wherein the holding bolt (46) is engageable with the recess (20, 22), cut-out (40) or key hole (40) of the corresponding front or rear metal plate (12, 14).

7. The side grid system according to claim 6,
characterized in that
the holding bolt (46) is provided for penetrating a hole in the holding plate (44) and for intruding into a hole (48) in the metal side wall (36) of the oven cavity.

8. The side grid system according to claim 6 or 7,
characterized in that
the holding plate (44) and the holding bolt (46) are each made of at least one electrically insulating material, wherein the holding plate (44) is preferably made of Teflon and the holding bolt (46) is preferably made of ceramic.

9. The side grid system according to claim 6 or 7, wherein the holding plate (44) is made of an electrically insulating material and the holding bolt (46) is made of a metal and the holding bolt (46) is engageable with a fixation means (47), such as for example a threaded nut (47), for fixing the holding bolt (46) by bearing against the outer face (50) of the metal cavity side wall (36) and wherein the fixation means (47) is adapted for suitably abutting against the outer face (50) of the metal cavity side wall (36) to form a substantially effective wave trap against microwaves that migrate along the holding bolt (46).

10. The side grid system according to any one of the preceding claims,
characterized in that
the rear metal plate (14) includes at least one horizontal recess (22), wherein an open side of said horizontal recess (22) is directed rearwards, so that the rear metal plate (14) is engaged or engageable with the at least one rear holding element (34) by a rearward movement of the side grid element (10), and/or the front metal plate (12) includes at least one vertical recess (20), wherein an open side of said vertical recess (20) is directed downwards, so that the front metal plate (12) is engaged or engageable with the at least one front holding element (32) by a downward movement of the side grid element (10).

11. The side grid system according to claim 10,
characterized in that
the front metal plate (12) includes at least one cut-out, preferably formed as a key hole (40), wherein a lower area of said cut-out is bigger than an upper area of said cut-out, so that the front metal plate (12) is engaged or engageable with the at least one front holding element (32) by a downward movement of the side grid element (10).

12. The side grid system according to claim 10 or 11,
characterized in that
the side grid element (10) is attachable by engaging the rear metal plate (14) with the at least one rear holding element (34) at first and then by engaging the front metal plate (12) with the at least one front holding element (32).

13. The side grid system according to any of the preceding claims,
characterized in that
two or more horizontal elongated rod sections (18) are formed as a single-piece part, in particular whereinthe plurality of horizontal elongated rod sections (18) of one side grid element (10) is formed by at least one serpentine rod (16), wherein the serpentine rod (16) is formed as a single-piece part.

14. The side grid system according to any one of the preceding claims,
characterized in that
the horizontal elongated rod sections (18) are arranged pairwise on top of each other, wherein two neighboured horizontal elongated rod sections (18) form a guide rail for the foodstuff carrier, preferably wherein a pull-out stop (26) for the foodstuff carrier is formed as a buckling (26) in an upper horizontal elongated rod section (18) of the guide rail, and/or wherein an end-stop (28) for the foodstuff carrier is formed by a curvature between two horizontal elongated rod sections (18) of one guide rail in the rear end of said horizontal elongated rod sections (18), in particular wherein a chamfer (30) is formed in a front portion of the upper horizontal elongated rod section (18) of the guide rail, so that the distance between the horizontal elongated rod sections (18) of one guide rail is increased at the front end of said guide rail.

15. The side grid system according to claim 14,
characterized in that
a further chamfer (42) is formed in a front portion of

the lower horizontal elongated rod section (18) of the guide rail, so that the distance between the horizontal elongated rod sections (18) of one guide rail is increased at the front end of said guide rail.

16. A microwave oven or an oven with a microwave heating function,
characterized in that
the oven comprises a side grid system according to any of the claims 1 to 15.

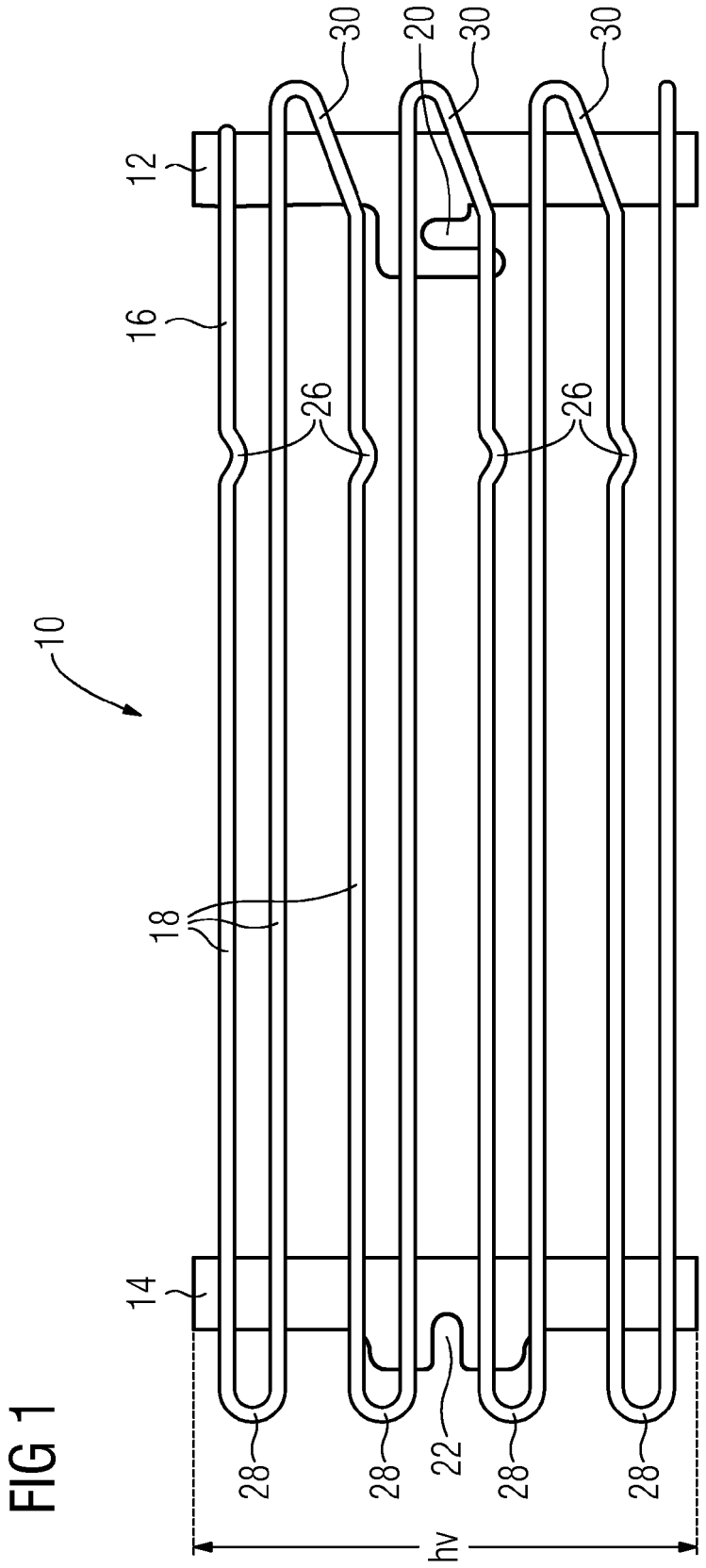


FIG 1

FIG 2

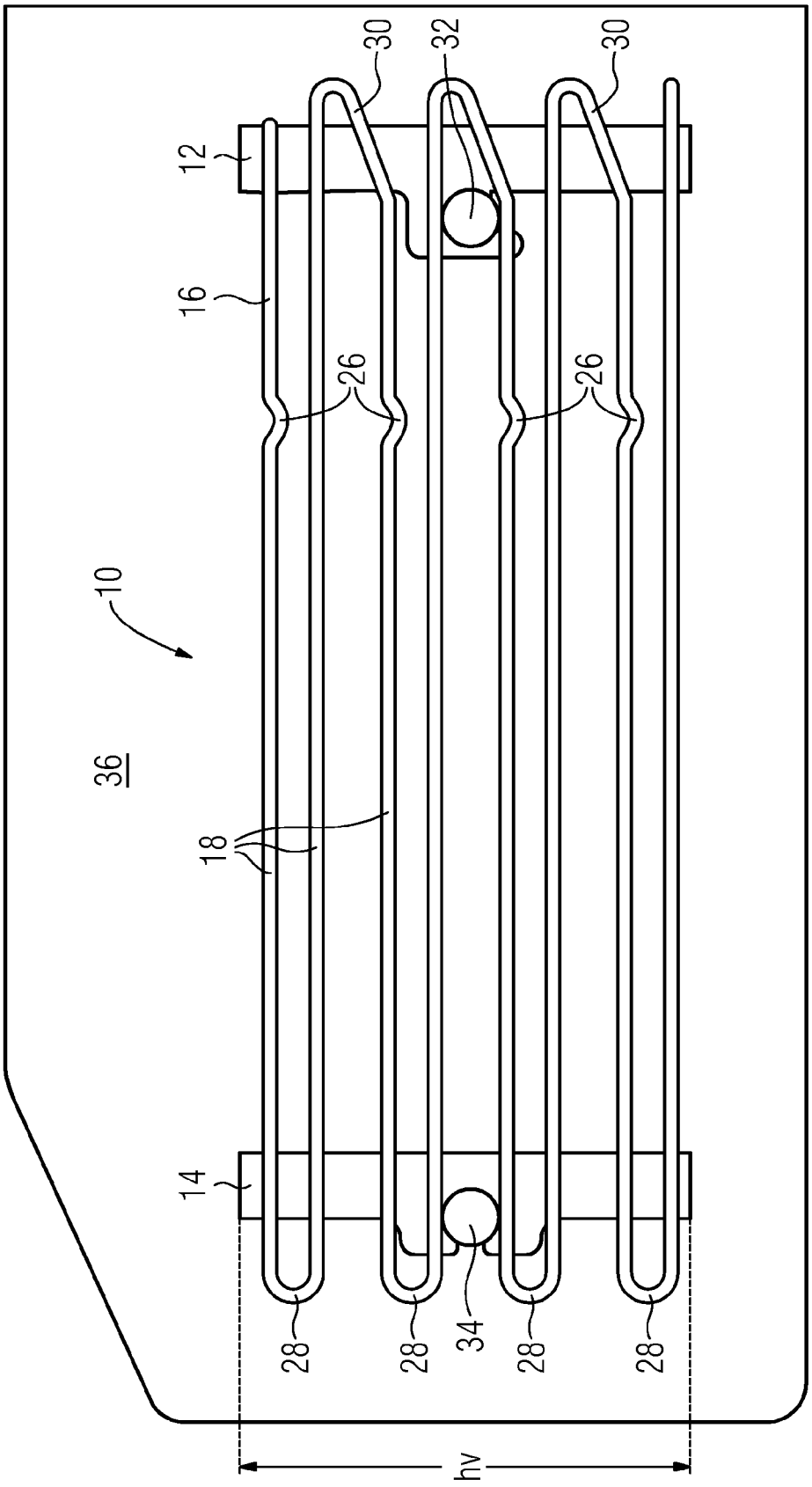
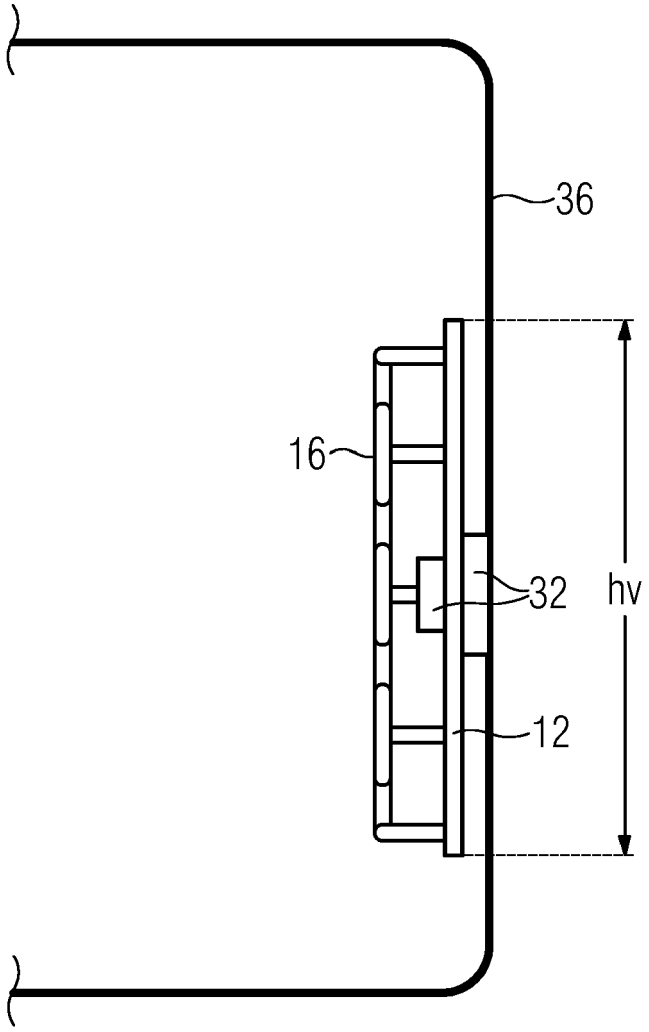


FIG 3



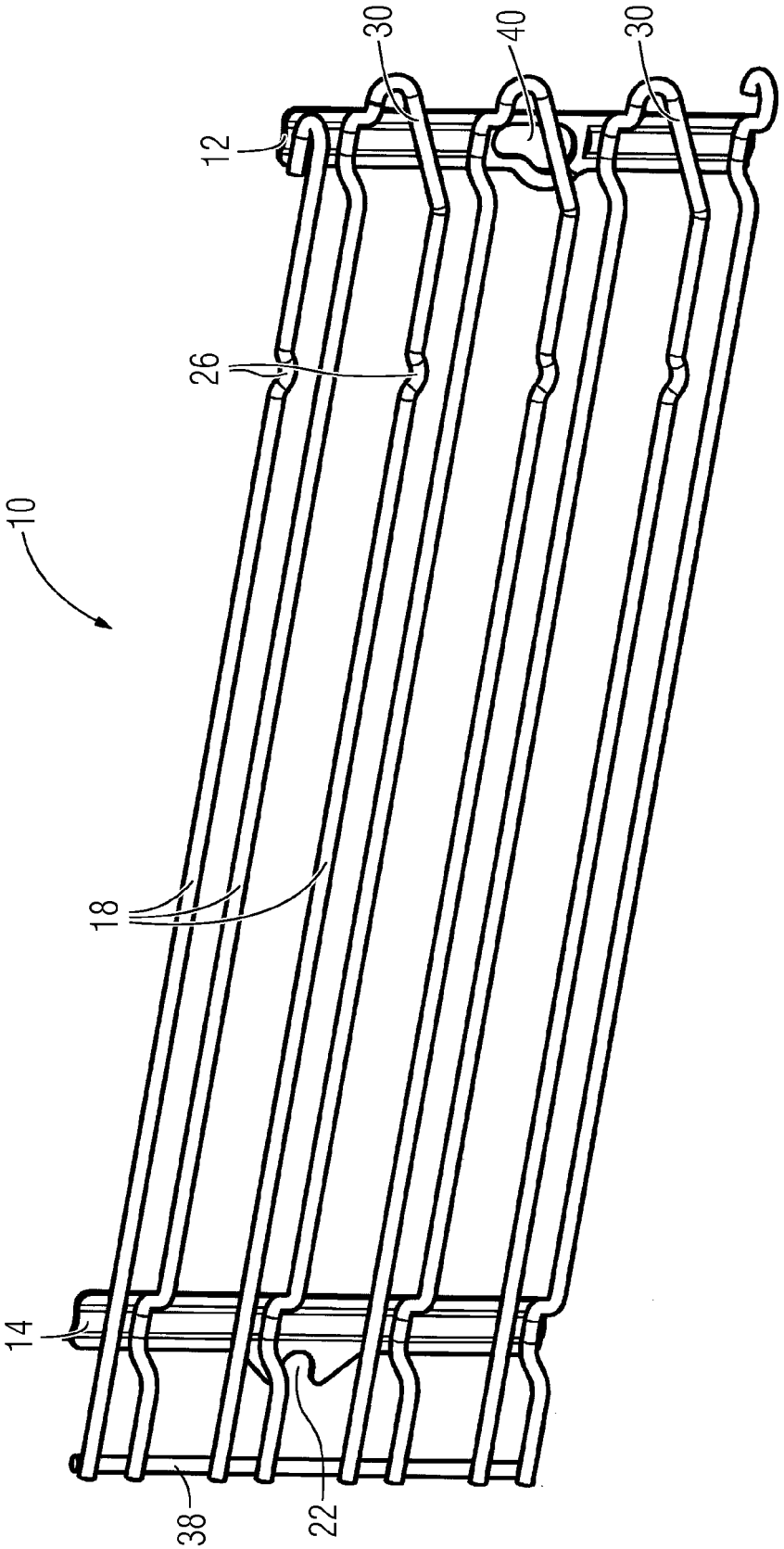


FIG 4

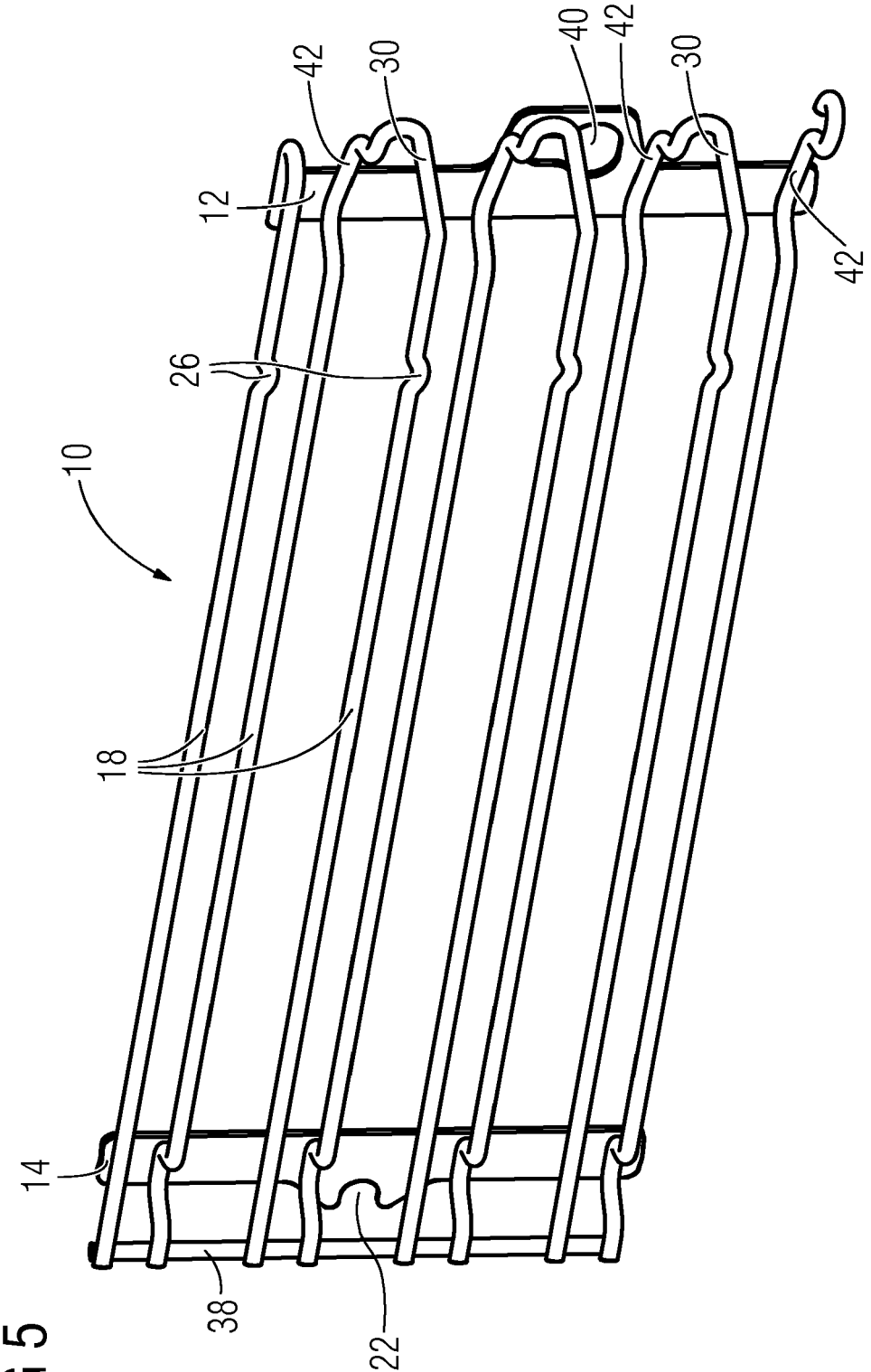


FIG 5

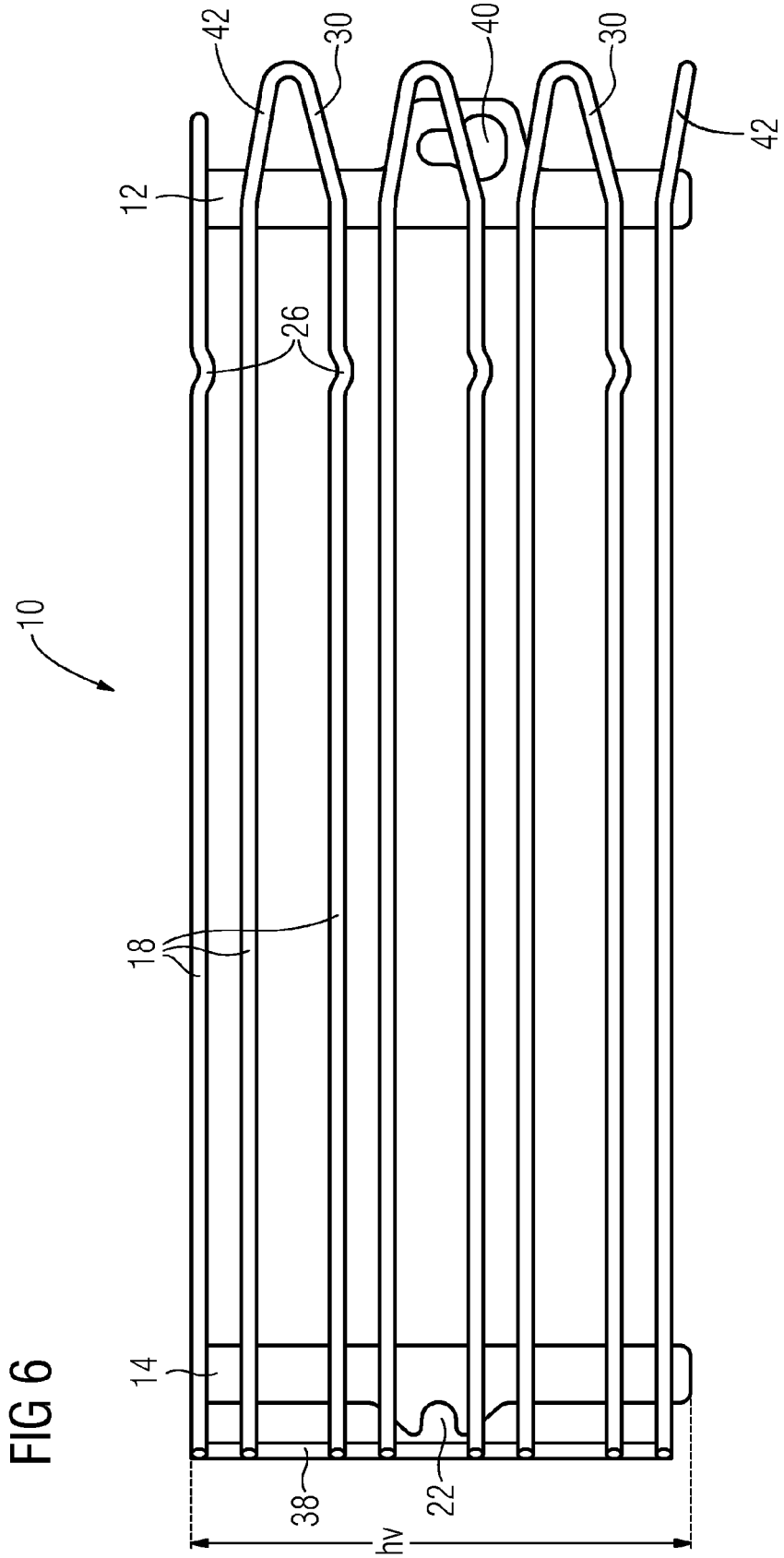


FIG 6

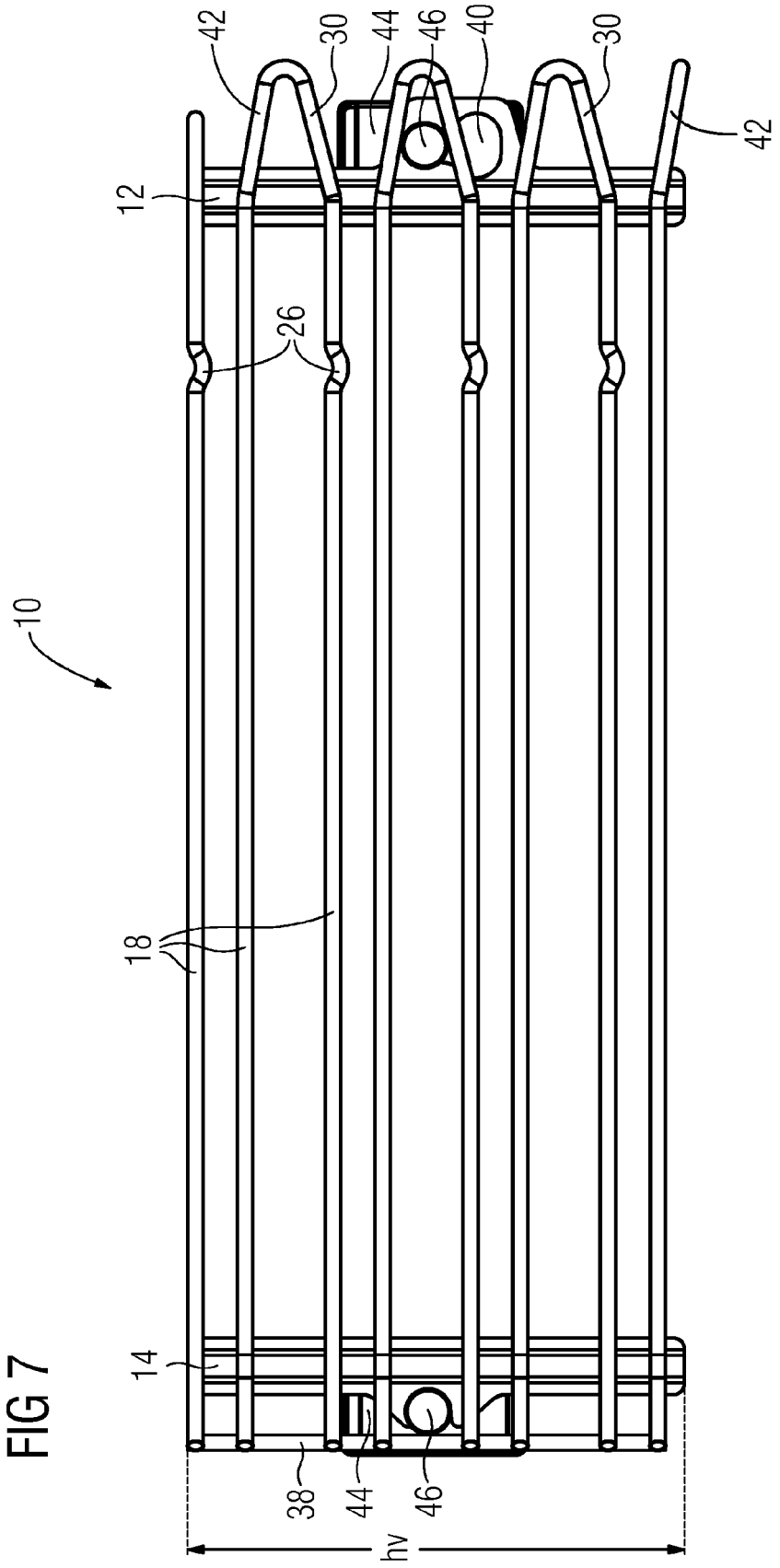
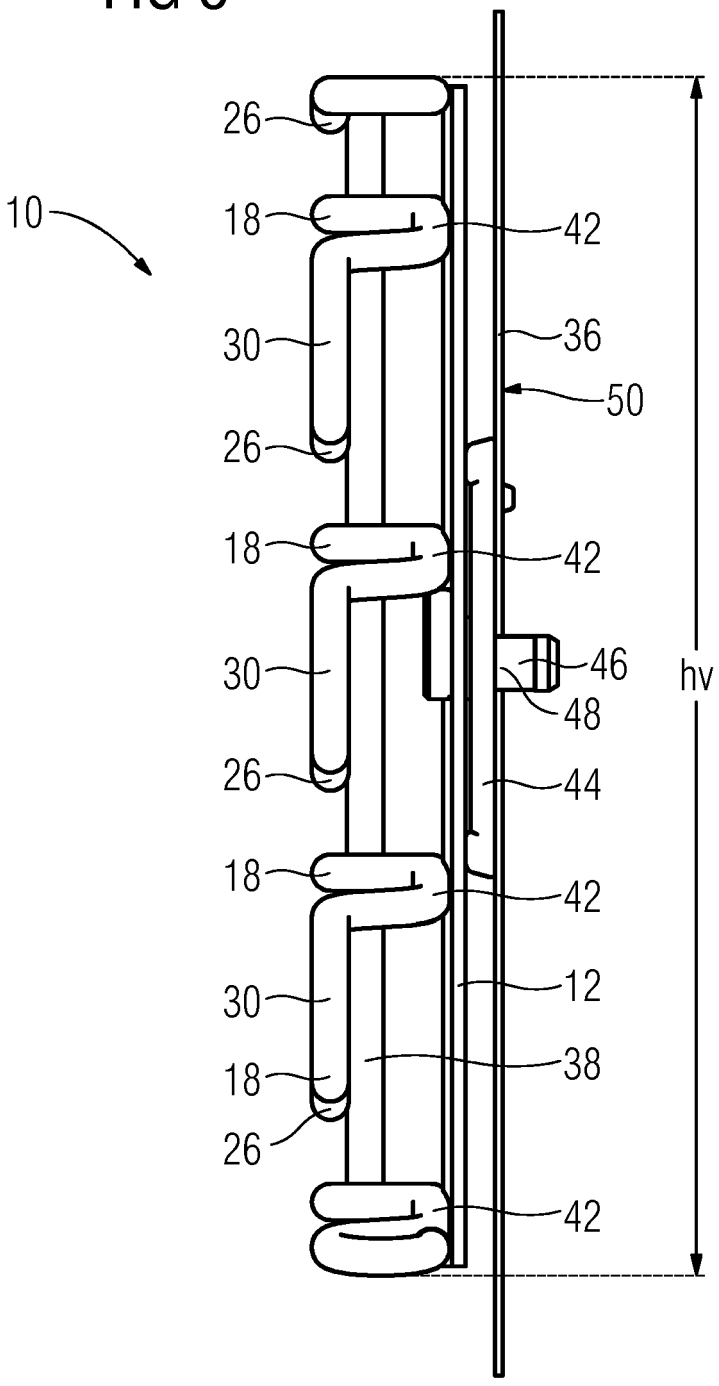


FIG 7

FIG 8



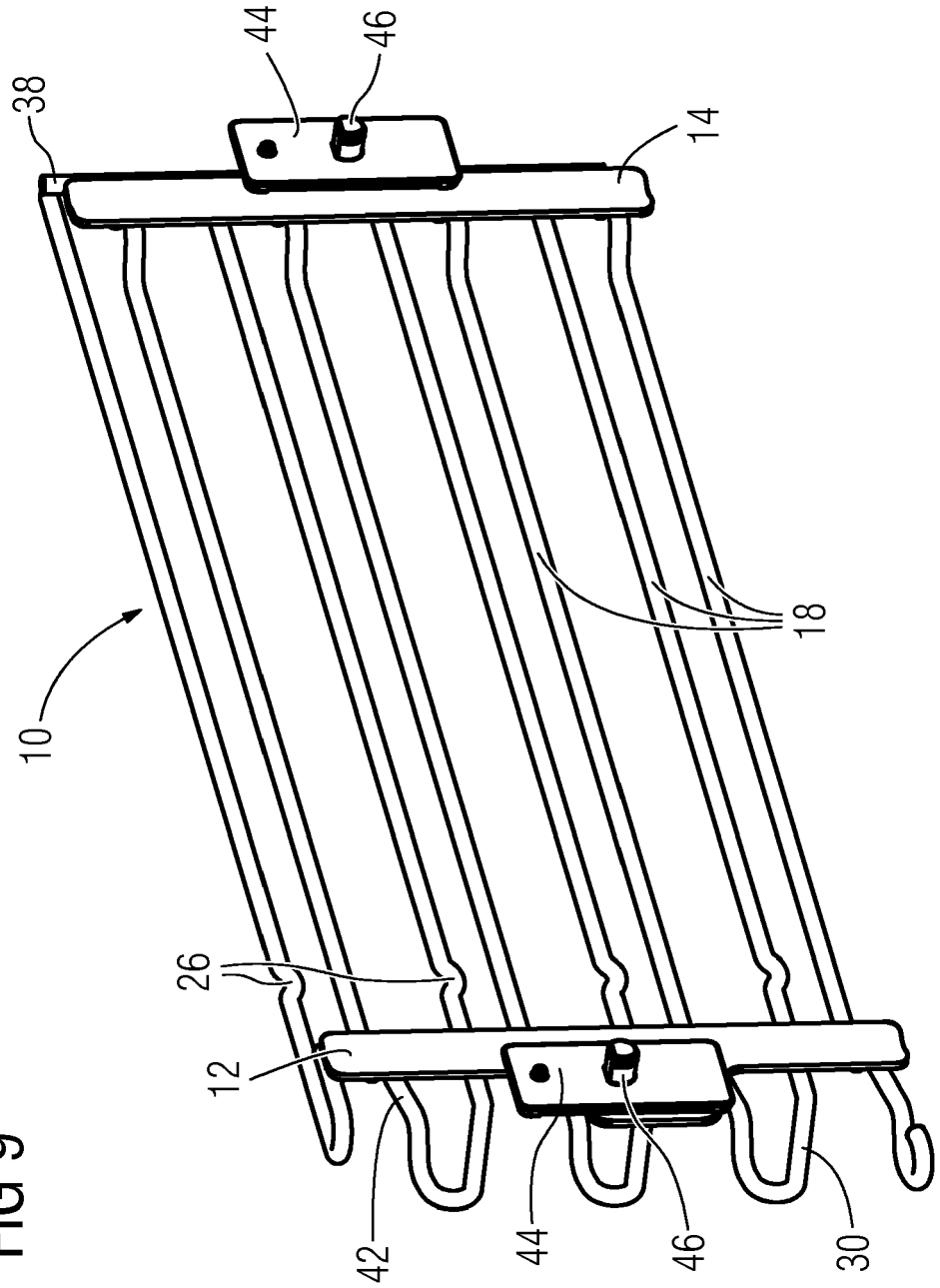


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FIG 10

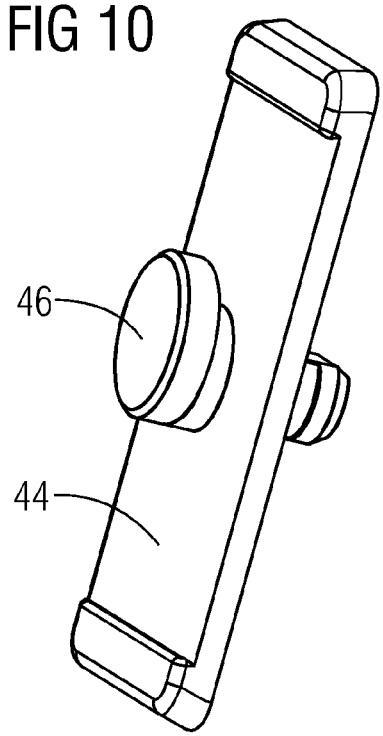


FIG 11

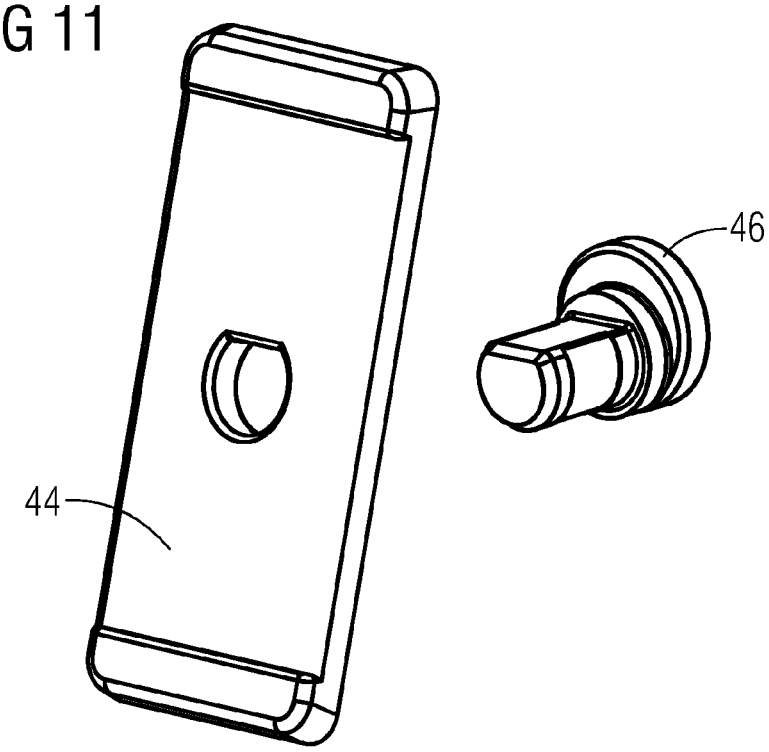
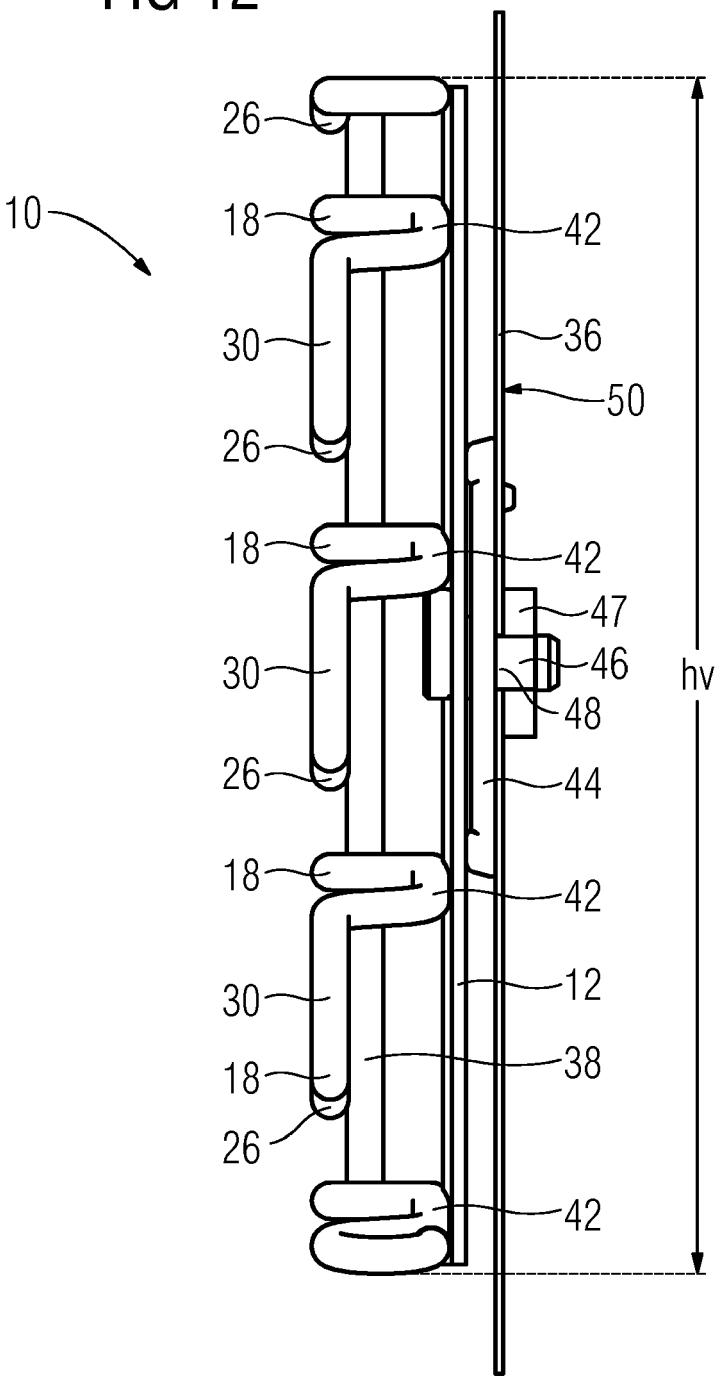


FIG 12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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	28 March 2014	Makúch, Milan

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Application Number
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