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(54) **Cooktop assembly comprising flush-mounted cooktop panel**

(57) In order to install a cooktop panel (1) in a cutout (4) of a surround, such as a countertop (2), eccentric cam plates (6) are pivotably mounted on the perimeter of the cutout (4). The eccentric cam plates (6) support with their camming surface (7) the periphery of the cooktop panel (1).
The gap (5) between the perimeter of the cutout (4) and the periphery of the cooktop panel (1) is closed by a detachable gasket seal (13).
Detaching the detachable gasket seal (13) allows for aligning of the cooktop panel (1) and the surround (2) in a coplanar arrangement by rotation of the cam plates (6), effected through the open gap (5) from above.
Such detachable arrangement also facilitates repair and service of the cooktop panel (1) and the heating units of the cooktop assembly.

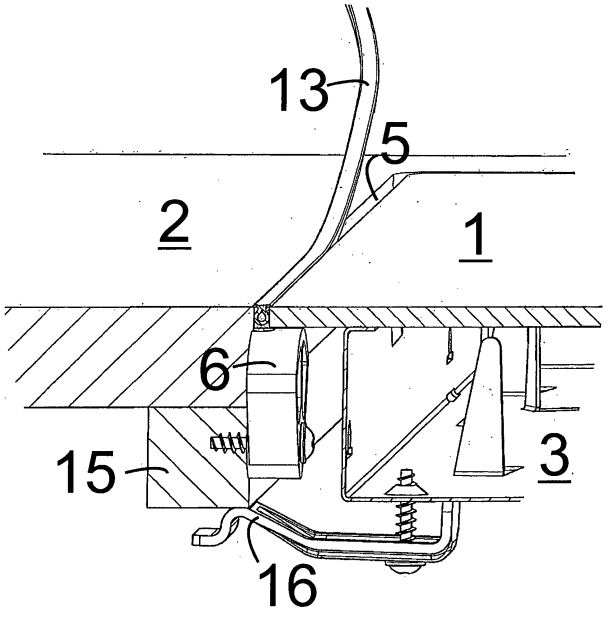

Fig. 1

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates generally to a cooktop assembly comprising a frameless, flush-mounted cooktop panel fitted into a suitable cutout of a countertop or another like surround by means of a height-adjustable mounting arrangement.

BACKGROUND OF THE INVENTION

[0002] Conventional mounting arrangements for mounting a cooktop panel into a countertop typically include a frame with an external trim portion supporting the cooktop panel. The frame is in turn attached to the surround, such as a countertop.

[0003] These conventional mounting arrangements have been generally satisfactory although there are certain disadvantages associated with such designs, including decreased cleanability due to the exposed trim portion, lack of an aesthetically pleasing appearance and the additional complexity and expense of providing an external trim portion between the cooktop panel and countertop.

[0004] According to an alternative design, a cooktop assembly is designed without an external trim portion. This design is suitable for direct, surface-flush installation into work surfaces consisting of wood, ceramics or synthetics. The cooktop panel is inserted, so that its surface is flush with the surrounding work surface using a variety of constructions, including support frames without external trim portion or frameless constructions using mounting means supported by a cutout recess.

[0005] A disadvantage of these "frame-less" cooktop panels is that installation is burdensome, because it is difficult to align the level of the cooktop panel with that of the countertop surface surrounding the panel.

[0006] DE 31 50 450 A1 discloses a fitted cooktop panel for fitted kitchen furniture, recessed in the cutout of a worktop of a kitchen furniture in such a way that said panel is in alignment with the worktop. For the purpose of aligning the height of the cooktop panel, the latter is placed on eccentrically constructed support members, which are provided with radial bores, for inserting an adjusting tool. An adhesive seal is injected into the gap between the worktop counter and the cooktop panel to close said gap.

[0007] Although this mounting arrangement provides the desirable flush fitting of the cooking hob, it may however be disadvantageous in that the appearance of the cooktop panel depends considerably on proper application of the adhesive material to the surround.

[0008] A further difficulty with this type of built-in design arises, when repair and replacement of heating units and associated components is required. The cooktop panel can only be removed with great difficulty and only after the adhesive seal has been removed. If the cooktop panel is not removed from the countertop, all servicing must be done "from below" the built-in cooktop panel unit. Due to the usually tight working area, this can be pretty laborious.

SUMMARY OF THE INVENTION

[0009] Thus, it is desirable to provide a cooktop assembly of a cooktop panel and associated burner box, which is received and secured to a surround in a flush-mounted arrangement without a visible frame portion, and which is easily removable from the surround for repair and replacement of assembly components.

[0010] These objectives are attained by providing a cooktop assembly for flush-mounting a cooktop panel into a cutout of a surround comprising a cooktop panel having a peripheral edge, a plurality of height-adjustable support members fastened to the vertical perimeter of the cutout for supporting the cooktop panel in relation to the surround, wherein a height -adjustable support member comprises an eccentric cam plate rotable around its pivotal axis on a fastening means, having a camming surface, facing an circumferential gap between the cutout perimeter and the peripheral edge of the cooktop panel, said camming surface forming the support to the cooktop panel, a detachable gasket seal positionable in the circumferential gap, and a separate burner box for accommodating the heating units of the cooktop assembly.

[0011] The cooktop assembly is designed so that after the cooktop panel and the burner box have been received and secured in the cutout in the countertop or a like work surface, the height-adjustable support members may be freely adjusted in a vertical manner through the open gap from the top, until the edges of the cooktop panel and the surrounding edges of the surround have the desired pre-selected height relationship. Facilitated installation is thereby provided.

[0012] By having the cooktop panel height-adjustable, the installation tolerances for the cutout are much less critical and thus more easily and inexpensively achieved.

[0013] The gasket seal is merely squeezed in the gap between the cooktop panel and the surround. Therefore, the additional manufacturing step of application of sealant or grout upon installation of the glass-ceramic panel assembly into the cooktop is eliminated. Time and cost for the manufacture of a cooktop assembly can thereby be reduced.

[0014] A particular advantageous feature of the design is that it permits a simplified access to the heating units and electrical connections after installation, when servicing is required.

[0015] The cooktop panel can quickly and easily detached from the surround from above by detaching the detachable circumferential seal gasket manually or with a suitable tool. This leaves the heating elements, circuitry and any other additional components in the separate burner box freely accessible from the top.

[0016] When servicing or replacing the cooktop panels

is required, this ability of the cooking unit to easily move up can be very advantageous. It greatly simplifies many servicing problems. Thanks to this simple principle, damaged panels can be easily replaced by new ones, conventional cooktop-panels can continue to be used without any change.

[0017] According to a preferred embodiment, the camming surface of the cam plate, facing a circumferential gap between the cutout of the cooktop panel and the peripheral edge of the cooktop panel, comprises a bore for accommodating a detachable levering tool for height adjustment of the cooktop panel.

[0018] Application of a levering tool further simplifies and facilitates the height-adjustment of the cooktop panel from above.

[0019] The cooktop assembly may further comprise a calibration tool, useful as a template for vertical pre-adjustment and re-adjustment of the height-adjustable support members.

[0020] The cooktop panel may comprise location ridges. The location ridges permit lateral adjustments to be made during installation of the cooktop panel in its lateral position relative to the surrounding work surface.

[0021] To allow for adjustment and re-adjustment of the position of the height-adjustable support members, while the burner box is installed, a sidewall of the burner box may comprise a fitting opening opposite a fastening means of the cam plate.

[0022] In order to ensure a good fixation of a height-adjustable support member, it is advisable that the height-adjustable support member comprises an additional fixation means to fix the cam plate in its final position.

[0023] An intermediate unitary support frame between the cooktop panel and the camming surface of the cam plate will aid to even out the bearing pressure on the peripheral edge of the cooktop panel.

[0024] According to a preferred embodiment of the invention, the detachable gasket seal comprises a horizontal flange for bridging the circumferential gap and a vertical flange for insertion into the circumferential gap.

[0025] The horizontal flange provides a flush fitting between the upper surface of the cooktop panel, the seal and the surround, making cooktop assemblies in accordance with the present invention advantageous for cleaning purposes. The vertical flange retains the panel within the surround in a relatively easily releasable manner, as well as providing firm support for the panel.

[0026] Cooktop assemblies cycle through high or low temperatures, thereby creating thermal cycling and cyclical expansion and contraction of the cooktop panel. Depending on conditions, this can eventually lead to cracks forming in the countertop corners. A detachable gasket seal comprising a vertical flange provided with outwardly directed legs prevents the formation of a tight mechanical connection and a pressure build-up in the circumferential gap.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

FIG 1 is a perspective view of a cooktop assembly according to a preferred embodiment of the invention.

FIG 2 is a perspective view of a counter top section, which displays several of the preferred features of the cooktop assembly.

FIG 3 shows a detail of the perspective view of FIG 2.

FIGs 4 and 5 are vertical views of the cooktop assembly showing different rotational positions of an eccentric cam plate 6 according to the invention.

Figs. 6 and 7 illustrate embodiments of a sealing gasket for use with the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Figure 1 shows part of a cooktop assembly comprising of a cooktop panel 1, in or below which a number, usually four, of non-illustrated heating units are arranged in a burner box 3, so that heat from the heating units is transmitted upwardly towards and through the cooktop panel 1 to heat a cooking utensil placed on the upper surface of the cooktop panel 1.

[0029] The assembly, when installed, is received in a cutout 4 formed in a surround, which may take the form of a freestanding cooking appliance or a countertop 2 of a kitchen furniture.

[0030] Only the cooktop panel 1 and a cooktop gasket seal 13 are exposed to the user's view, when the assembly is completely installed.

[0031] The invention is advantageously employed, when an individual cooktop assembly is to be seamlessly fitted into large even work surfaces, made from insulating material such as woods or a man-made material such as MDF,

[0032] Formica(TM) or Corian(TM. Besides working surfaces constructed of wood and plastics, the present invention can be used as well with such surfaces as consisting of ceramics, glass, marble or metals, for example a stainless steel work surface.

[0033] The cutout 4 is forming an inner peripheral area larger than the area of the cooktop panel 1, so that when the panel is mounted in the cutout 4, there is a peripheral gap 5 there between. In this device, the cooktop panel is loosely located in the cutout.

[0034] The frame-like circumferential gap 5 remaining between the countertop 2 and the cooktop panel 1 is closed by a sealing gasket.

[0035] The gap 5 extends along the entire length of cooktop panel 1 and forms a continuous even groove, which extends longitudinally along essentially the entire

length of an aligned panel run. In order to provide a better anchorage for the supports of the cooktop panel and the burner box, the periphery of the cutout may be provided with an edge reinforcement. Preferably, the cutout 4 includes a ledge 15 permanently fixed with respect to the vertical flange of the cutout 4. This provides a very rigid and pressure-resistant structure to the perimeter of the cutout 4, wherein the support members are fastened.

[0036] The cooktop panel 1 is preferably of the ceramic glass, or similar type, wherein the panel has a selected area, a peripheral edge, a top surface and a bottom surface.

[0037] The heating units are suspended independently from the cooktop panel 1 in a burner box 3, so as to be removable therewith from the rest of the cooktop assembly. Further components of the cooktop assembly such as wiring and control unit may be subassembled in such burner box 3.

[0038] This also enables components of the heating unit to be readily accessible for repair and further allows the completed subassembly including heating units and further components to be readily installed in place on the cooktop for facilitated separate installation.

[0039] FIG 1 illustrates an installation embodiment, wherein the burner box 3 is installed to a countertop 2 by means of brackets. The height adjustment of the burner box 3 is achieved by setscrews.

[0040] As also shown in FIG 1, the burner box 3 is formed as a closed mounting tray and includes vertical sidewalls opposite the cutout perimeter.

[0041] The cooktop panel 1 in itself rests freely movable on a peripheral mounting arrangement, comprising a plurality of support members.

[0042] The plurality of support members are located at appropriate intervals around the perimeter of the cutout 4 in the countertop 2 and are rigidly coupled thereto, reaching out under the periphery of the cooktop panel 1.

[0043] The support members support the cooktop panel adjustable in height in relation to the surround 2 for a surface-flush co-planar installation of the cooktop panel 1.

[0044] An individual support member is formed by a cam unit, comprising an eccentric cam plate 6.

[0045] The eccentric cam plate 6 as further illustrated in Figs. 3, 4 and 5 is provided with an upwardly facing camming surface 7 as defined by its upstanding rim, adapted to support the mounted cooktop panel in substantially coplanar relation with an adjacent counter surface.

[0046] The camming surface 7 can be any shape suitable for their intended purpose. Thus, the cross section of the cam plate 6 may be such as a circle, an oval or an ellipse. However, the cross section need not be in the shape of a complete circle, oval or ellipse, but can take the form of a sector of a circle, oval or ellipse, or even another shape. As shown in FIGS.1 to 5, an exemplary cam plate 6 is wedge-shaped.

[0047] Each cam plate is pivotally supported to the perimeter of the cutout by fastening means such as screws, pins, bolts or the like, which are projected through bores arranged off-centre in the eccentric pivotal axis of the cam plate.

[0048] The fastening means are so constructed as to set the axis of said cam plate member substantially horizontal and parallel with the cooktop surround 2.

[0049] As may be clearly seen in Figs. 4 and 5, if screw 8 is loosely engaged in the perimeter of the cutout 4, the cam plate 6 is free to rotate about screw 8 and said cam plate 6 can be rotated forward and backward,

[0050] By means of rotation of eccentric cam plate 6, the cooktop panel is caused to project from, or be withdrawn into the opening of the countertop 2.

[0051] On installation, the cam plates 6 are adjusted one after the other until the edges of the cooktop panel surface 2 lie flush with the surrounding edge of the opening in the work surface.

[0052] Thus, the intended equality of level between the countertop 2 and the cooktop panel 1 can be achieved in a straightforward manner.

[0053] As long as the cooktop panel 1 is removed from the cutout 4, pivoting each of the cam plates 6 to a position wherein the camming surface 7 engages the cooktop panel 1 in a coplanar alignment to the countertop 2 surface, may be performed manually.

[0054] For purposes of fitting, a calibration tool 12 such as shown in Figs. 2 and 3, may be helpful to preliminary adjust the position of the height-adjustable support members for coplanar installation of the cooktop panel. Such leveling may otherwise easily be effected, for example using a ruler or other straight edge.

[0055] Once all cam units are in the active position shown in FIGs. 1 and 5, the locking screws 8 are tightened to lock the cam units in this position.

[0056] After the cam plates 6 are tightened, any risk of lateral displacement has to be avoided.

[0057] However, reduction in the developed clamping force by the screw fastening could cause the cam plate 6 to "loosen" or "slip", causing a displacement of the cooktop panel.

[0058] Accordingly, it is important that the cam plate 6 develop sufficient frictional contact, when secured in a clamped or locked position to keep the panel position stable during its entire work life.

[0059] Lateral displacement may be precluded by the provision of an additional fixation means to fix the cam plate 6 in its final position.

[0060] According to one embodiment, a locking pin is received in suitable bores in each cam plate 6. Thus, once the cam plates 6 are located in their final position shown in FIG 5, a transverse pin can be passed through the perforations 10 in the cam plate to lock the cam plate 6 in that position.

[0061] Additionally or alternatively, the cam plate 6 can be provided with a frictional inner surface.

[0062] Frictional contact may help to secure the cam plate 6 against relative rotation. To increase the frictional

contact between the cam inner surface and the cutout perimeter, anchoring teeth may be provided to the inner side face of the cam plate 6, so that, when the cam plate 6 is tightened, the anchoring teeth penetrate into the material of the cutout perimeter, to hold the cam plate 6 fixedly to the sidewall of the cutout 4.

[0063] The frictional inner cam surface also can be created by placing a material having a higher coefficient of friction than the sliding metallic or plastic cam surface directly onto the cam face. Other methods of producing a frictional cam surface include surface treatment, which creates a roughened surface.

[0064] As a result, the cam plate 6 remains in the set position without fear that the mechanism will slip or loosen during usage.

[0065] Usually, the installation of a cooktop assembly is started by fixing the burner box 3 to ledge 15, before the cooktop panel 1 is detachably adjusted to the countertop 2.

[0066] Therefore, if on installation of the cooktop panel, the burner box 3 is already installed or has to stay put, according to one embodiment of the invention, the cam plate 6 can then be locked by tightening the screw 8 through suitable fitting openings 11 in the burner box 3.

[0067] It will be understood that such fitting openings are positioned in a sidewall of the burner box opposite a fastening means (8) of the cam plate (6) and sized and shaped to allow adjustment of the fastening means 8. Preferably, the fitting openings are oblong.

[0068] After installation of the burner box, the cooktop panel has to be fitted into the receiving cutout 4.

[0069] To this aim, the cooktop panel 1 is put on the support members loosely and has to be centered concentrically to the cutout perimeter.

[0070] In order to fit the cooktop panel 1 in the correct central position within the cooktop cutout 4, the cooktop panel 1 may be set by special location means, e.g. by a trim ring. In another embodiment of the invention, the location means comprise clips uniformly distributed around the cooktop panel periphery.

[0071] Otherwise, the periphery of the cooktop panel 1 may be provided with a number of location ridges, which locate the panel within the respective cutout 4.

[0072] Under operation, the sensitive edge of the cooktop panel is bearing against camming surface 7 of the cam plates 6. To even out the pressure to the cooktop panel, the cooktop panel may be placed on an additional intermediate unitary support frame. An intermediate unitary support frame will transmit some of the downward load of the panel into a horizontal load, therefore providing a high degree of ruggedness to the arrangement.

[0073] The final height-adjustment of the cooktop panel may also be performed, while the cooktop panel 1 is already inserted into the cutout 4.

[0074] To facilitate alignment and realignment of the cooktop panel 1, while it is installed in the countertop, application of a lever tool may be required for appropriate rotary motion of eccentric camming elements.

[0075] According to the invention, the dimensions of the cutout 4 are slightly larger than those of the cooktop panel, so that a gap 5 between the two planes is formed. As a result, the camming surfaces of the cam plates can be visually observed by an operator and inspection of the radial alignment of the cam plates by a lever tool is easily performed.

[0076] For detachably accommodating a lever tool, each of the cam plates 6 is provided with at least one radial bore 9 for receiving said operating lever tool. It will be appreciated that alternative means for fastening the lever tool to the cam plate 6 could be utilized, for example, a threaded pin, hooks or another fastening component.

[0077] As the lever tool is moved in a forward or backward position, the camming surface 7 moves in either an upward or a downward fashion depending upon the position of the handle.

[0078] In this fashion, an actuating force can be applied to the cam plates via the pivoting action of the levering tool, while the cooktop panel 1 is already set into the surround 2 and the cooktop panel 1 can be quickly and easily realigned or repositioned from above by simply moving the levering tool.

[0079] After the cooktop panel 1 has been installed as is described above and the desired height relationship is established, the actual embedding of the cooktop panel 1 takes place, i.e. the sealing-off.

[0080] As the cooktop panel 1 is positioned in the surround to define an upwardly opening gap 5 around its periphery portion, there remains a uniformly wide groove that permits continuous, uninterrupted sliding or adjustment of a detachable seal strip along the entire length of the aligned panel.

[0081] Thus, the sealing-off comprises only the step of closing of the gap by a detachable resilient gasket seal 13, whereby the surface-flush installation of the cooktop 1 in the countertop cutout 4 is complete.

[0082] The gap-filling sealing gasket, as shown in FIG 1, has the task of mechanically connecting the panel firmly with the cutout 4 and sealing off the gap 5, to permanently prevent liquids and dirt from leaking between the cooktop panel 1 and the countertop 2.

[0083] The cooktop panel 1 is thereby secured to the countertop 2 in a releasable manner, without being permanently adhered thereto, as shown in the embodiment of FIG 1.

[0084] The seal is typically made from a material, which is sufficiently hard and resilient to enable the cooktop panel 1 to be assembled and disassembled with or without the use of a suitable tool, whilst being sufficiently rigid to retain the panel within the surround 2 during use of the cooktop.

[0085] The sealing gasket 13 should consist of a temperature-stable material, for example, of pre-extruded silicone.

[0086] Silicone is sufficiently flexible to follow the peripheral shape of the panel. When such a panel has angular corners or tight curves, a silicone seal may be bent

round and secured at the corners thereof by its own resilience.

[0087] Although silicone is the material of preference, it will be understood by those skilled in the art that other sealing materials may also be utilized. For example, said temperature -stable, resilient material may be expanded rubber or a thermoplastic strip.

[0088] The sealing body of the sealing gasket can be constructed in the shape of any convenient profile that fits flush with the countertop surround 2.

[0089] For example, a profiled hose or bead can serve for the purpose of sealing off the gap 5 region between the panel and the surround.

[0090] Preferably, a gasket seal 13 with a hollow profile and, where applicable, provided with additional sealing lips is used. Due to matching hollow profile configurations such a gasket seal will be compressed between the cooktop panel edge and the cutout perimeter and thus be firmly fixed in position.

[0091] In further preferred embodiments, as shown in Figs. 6 and 7, the gasket seal has a generally T-shaped cross-section, including a horizontal flange portion 14 for projecting beyond the gap 5 and a vertical flange portion for insertion into the gap 5.

[0092] Gasket seals of this type are intended to avoid the formation of a dirt trap at the edge of the seal. In the installed condition, the horizontal flange provides a bridging surface between the cooktop panel and the surround. The bridging portion covers the otherwise unsightly fringes of the gap between the cooktop panel 1 and the countertop 2. Thus, the horizontal flange forms a flush layer and eliminates the need for separate exterior trim or leveling apparatus.

[0093] The vertical flange of the T-shaped gasket seal provides a gripping portion shaped to retain both the gasket seal 13 and the cooktop panel 1 within the surround 2. The resilient surface thereof completely and cleanly closes the gap 5.

[0094] In a first embodiment of a T-shaped seal, as shown in FIG 6, the vertical flange is drop-shaped and has a notched neck that projects convexly into the separating gap 5.

[0095] Otherwise, the vertical flange can be formed by a sealing ring with a substantially O-shaped hollow cross-section spanning the gap. A durable but easily detachable connection between cooktop panel and surround is obtained due to the fact that the hollow vertical flange of the sealing gasket is capable of a slight amount of elastic movement.

[0096] In a second embodiment of a T-shaped seal, as shown in FIG 7, the horizontal flange is formed by a slightly concave flat strip, same as in the case of the first example. The vertical flange comprises outwardly directed legs, which abut the perimeter of the cutout 4 and the periphery of the cooktop panel.

[0097] The outwardly directed legs fill gap 5 completely, so that liquid or dirt cannot penetrate into the box section. An improved sealing contact is achieved by this design.

[0098] With this kind of detachable, resilient sealing, the gasket seal can be readily separated from cooktop assembly by pulling it up, away from the circumferential gap and thus from the cooktop panel itself.

[0099] Particularly, the horizontal flange of a T-shaped gasket seal allows for ease of withdrawing said seal. The flexible nature of the gripping portion enables it to flex, thereby enabling the gripping portion to be released from the gap, so that the seal can be removed and thereafter the cooktop panel 1 for easy repair exchange and access to the burner box 3.

[0100] As is apparent from the foregoing specification, the invention is susceptible of being embodied with various alterations and modifications, which may differ particularly from those, that have been described the preceding specification and description.

[0101] Such alterations and modifications may be made without departing from the scope of the invention.

NUMERALS

[0102]

1	cooktop panel
2	countertop
3	burner box
4	cutout
5	gap
6	cam plate
7	camming surface
8	fastening means
9	radial bore
10	perforation
11	fitting opening
12	calibration tool
13	gasket seal
14	horizontal seal flange
15	ledge
16	support frame

Claims

1. Cooktop assembly for flush-mounting a cooktop panel (1) into a cutout (4) of a surround comprising
a cooktop panel (1) having a peripheral edge,
a plurality of height-adjustable support members fastened to the vertical perimeter of the cutout (4) for supporting the cooktop panel (1) in relation to the surround, wherein
a height -adjustable support member comprises an eccentric cam plate (6) rotable around its pivotal axis on a fastening means (8), having
a camming surface (7) facing an circumferential gap (5) between the cutout perimeter and the peripheral edge of the cooktop panel (1), said camming surface (7) forming the support to the cooktop panel (1),

a detachable gasket seal (1) positionable in the circumferential gap (5), and
a separate burner box (3) for accommodating the heating units of the cooktop assembly.

2. A cooktop assembly according to claim 1, wherein the camming surface (7) of the cam plate (6), facing a circumferential gap (5) between the cut-out (4) of the cooktop panel and the peripheral edge of the cooktop panel (1), comprising a bore (9) for accommodating a detachable levering tool for height adjustment of the cooktop panel.

3. A cooktop assembly according to claims 1 and 2, comprising
a calibration tool (12) as a template for vertical pre-adjustment and re-adjustment of the height-adjustable support members.

4. A cooktop assembly according to claims 1 to 3, wherein
the cooktop panel (1) comprises location ridges.

5. A cooktop assembly according to claims 1 to 4, wherein
a sidewall of the burner box (3) comprises a fitting opening (11) opposite a fastening means (8) of the cam plate (6).

6. A cooktop assembly according to claims 1 to 5, wherein
a height-adjustable support member comprises a fixation means to fix the cam plate (6) in its final position.

7. A cooktop assembly according to claims 1 to 6, comprising
an intermediate unitary support frame between the cooktop panel (1) and the camming surface of the cam plate (6).

8. A cooktop assembly according to claims 1 to 7, wherein
the detachable gasket seal (13) comprises a horizontal flange for bridging the circumferential gap (5) and a vertical flange for insertion into the circumferential gap (5).

9. A cooktop assembly according to claim 8, wherein
the detachable gasket seal (13) comprises a vertical flange provided with outwardly directed legs.

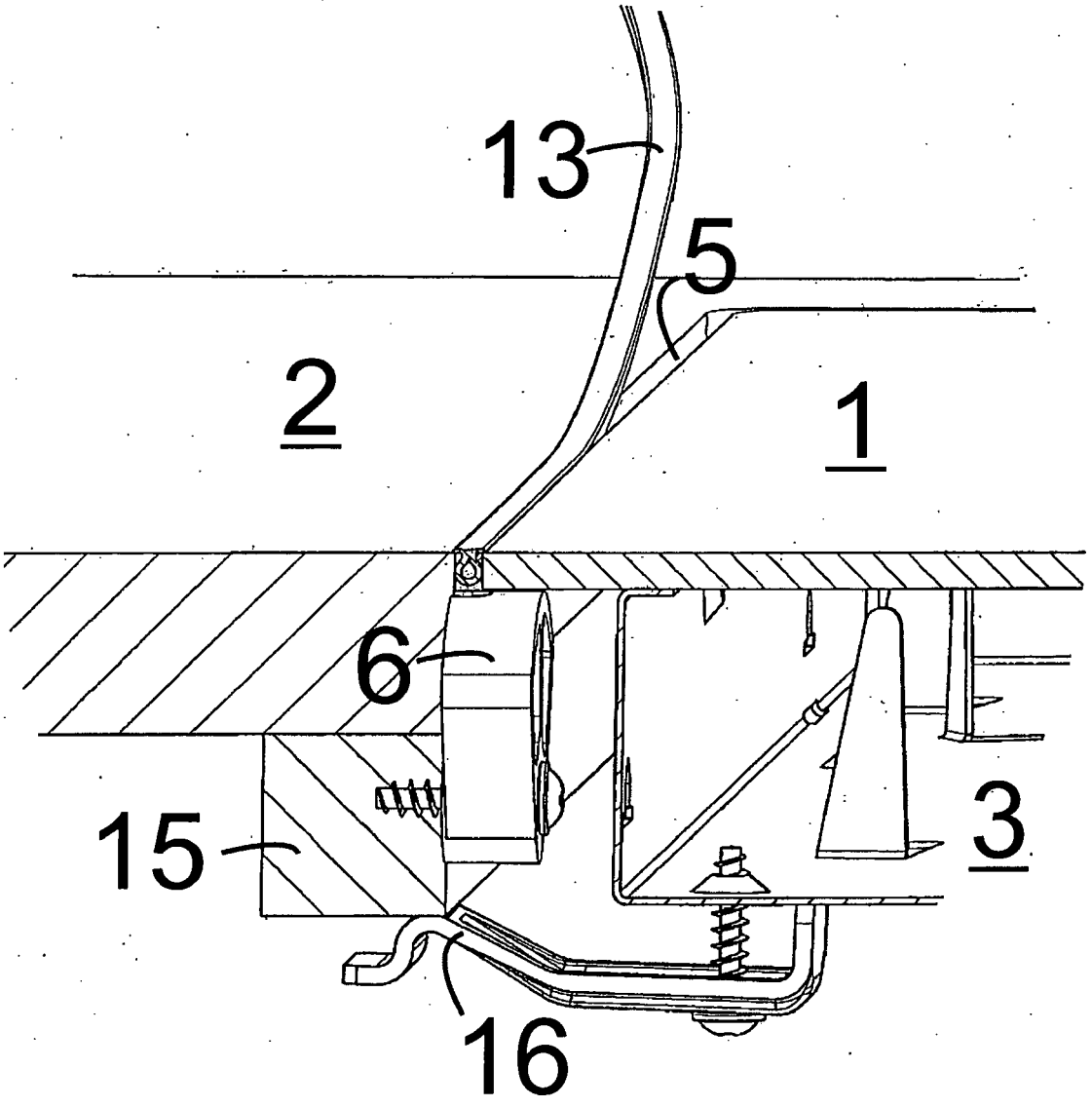

Fig. 1

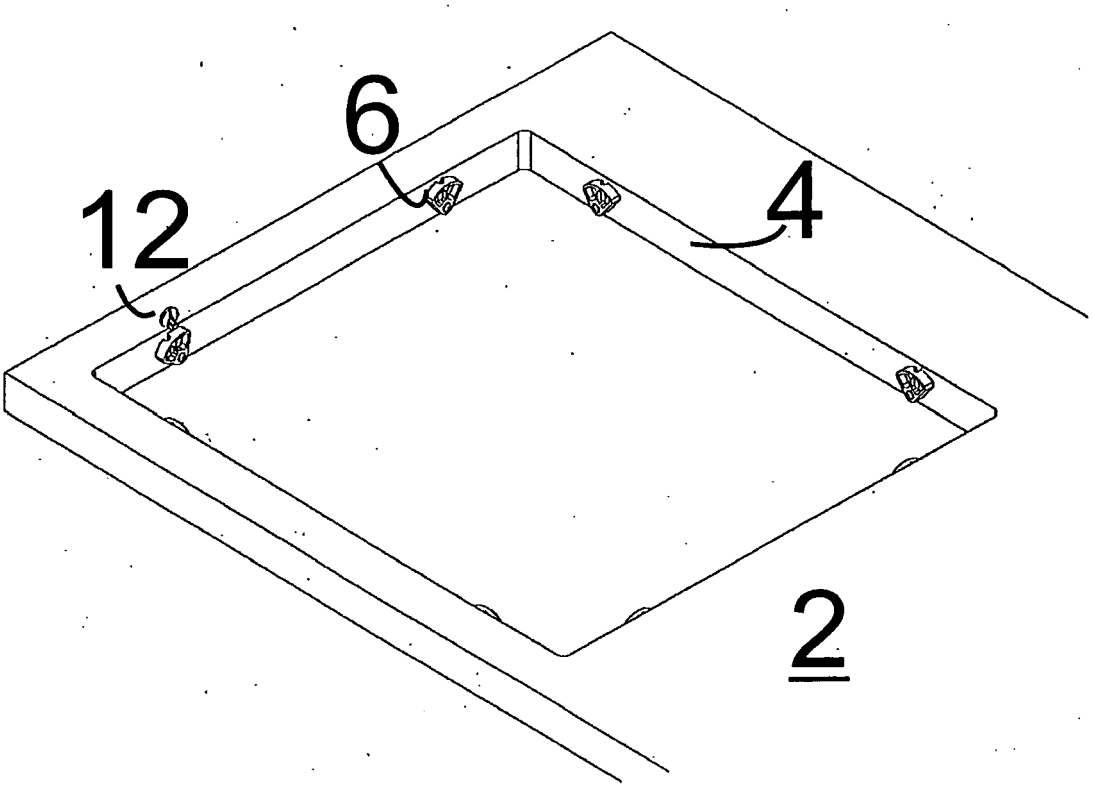

Fig. 2

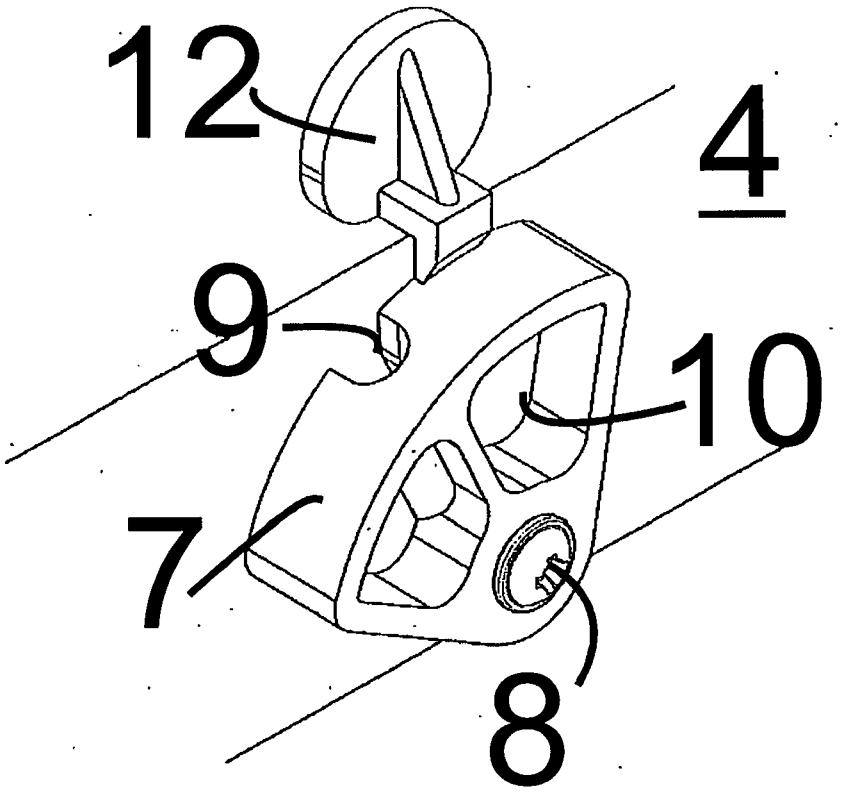

Fig. 3

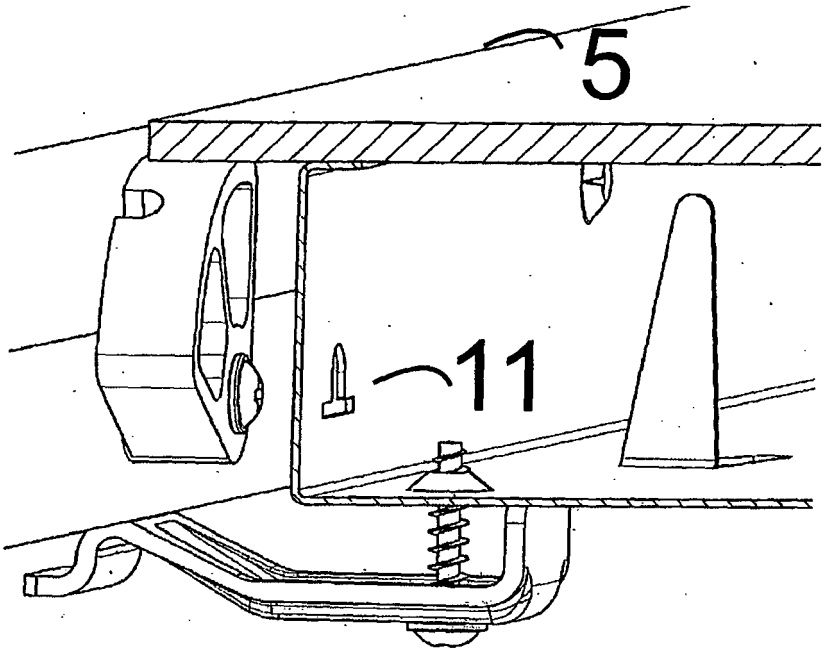

Fig. 4

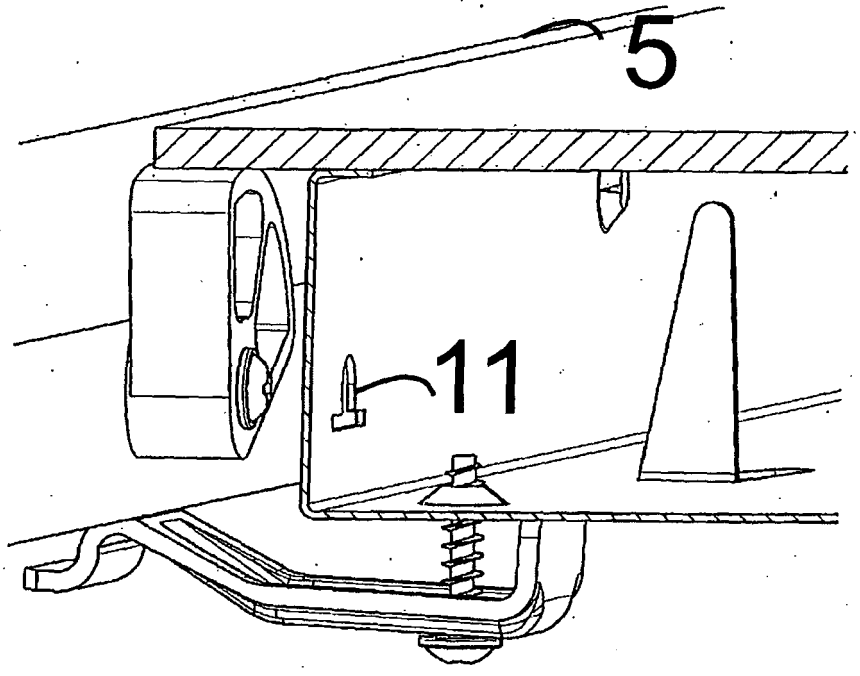

Fig. 5

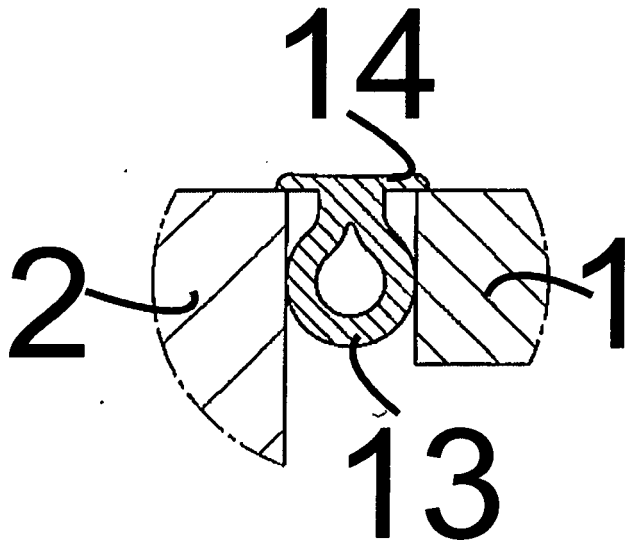

Fig. 6

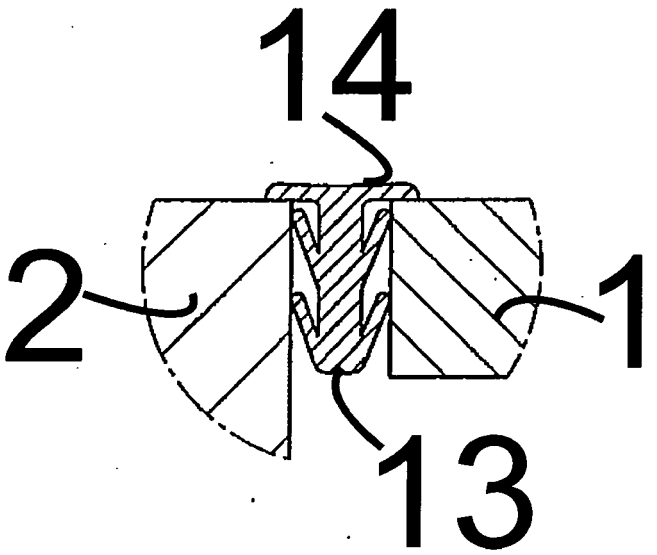

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 08 01 2381

DOCUMENTS CONSIDERED TO BE RELEVANT

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F24C
A47B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 April 2009	Blot, Pierre-Edouard

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