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

(11) **EP 2 811 231 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
10.12.2014 Bulletin 2014/50

(21) Application number: **13743452.8**

(22) Date of filing: **01.02.2013**

(51) Int Cl.:
F24C 15/16 *(2006.01)* ***F24C 7/02*** *(2006.01)*

(86) International application number:
PCT/JP2013/052365

(87) International publication number:
WO 2013/115373 (08.08.2013 Gazette 2013/32)

(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: **02.02.2012 JP 2012020632**

(71) Applicant: **Sharp Kabushiki Kaisha**
Osaka-shi, Osaka 545-8522 (JP)

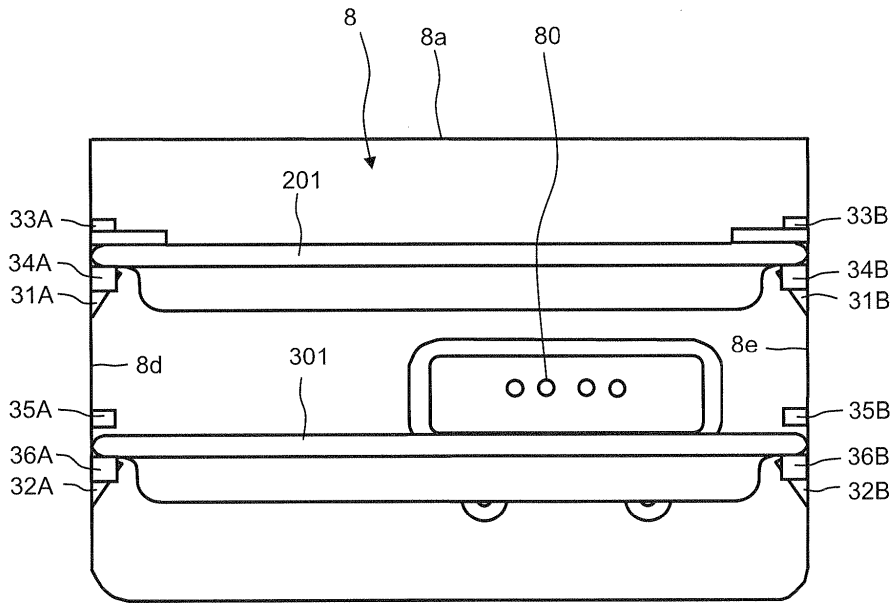
(72) Inventor: **ASAMI, Shinji**
Osaka-shi, Osaka 545-8522 (JP)

(74) Representative: **Treeby, Philip David William**
RGC Jenkins & Co.
26 Caxton Street
London SW1H 0RJ (GB)

(54) **COOKER**

(57) In this cooker, in process of pulling out a tray (201, 301) from within a heating cabinet (8), the tray (201, 301) is tilted in a direction other than a forward direction in a state that restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) are in contact with part of the tray (201, 301), whereby the contact of the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) with the part of the tray (201, 301) is released, thus allowing the tray (201, 301) to be pulled out of the heating cabinet (8).

Fig.6



EP 2 811 231 A1

Description

TECHNICAL FIELD

[0001] The present invention relates to a cooker.

BACKGROUND ART

[0002] Conventionally, there has been provided a cooker which includes a heating cabinet having an opening on its front side, a tray to be removably placed in the heating cabinet for mounting thereon a heating object, which is to be heated, and tray holders provided on individual side faces of the heating cabinet to hold the tray from below (see, e.g., JP 2011-163697 A (PTL1)).

[0003] The tray holders, extending from proximities of the opening on the front side of the heating cabinet to proximities of a rear-end wall of the heating cabinet, serve also for guiding the tray into the heating cabinet when the tray is put into the heating cabinet.

CITATION LIST

Patent Literature

[0004] PTL1: JP 2011-163697 A

SUMMARY OF INVENTION

Technical Problem

[0005] Unfortunately, with the above-described cooker, when the tray is put out from within the heating cabinet, fore end portions of the tray holders are hidden invisible by the tray because the tray holders are positioned below the tray. As a result, there is a problem that the user may excessively pull out the tray erroneously, so that the tray, or the heating object on the tray, may be fallen off.

[0006] Accordingly, an object of the present invention is to provide a cooker capable of preventing the tray and heating objects from falling off.

Solution to Problem

[0007] In order to achieve the objective of the present invention, a cooker according to the present invention comprises

a casing;

a heating cabinet provided in the casing and having an opening on its front side;

a door for opening and closing the opening (8a) of the heating cabinet;

a tray to be removably placed in the heating cabinet for mounting thereon a heating object, which is to be heated;

holding parts provided on an inner surface of the heating cabinet and serving for holding the tray in the heating cabinet; and

restricting parts provided on the inner surface of the heating cabinet and serving for, when put into contact with part of the tray, restricting forward moves of the tray, wherein

in process of pulling out the tray from within the heating cabinet, the tray is tilted in a direction other than a forward direction in a state that the restricting parts are in contact with the part of the tray, whereby the contact of the restricting parts with the part of the tray is released, thus allowing the tray to be pulled out of the heating cabinet.

[0008] With this constitution, in process of pulling out the tray from within the heating cabinet, before the entirety of the tray comes out of the heating cabinet, the restricting parts make contact with the part of the tray, by which forward moves of the tray are restricted. Accordingly, even if the front sides of the holding parts are hidden invisible by the tray, the tray and the heating object can be prevented from falling off due to the user's erroneous, excessive pull-out of the tray.

[0009] Also, in process of pulling out the tray from within the heating cabinet, the tray is tilted in a direction other than a forward direction in a state that the restricting parts are in contact with the part of the tray, whereby the contact of the restricting parts with the part of the tray is released, thus allowing the tray to be pulled out of the heating cabinet. As a result, the tray can be easily cleaned outside the heating cabinet and moreover the heating object can be easily mounted on the tray.

[0010] In a cooker according to one embodiment,

the restricting parts are to be put into contact with an upper side of the tray to restrict vertical pivoting of the tray.

[0011] According to this embodiment, the restricting parts make contact with the upper side of the tray to restrict vertical pivoting of the tray. Thus, even if The user does not hold the tray, the tray can be prevented from tilting down due to pivoting by its self weight.

[0012] Also, since the tray can be prevented from tilting down due to pivoting by its self weight even without the user's holding the tray, the user can easily take out the heating object from the tray by using both hands.

[0013] In a cooker according to one embodiment,

the tray has a tray body, and first stoppers provided on the tray body, and

the part of the tray serves as the first stoppers.

[0014] According to this embodiment, since the restricting parts make contact with the first stoppers provided on the tray body, forward moves of the tray can securely be restricted.

[0015] In a cooker according to one embodiment,

the first stoppers are provided on a lower surface of the tray body.

[0016] According to this embodiment, since the first stoppers are provided on the lower surface of the tray, the first stoppers are less noticeable as the tray is viewed from above, so that the tray can be prevented from degrading in appearance.

[0017] In a cooker according to one embodiment,

the first stoppers have first end faces which are to be put into contact with the restricting parts when the tray is

pulled out from within the heating cabinet, and second end faces which are to be put into contact with the restricting parts when the tray is put into the heating cabinet, and

an angle formed by the second end faces of the first stoppers against a pulling-in/out direction of the tray is smaller than an angle formed by the first end faces of the first stoppers against the pulling-in/out direction of the tray.

[0018] According to this embodiment, in process of pulling out the tray from within the heating cabinet, since the angle formed by the first end faces of the first stoppers against the pulling-in/out direction of the tray is larger than the angle formed by the second end faces of the first stoppers against the pulling-in/out direction of the tray, the first end faces of the first stoppers make contact with the restricting parts, thus being enabled to restrict moves of the tray. Meanwhile, in process of pulling the tray into the heating cabinet, since the angle formed by the second end faces of the first stoppers against the pulling-in/out direction of the tray is smaller than the angle formed by the first end faces of the first stoppers against the pulling-in/out direction of the tray, the second end faces of the first stoppers make sliding contact with the restricting parts, thus allowing the first stoppers to go beyond the restricting parts. Thus, the tray can be pulled relatively smoothly into the heating cabinet.

[0019] In a cooker according to one embodiment,

the first stoppers are provided on an upper surface of the tray body.

[0020] According to this embodiment, since the first stoppers are provided on the upper surface of the tray body, it becomes easily achievable to discern the contact state of the restricting parts with the first stoppers. Thus, it becomes easily achievable to do the tilting operation of the tray for releasing the contact of the restricting parts.

[0021] In a cooker according to one embodiment,

an outer peripheral edge of the tray has a generally rectangular shape, and

the first stoppers are positioned at rear-side corner portions of the tray.

[0022] According to this embodiment, since the first stoppers are positioned at rear-side corner portions of the tray, the contact of the restricting parts with the first stoppers can securely be released by tilting the tray.

[0023] In a cooker according to one embodiment,

the four corner portions of the tray are generally identical in shape to one another.

[0024] According to this embodiment, since the four corner portions of the tray are generally identical in shape to one another, positioning of the tray for its pull-in into the heating cabinet does not need to be determined uniquely, hence an improved usability.

[0025] In a cooker according to one embodiment,

the tray has second stoppers for positioning in the heating cabinet.

[0026] According to this embodiment, since the tray can be positioned in the heating cabinet by the second stoppers, a target heating of the heating object can securely be achieved.

[0027] In a cooker according to one embodiment,

the first stoppers are provided integrally with the tray body.

[0028] According to this embodiment, since the first stoppers are provided integrally with the tray body, the first stoppers and the tray body can be obtained by integral molding. Thus, manufacturing steps for the tray can be reduced so that manufacturing cost for the tray can be reduced.

[0029] In a cooker according to one embodiment,

the restricting parts are positioned near the opening of the heating cabinet.

[0030] According to this embodiment, while the restricting parts are in contact with the first stoppers so as to restrict forward moves of the tray, the restricting parts are positioned near the opening of the heating cabinet, so that most part of the tray can be protruded from the heating cabinet. Thus, the heating object can be taken out more easily from the tray.

[0031] In a cooker according to one embodiment of the cooker,

the restricting parts include a protruding portion positioned upward of the holding parts, and a protruding portion positioned forward of the holding parts.

[0032] According to this embodiment, since the restricting parts include a protruding portion positioned upward of the holding parts, and a protruding portion positioned forward of the holding parts, there can be obtained, with a simple structure, an effect that the tray and the heating object can be prevented from falling off, an effect that the tray can be easily cleaned outside the heating cabinet, and an effect that the heating object can be easily mounted on the tray.

[0033] In a cooker according to one embodiment of the cooker,

the contact of the restricting parts can be released by tilting the tray so that the forward side of the tray becomes higher than the deeper side of the tray.

[0034] According to this embodiment, with the heating object mounted on the tray, tilting the tray so that the forward side of the tray becomes higher than the deeper side of the tray causes the contact of the restricting parts to be released. Thus, in process of releasing the contact of the restricting parts, the heating object can be prevented from moving toward the forward side of the tray and dropping off from the tray.

Advantageous Effects of Invention

[0035] The cooker of the present invention includes: a casing; a heating cabinet provided in the casing and having an opening on its front side; a door for opening and closing the opening of the heating cabinet; a tray to be removably placed in the heating cabinet for mounting thereon a heating object, which is to be heated; holding parts provided on an inner surface of the heating cabinet and serving for holding the tray in the heating cabinet;

and restricting parts provided on the inner surface of the heating cabinet and serving for, when put into contact with part of the tray, restricting forward moves of the tray. Thus, the cooker is enabled to prevent the tray and the heating object from falling off.

[0036] Also, in process of pulling out the tray from within the heating cabinet, the tray is tilted in a direction other than a forward direction in a state that the restricting parts are in contact with part of the tray, whereby the contact of the restricting parts with part of the tray is released, thus allowing the tray to be pulled out of the heating cabinet. Thus, the tray can be easily cleaned outside the heating cabinet and moreover the heating object can be easily mounted on the tray.

BRIEF DESCRIPTION OF DRAWINGS

[0037]

Fig. 1 is a front view of a cooker according to an embodiment of the present invention;
Fig. 2 is a top view of the cooker with its handle-attached door opened;
Fig. 3 is a front view of the cooker with its handle-attached door opened;
Fig. 4 is a schematic sectional view of the cooker;
Fig. 5 is a perspective view of the cooker with its casing removed;
Fig. 6 is a schematic view of the cooker as the interior of its heating cabinet is viewed from the opening side;
Fig. 7 is a schematic top view of a metal tray of the cooker;
Fig. 8 is a schematic right side view of the metal tray;
Fig. 9 is a schematic left side view of the metal tray;
Fig. 10 is a schematic top view of a glass tray of the cooker;
Fig. 11 is a schematic right side view of the glass tray;
Fig. 12 is a schematic left side view of the glass tray;
Fig. 13 is a schematic view of a right side wall of the heating cabinet as viewed from the inner side;
Fig. 14 is a schematic view of a left side wall of the heating cabinet as viewed from the inner side;
Fig. 15 is a schematic view for explaining extracting operation of the metal tray;
Fig. 16 is a schematic view for explaining extracting operation of the metal tray;
Fig. 17 is a schematic view for explaining extracting operation of the metal tray;
Fig. 18 is a schematic view for explaining extracting operation of the metal tray;
Fig. 19 is a schematic view for explaining inserting operation of the metal tray;
Fig. 20 is a schematic view for explaining inserting operation of the metal tray;
Fig. 21 is a schematic view for explaining extracting operation of the glass tray;
Fig. 22 is a schematic view for explaining extracting operation of the glass tray;
Fig. 23 is a schematic view for explaining extracting operation of the glass tray;
Fig. 24 is a schematic view for explaining extracting operation of the glass tray;
Fig. 25 is a schematic view for explaining extracting operation of the glass tray;
Fig. 26 is a schematic view for explaining extracting operation of the glass tray;
Fig. 27 is a schematic view for explaining inserting operation of the glass tray; and
Fig. 28 is a schematic view for explaining inserting operation of the glass tray.

DESCRIPTION OF EMBODIMENTS

[0038] Hereinbelow, a cooker of the present invention will be described in detail by embodiments thereof illustrated in the accompanying drawings.

[0039] Fig. 1 is a front view of a cooker according to an embodiment of the invention.

[0040] The cooker includes a casing 1, and a handle-attached door 2 mounted on the front side of the casing 1. A heat-resistant glass 5 is mounted at a generally center of the handle-attached door 2. Also on the front side of the casing 1, an operation panel 3 is provided so as to be next to the closed handle-attached door 2. Then, a dew receiving container 4 is set below the handle-attached door 2 and the operation panel 3. In addition, the handle-attached door 2 is an example of a door.

[0041] The operation panel 3 has an LCD (Liquid Crystal Display) part 7, which makes displays in response to operations. Although not shown, a plurality of press buttons and the like are provided on the operation panel 3.

[0042] The dew receiving container 4 is a container fittable to and removable from two front legs 6, 6 provided on the front side of bottom portion of the casing 1. Then, as the dew receiving container 4 is inserted to the lower side of the casing 1 from forward to rearward so as to be fitted to the front legs 6, 6, the dew receiving container 4 is partly positioned below the rear face (back face) of the closed handle-attached door 2.

[0043] Fig. 2 is a top view of the cooker with its handle-attached door 2 fully opened (in open state), as viewed from above. Fig. 3 is a front view of the cooker with its handle-attached door 2 fully opened.

[0044] In the casing 1 shown in Figs. 2 and 3, a heating cabinet 8 for heating a heating object 23 (see Fig. 4), which is to be heated, is provided. The heating cabinet 8 has an opening 8a on its front side, and the opening 8a is opened and closed by lateral pivoting of the handle-attached door 2. In this case, one side portion of the handle-attached door 2 opposite to the operation panel 3 side is pivotably attached via a hinge (not shown) to one side portion of the casing 1 opposite to the operation panel 3 side.

[0045] Latch hooks 90 are provided on the rear face of the handle-attached door 2. When the handle-attached door 2 is closed, the latch hooks 90 are inserted into

insertion holes 91 provided in peripheral portion of the opening 8a, so that the latch hooks 90 are disengageably engaged with a latch mechanism (not shown) within the casing 1. Also, disengagement of the latch hooks 90 can be done by the user's gripping the handle 2a of the handle-attached door 2.

[0046] In addition, in Fig. 3, reference sign 80 denotes steam blowoff holes through which steam generated by a steam generator 13 (see Fig. 5) is blown off inward of the heating cabinet 8.

[0047] Fig. 4 is a schematic sectional view of the cooker.

[0048] In this cooker, air outside the casing 1 is sucked into the casing 1 via a plurality of inlet ports 17 by a cooling fan 16. Part of air sucked into the casing 1 via the plurality of inlet ports 17 passes through an electrical component chamber 9 and then, with an air supply damper 50 opened, flows into the heating cabinet 8 through a plurality of open-state air supply opening 8b. Meanwhile, another part of the air sucked into the casing 1 via the plurality of inlet ports 17, after passing through the electrical component chamber 9, flows to the bottom side of the casing 1 so as to flow into a cooling air inlet 101 of an exhaust duct 100 via an air flow passage 112 on the lower side of the heating cabinet 8.

[0049] Also, part of the air within the heating cabinet 8 is discharged to the exhaust duct 100 via an exhaust port 8c and an exhaust tube 18 so as to be mixed and diluted in the exhaust duct 100 with the air that has come in through the cooling air inlet 101. The air diluted in the exhaust duct 100 is blown off from a plurality of discharge ports 102 provided in the exhaust duct 100 inward of one end portion of the dew receiving container 4.

[0050] In this process, part of air flowing through the air flow passage 112 is blown off from a plurality of cooling-air blowoff ports 70 provided on the front side of the bottom plate of the casing 1, inward of one end portion of the dew receiving container 4.

[0051] In addition, in Fig. 4, reference sign 26 denotes a heater 26 for heating the heating object 23. Also, the inlet ports 17 are formed from slits, respectively, provided in rear portion of the casing 1.

[0052] Fig. 5 is a perspective view of the cooker with its casing 1 removed, as viewed from rearward and obliquely upward.

[0053] In the casing 1, the electrical component chamber 9 is provided sideward of the heating cabinet 8 (see Figs. 3 and 4) and rearward of the operation panel 3. An inlet space 10 is provided sideward of the heating cabinet 8 and rearward of the electrical component chamber 9.

[0054] In an upper space within the heating cabinet 8, the heater 26 for heating the heating object 23 is placed.

[0055] Meanwhile, outside the heating cabinet 8, heat shielding plates 11, 11, ... are placed upward, downward, rearward and both sideward of the heating cabinet 8, respectively. That is, the heat shielding plates 11, 11, ... are placed all around the heating cabinet 8 except its opening 8a. Also, heat insulating material (not shown) is filled in spaces between the heat shielding plates 11 and the heating cabinet 8. In addition, in Fig. 5, the heat shielding plate placed upward of the heating cabinet 8 is omitted in drawing.

[0056] Further, a steam generator 13 for generating steam is placed on the rear face side of the heating cabinet 8. A feedwater pump 19 connected to the steam generator 13 via a feedwater tube (not shown) is placed on the lower side of the heating cabinet 8.

[0057] A tank accommodating part 15 for accommodating a feedwater tank (not shown), a magnetron 51, a power transformer 52 and the like are disposed in the electrical component chamber 9. Then, during heating of the heating object 23, cooling air from the cooling fan 16 flows within the electrical component chamber 9 so that the magnetron 51 and other electrical components can be cooled.

[0058] Microwaves generated by the magnetron 51 are led to a lower center of the heating cabinet 8 via a waveguide (not shown) and, while being stirred by a rotating antenna (not shown), radiated upward within the heating cabinet 8 so as to heat the heating object 23.

[0059] Water in the feedwater tank accommodated in the tank accommodating part 15 is fed to the steam generator 13 via a feedwater tube (not shown) by the feedwater pump 19. The steam generator 13 heats the water derived from the feedwater pump 19 by a steam generating heater 24 so as to generate steam.

[0060] As the cooling fan 16 is driven, air outside the casing 1 flows into the inlet space 10 through the plurality of inlet ports 17 (see Fig. 4). Then, air within the inlet space 10 is fed into the electrical component chamber 9 by the cooling fan 16.

[0061] In addition, in Fig. 5, reference sign 21 denotes a partitioning wall for partitioning between the electrical component chamber 9 and the inlet space 10. The cooling fan 16 is mounted on the partitioning wall 21.

[0062] Fig. 6 is a schematic view as the interior of the heating cabinet 8 is viewed from the opening 8a.

[0063] A metal tray 201 and a glass tray 301 are settable into and out of the heating cabinet 8. Upper tray holders 31A, 31B are provided on the up side of inner surfaces of a right side wall 8d and a left side wall 8e of the heating cabinet 8, respectively, and these upper tray holders 31A, 31B hold the metal tray 201 from below. Further, lower tray holders 32A, 32B are provided on the lower side of inner surfaces of the right side wall 8d and the left side wall 8e of the heating cabinet 8, respectively, and these lower tray holders 32A, 32B hold the glass tray 301 from below. The metal tray 201, while held by the upper tray holders 31A, 31B, is positioned at a height of e.g. about 23 cm from the installation plane of the cooker. Also, the glass tray 301, while held by the lower tray holders 32A, 32B, is positioned at a height of e.g. about 15 cm from the installation plane of the cooker. The upper tray holders 31A, 31B are enabled to hold the glass tray 301 as well, while the lower tray holders 32A, 32B are enabled to hold the metal tray 201 as well. In addition,

the metal tray 201 and the glass tray 301 are each an example of the tray. The upper tray holders 31A, 31B and the lower tray holders 32A, 32B are each an example of the holding part.

[0064] Fig. 7 is a schematic top view of the metal tray 201 as viewed from above. Fig. 8 is a schematic right side view of the metal tray 201 as viewed from the right side. Fig. 9 is a schematic left side view of the metal tray 201 as viewed from the left side.

[0065] The metal tray 201, as shown in Figs. 7 to 9, has a tray body 202 made of a metal such as iron or stainless, and stoppers 203A, 203B, 203C, 203D made of a heat-resistant resin, while the outer peripheral edge of the metal tray 201 has a generally rectangular shape. Four corner portions of the metal tray 201 are generally identical in shape to one another. Also, the metal tray 201 can be set in either upper or lower part in the heating cabinet 8 so that the stoppers 203A, 203B are positioned deeper in the heating cabinet 8, or the metal tray 201 can be set in either upper or lower part in the heating cabinet 8 so that the stoppers 203C, 203D are positioned on the deeper side in the heating cabinet 8. In addition, the stoppers 203A, 203B, 203C, 203D are an example of a first stopper as well as an example of a second stopper.

[0066] The tray body 202 is composed of a bottom portion 202a for mounting the heating object 23 thereon, a side portion 202b erectly provided all over the peripheral edge portion of the bottom portion 202a, and a flange portion 202c adjoining an upper end portion of the side portion 202b. A plurality of through holes 202d are provided in the bottom portion 202a so that water or other liquids do not accumulate on the bottom portion 202a. Also, the four corner portions of the flange portion 202c are formed each into an arc-like shape in a top view. That is, outer peripheral edges of the four corner portions of the flange portion 202c are rounded.

[0067] Either the pair of stoppers 203A and 203B or the pair of stoppers 203C and 203D, whichever it is positioned deeper in the heating cabinet 8, serves for the role of restricting moves of the metal tray 201 in the heating cabinet 8, while the pair positioned on the forward side in the heating cabinet 8 serves for the role of positioning the metal tray 201 in the heating cabinet 8. Also, the stoppers 203A, 203B, 203C, 203D, each having a sectoral shape as viewed from above, are placed on the corner portions of the flange portion 202c and fixed with screws 204. Also, the stoppers 203A, 203B, 203C, 203D are slightly larger in width than the corner portions of the flange portion 202c, and there is a step gap between top faces of the stoppers 203A, 203B, 203C, 203D and a top face of the flange portion 202c. While the upper tray holders 31A, 31B hold the metal tray 201 from below and moreover the bottom portion 202a of the tray body 202 is generally horizontal, the corner portions of the flange portion 202c are kept from contact with upper surfaces of the upper tray holders 31A, 31B.

[0068] Fig. 10 is a schematic top view of the glass tray 301 as viewed from above. Fig. 11 is a schematic right side view of the glass tray 301 as viewed from the right side. Fig. 12 is a schematic left side view of the glass tray 301 as viewed from the left side.

[0069] The glass tray 301, as shown in Fig. 10, has a bottom portion 301a for mounting the heating object 23 thereon, a right side portion 301b erectly provided at a right-side edge portion of the bottom portion 301a, a left side portion 301c erectly provided at a left-side edge portion of the bottom portion 301a, a plate-shaped right end portion 301d adjoining an upper end portion of the right side portion 301b, and a left end portion 301e adjoining an upper end portion of the left side portion 301c. No through holes are provided in the bottom portion 301a, so that water or other liquids can be held by the bottom portion 301a. Also, outer peripheral edges of the four corner portions of the glass tray 301 are rounded. The glass tray 301 can be set in either upper or lower part in the heating cabinet 8 so that later-described stoppers 302A, 302B are positioned on the deeper side in the heating cabinet 8, or the glass tray 301 can be set in either upper or lower part in the heating cabinet 8 so that later-described stoppers 302C, 302D are positioned on the deeper side in the heating cabinet 8. In addition, the bottom portion 301a, the right side portion 301b, the left side portion 301c, the right end portion 301d, and the left end portion 301e are an example of the tray body.

[0070] As shown in Fig. 11, stoppers 302A, 302C having a trapezoidal shape as viewed sideways are provided on the lower surface of the right end portion 301d. The stopper 302A has a first inclined end face 303A on one side facing the stopper 302C. On the other hand, the sttopper 302A has a second inclined end face 304A on the side opposite to the stopper 302C side. Also, like the stopper 302A, the stopper 302C also has a first inclined end face 303C on one side facing the stopper 302A. On the other hand, the sttopper 302C has a second inclined end face 304C on the side opposite to the stopper 302A side. An inclination angle of the first inclined end faces 303A, 303C relative to the lower surface of the right end portion 301d is set larger than an inclination angle of the second inclined end faces 304A, 304C relative to the lower surface of the right end portion 301d. In addition, the stoppers 302A, 302C are an example of the first stopper. The first inclined end faces 303A, 303C are an example of a first end face. Also, the second inclined end faces 304A, 304C are an example of a second end face.

[0071] As shown in Fig. 12, stoppers 302B, 302D having a trapezoidal shape as viewed sideways are provided on the lower surface of the left end portion 301e. The stopper 302B has a first inclined end face 303B on one side facing the stopper 302D. On the other hand, the sttopper 302B has a second inclined end face 304B on the side opposite to the stopper 302D side. Also, like the stopper 302B, the stopper 302D also has a first inclined end face 303D on one side facing the stopper 302B. On the other hand, the sttopper 302D has a second inclined end face 304D on the side opposite to the stopper 302B side. An inclination angle of the first inclined end faces

303B, 303D relative to the lower surface of the left end portion 301e is set larger than an inclination angle of the second inclined end faces 304B, 304D relative to the lower surface of the left end portion 301e. In addition, the stoppers 302B, 302D are an example of the first stopper. The first inclined end faces 303B, 303D are an example of the first end face. Also, the second inclined end faces 304B, 304D are an example of the second end face.

[0072] Either the pair of stoppers 302A and 302B or the pair of stoppers 302C and 302D, whichever it is positioned deeper in the heating cabinet 8, serves for the role of restricting moves of the metal tray 201 in the heating cabinet 8. Also, the stoppers 302A, 302B, 302C, 302D are protruding portions which protrude downward from the lower surface of the right end portion 301d or the left end portion 301e and which are formed by integral molding using heat-resistant glass material together with the bottom portion 301a, the right side portion 301b, the left side portion 301c, the right end portion 301d, the left end portion 301e, and the like.

[0073] In addition, the lower surface of the left end portion 301e is a surface that is generally parallel to a pulling-in/out direction of the glass tray 301.

[0074] Fig. 13 is a schematic view of the right side wall 8d of the heating cabinet 8 as viewed from the inner side. Fig. 14 is a schematic view of the left side wall 8e of the heating cabinet 8 as viewed from the inner side.

[0075] As shown in Figs. 13 and 14, the upper tray holders 31A, 31B and the lower tray holders 32A, 32B extend in straight lines from vicinities of the opening 8a of the heating cabinet 8 toward the rear portion of the heating cabinet 8. Also, the upper surfaces of the upper tray holders 31A, 31B and the upper surfaces of the lower tray holders 32A, 32B are inclined obliquely downward relative to the horizontal direction. The flange portion 202c of the tray body 202 of the metal tray 201 slides in contact on the upper surfaces of the upper tray holders 31A, 31B. On the other hand, the right end portion 301d and the left end portion 301e of the glass tray 301 slide in contact on the upper surfaces of the lower tray holders 32A, 32B.

[0076] On the upper side of inner surfaces of the right side wall 8d and the left side wall 8e of the heating cabinet 8, cylindrical-shaped first upper protrusions 33A, 33B are provided so as to be positioned upward of fore end portions of the upper tray holders 31A, 31B while cylindrical-shaped second upper protrusions 34A, 34B are provided so as to be positioned forward of the fore end portions of the upper tray holders 31A, 31B. These first upper protrusions 33A, 33B and the second upper protrusions 34A, 34B are positioned close to the opening 8a of the heating cabinet 8. A diameter of the first upper protrusions 33A, 33B is set smaller than a diameter of the second upper protrusions 34A, 34B. Upper ends of the second upper protrusions 34A, 34B are generally flush with the upper surfaces of the upper tray holders 31A, 31B. Also, in a case where the metal tray 201 in the state that the stoppers 203A, 203B are positioned deeper than the stoppers 203C, 203D is pulled out from within the heating cabinet 8 by a horizontal move, when the metal tray 201 has been pulled out to a preset length from within the heating cabinet 8, the first upper protrusions 33A, 33B come into contact with fore end faces (end faces on the opening 8a side) of the stoppers 203A, 203B so that horizontal moves of the metal tray 201 are restricted. Moreover, with the metal tray 201 pulled out to the preset length from within the heating cabinet 8, even if the metal tray 201 is induced to pivot by its self weight, the first upper protrusions 33A, 33B come into contact with the upper surface of the flange portion 202c of the tray body 202 so that pivoting of the metal tray 201 is restricted. In addition, the first upper protrusions 33A, 33B and the second upper protrusions 34A, 34B are an example of restricting parts.

[0077] Also, on the lower side of the inner surfaces of the right side wall 8d and the left side wall 8e of the heating cabinet 8, cylindrical-shaped first lower protrusions 35A, 35B are provided so as to be positioned upward of the fore end portions of the lower tray holders 32A, 32B while cylindrical-shaped second lower protrusions 36A, 36B are provided so as to be positioned forward of the fore end portions of the lower tray holders 32A, 32B. These first lower protrusions 35A, 35B and the second lower protrusions 36A, 36B are positioned close to the opening 8a of the heating cabinet 8. A diameter of the first lower protrusions 35A, 35B is set smaller than a diameter of the second lower protrusions 36A, 36B. Upper ends of the second lower protrusions 36A, 36B are generally flush with the upper surfaces of the lower tray holders 32A, 32B. Also, in a case where the glass tray 301 in the state that the stoppers 302A, 302B are positioned deeper than the stoppers 302C, 302D is pulled out from within the heating cabinet 8 by a horizontal move, when the glass tray 301 has been pulled out to a preset length from within the heating cabinet 8, the second lower protrusions 36A, 36B come into contact with the first inclined end faces 303A, 303B of the stoppers 302A, 302B so that horizontal moves of the glass tray 301 are restricted. Moreover, with the glass tray 301 pulled out to the preset length from within the heating cabinet 8, even if the glass tray 301 is induced to pivot by its self weight, the first lower protrusions 35A, 35B come into contact with the upper surfaces of the right end portion 301d and the left end portion 301e of the glass tray 301 so that pivoting of the glass tray 301 is restricted. In addition, the first lower protrusions 35A, 35B and the second lower protrusions 36A, 36B are an example of the restricting parts.

[0078] In execution of a steam cooking as an example with the cooker having the above-described constitution, after the heating object 23 is set on the bottom portion 202a of the tray body 202 of the metal tray 201, the metal tray 201 is put in upper part within the heating cabinet 8 so that the stoppers 203A, 203B are positioned on the deeper side (rear side) in the heating cabinet 8, by which the metal tray 201 is held by the upper tray holders 31A, 31B. In addition to this, the glass tray 301 is put in lower

part within the heating cabinet 8 so that the stoppers 302A, 302B are positioned on the deeper side (rear side) in the heating cabinet 8, by which the glass tray 301 is held by the lower tray holders 32A, 32B. Then, the handle-attached door 2 is closed and a plurality of press buttons on the operation panel 3 are operated, by which the heating object 23 is steamed. In this process, condensed water or the like generated on the metal tray 201 drips through the plurality of through holes 202d of the bottom portion 202a of the tray body 202, accumulating on the bottom portion 202a of the glass tray 301.

[0079] After the steaming of the heating object 23 as shown above, in the case where the handle-attached door 2 is opened and the metal tray 201 is pulled out to take out the heating object 23 from within the heating cabinet 8, when most part (e.g., more than a half) of the metal tray 201 has come out of the heating cabinet 8 as shown in Figs. 15 and 16, the first upper protrusions 33A, 33B come into contact with the fore end faces of the stoppers 203A, 203B, inhibiting the metal tray 201 from being pulled out. As a result of this, even if the fore end portions of the upper tray holders 31A, 31B are hidden by the metal tray 201, the metal tray 201 and the heating object 23 can be prevented from falling off due to the user's erroneous, excessive pull-out of the metal tray 201.

[0080] Also, with the metal tray 201 in the state of Figs. 15 and 16, even if the metal tray 201 is induced to pivot about near the second upper protrusions 34A, 34B by its self weight, the first upper protrusions 33A, 33B come into contact with the upper surface of the flange portion 202c so that such pivoting of the metal tray 201 can be prevented. Therefore, even without the user's holding of the metal tray 201, it becomes possible to hold the state that most of the metal tray 201 has come out of the heating cabinet 8. Accordingly, since the user is allowed to freely use both hands in the above-described state, it becomes possible to easily take out the heating object 23 from the metal tray 201. For example, in the state of Figs. 15 and 16, even when a weight of 2 kg is placed on the forward side of the metal tray 201 with the hands off the metal tray 201, the metal tray 201 can be prevented from tilting down.

[0081] Moreover, since the heating object 23 can be taken out in the state of Figs. 15 and 16, takeout of the heating object 23 can be fulfilled without giving considerations for the rest place for the metal tray 201 even in a narrow kitchen as an example, hence an improved usability.

[0082] Also, tilting the metal tray 201 as shown in Figs. 17 and 18 causes the first upper protrusions 33A, 33B to be released from contact therewith. That is, the stoppers 203A, 203B go apart from the first upper protrusions 33A, 33B. Therefore, the stoppers 203A, 203B are allowed to go through under the first upper protrusions 33A, 33B, so that the metal tray 201 can entirely be taken out of the heating cabinet 8. As a result, the metal tray 201 can be easily cleaned outside the heating cabinet 8 and moreover the heating object 23 can be easily rested on the bottom portion 202a of the tray body 202.

[0083] Also, since the stoppers 203A, 203B are placed on the flange portion 202c, it becomes easily achievable to discern the contact state of the first upper protrusions 33A, 33B with the stoppers 203A, 203B. Thus, it becomes easily achievable to do the tilting operation of the metal tray 201 for releasing the contact of the first upper protrusions 33A, 33B.

[0084] Further, since the stoppers 203A, 203B are positioned on the corner portions of the flange portion 202c, the stoppers 203A, 203B can securely be released from the first upper protrusions 33A, 33B by tilting the metal tray 201.

[0085] Further, since the first upper protrusions 33A, 33B are positioned close to the opening 8a of the heating cabinet 8, it follows that when the first upper protrusions 33A, 33B have come into contact with the stoppers 203A, 203B so that the metal tray 201 has been stopped, most part of the metal tray 201 can securely be taken out of the heating cabinet 8. Thus, the heating object 23 can more easily be taken out from the metal tray 201.

[0086] Also in the case where the metal tray 201 is put in upper part within the heating cabinet 8 so that the stoppers 203A, 203B are positioned on the deeper side (rear side) in the heating cabinet 8, tilting the metal tray 201 about the second upper protrusions 34A, 34B as shown in Figs. 17 and 18 allows the stoppers 203A, 203B to go through under the first upper protrusions 33A, 33B, in which state the metal tray 201 is pushd into the heating cabinet 8. Then, as shown in Figs. 19 and 20, the first upper protrusions 33A, 33B come into contact with rear end faces of the stoppers 203C, 203D, inhibiting the metal tray 201 from being pushd into the heating cabinet 8. As a result, the metal tray 201 can securely be set to a predetermined place, making it possible to securely fulfill a target heating of the heating object 23 on the bottom portion 202a.

[0087] Meanwhile, in the case where the glass tray 301 is pulled out, when part (e.g., less than a half) of the glass tray 301 has come out of the heating cabinet 8 as shown in Figs. 21 and 22, the second lower protrusions 36A, 36B come into contact with the second inclined end faces 304C, 304D of the stoppers 302C, 302D. In this state, further pulling the glass tray 301 causes the second inclined end faces 304C, 304D of the stoppers 302C, 302D to slide in contact with the second lower protrusions 36A, 36B, so that the stoppers 302C, 302D go beyond the second lower protrusions 36A, 36B. Therefore, the glass tray 301 can be further pulled out from within the heating cabinet 8. Thus, the glass tray 301 can be pulled out relatively smoothly from within the heating cabinet 8.

[0088] Also in the case where the glass tray 301 is further pulled out, when most part (e.g., more than a half) of the glass tray 301 has come out of the heating cabinet 8 as shown in Figs. 23 and 24, the second lower protrusions 36A, 36B come into contact with the first inclined end faces 303A, 303B of the stoppers 302A, 302B, inhibiting the glass tray 301 from being pulled out. As a

result of this, even if the fore end portions of the lower tray holders 32A, 32B are hidden invisible by the metal tray 201, the glass tray 301 can be prevented from falling off due to the user's erroneous, excessive pull-out of the glass tray 301.

[0089] Also, with the glass tray 301 in the state of Figs. 23 and 24, even if the glass tray 301 is induced to pivot about near the second lower protrusions 36A, 36B by its self weight, the first lower protrusions 35A, 35B come into contact with the upper surfaces of the right end portion 301d and the left end portion 301e so that such pivoting of the glass tray 301 can be prevented. Therefore, even without the user's holding of the glass tray 301, it becomes possible to hold the state that most of the glass tray 301 has come out of the heating cabinet 8. Accordingly, on condition that the heating object 23 is mounted on the glass tray 301, the user is allowed to easily take out the heating object 23 from the glass tray 301 as it is in the above state. For example, in the state of Figs. 23 and 24, even when a weight of 2 kg is placed on the forward side of the glass tray 301 with the hands off the glass tray 301, the glass tray 301 can be prevented from tilting down.

[0090] Moreover, since the heating object 23 can be taken out in the state of Figs. 23 and 24, takeout of the heating object 23 can be fulfilled without giving considerations for the rest place for the glass tray 301 even in a narrow kitchen as an example, hence an improved usability.

[0091] Also, tilting the glass tray 301 as shown in Figs. 25 and 26 causes the second lower protrusions 36A, 36B to be released from contact therewith. That is, the stoppers 302A, 302B go apart from the second lower protrusions 36A, 36B. Therefore, the stoppers 302A, 302B are allowed to go beyond the second lower protrusions 36A, 36B, so that the glass tray 301 can entirely be taken out of the heating cabinet 8. As a result, the heating object 23 can be easily rested on the bottom portion 301a of the glass tray 301, and moreover the glass tray 301 can be easily cleaned outside the heating cabinet 8.

[0092] Also, in the case where the glass tray 301 is set in lower part within the heating cabinet 8 so that the stoppers 302A, 302B are positioned on the deeper side (rear side) in the heating cabinet 8, the second lower protrusions 36A, 36B come into contact with the second inclined end faces 304A, 304B of the stoppers 302A, 302B as shown in Figs. 27 and 28. In this state, further pushing the glass tray 301 causes the second inclined end faces 304A, 304B of the stoppers 302A, 302B to slide in contact with the second lower protrusions 36A, 36B, so that the stoppers 302A, 302B go beyond the second lower protrusions 36A, 36B. Therefore, the glass tray 301 can be further put into the heating cabinet 8. Thus, the glass tray 301 can be put relatively smoothly into the heating cabinet 8.

[0093] After the stoppers 302A, 302B have gone beyond the second lower protrusions 36A, 36B, the first inclined end faces 303C, 303D of the stoppers 302C, 302D come into contact with the second lower protrusions 36A, 36B. In this state, tilting the glass tray 301 as in the case of Figs. 25 and 26 causes the second lower protrusions 36A, 36B to be released from contact therewith. That is, the stoppers 302C, 302D go apart from the second lower protrusions 36A, 36B. Therefore, the stoppers 302C, 302D are allowed to go beyond the second lower protrusions 36A, 36B, so that the glass tray 301 can entirely be put in lower part within the heating cabinet 8.

[0094] Also, since the stoppers 302A, 302C are provided on the lower surface of the right end portion 301d while the stoppers 302B, 302D are provided on the lower surface of the left end portion 301e, it becomes possible to use the glass tray 301 as the metal tray 201 is superimposed thereon for example. Thus, the convenience of the glass tray 301 can be improved.

[0095] Also, since the stoppers 302A, 302C are provided on the lower surface of the right end portion 301d while the stoppers 302B, 302D are provided on the lower surface of the left end portion 301e, it follows that the stoppers 302A, 302B, 302C, 302D are less noticeable as the glass tray 301 is viewed from above, so that the glass tray 301 can be prevented from degrading in appearance.

[0096] Also, since the stoppers 302A, 302B, 302C, 302D are made by integral molding using heat-resistant glass material together with the bottom portion 301a, the right side portion 301b, the left side portion 301c, the right end portion 301d, the left end portion 301e and the like, it follows that manufacturing steps for the glass tray 301 can be reduced so that manufacturing cost for the glass tray 301 can be reduced.

[0097] Also, since the second lower protrusions 36A, 36B are positioned near the opening 8a of the heating cabinet 8, it follows that when the glass tray 301 has stopped due to contact of the second lower protrusions 36A, 36B with the stoppers 302A, 302B, most part of the glass tray 301 can securely be put out of the heating cabinet 8. Accordingly, on condition that the heating object 23 is mounted on the glass tray 301, the heating object 23 can be taken out more easily from the glass tray 301.

[0098] Although the glass tray 301 is provided with no stopper for its positioning within the heating cabinet 8 in this embodiment, yet the glass tray 301 may be provided with a stopper for fulfilling the positioning within the heating cabinet 8.

[0099] In this embodiment, the metal tray 201 is set in upper part within the heating cabinet 8 so that the stoppers 203A, 203B are positioned on the deeper side in the heating cabinet 8. However, the metal tray 201 can also be set in upper part within the heating cabinet 8 so that the stoppers 203C, 203D are positioned on the deeper side in the heating cabinet 8.

[0100] Also in the case where the metal tray 201 is set in upper part within the heating cabinet 8 so that the stoppers 203C, 203D are positioned on the deeper side in

the heating cabinet 8, the same functional effects can be obtained as in the case where the metal tray 201 is set in upper part within the heating cabinet 8 so that the stoppers 203A, 203B are positioned on the deeper side in the heating cabinet 8.

[0101] In this embodiment, the glass tray 301 is set in lower part within the heating cabinet 8 so that the stoppers 302A, 302B are positioned on the deeper side in the heating cabinet 8. However, the glass tray 301 can also be set in lower part within the heating cabinet 8 so that the stoppers 302C, 302D are positioned on the deeper side in the heating cabinet 8.

[0102] Also in the case where the glass tray 301 is set in lower part within the heating cabinet 8 so that the stoppers 302C, 302D are positioned on the deeper side in the heating cabinet 8, the same functional effects can be obtained as in the case where the glass tray 301 is set in lower part within the heating cabinet 8 so that the stoppers 302A, 302B are positioned on the deeper side in the heating cabinet 8.

[0103] Although the metal tray 201 is held by the upper tray holders 31A, 31B in this embodiment, yet the glass tray 301 can also be held by the upper tray holders 31A, 31B.

[0104] Also in the case where the glass tray 301 is held by the upper tray holders 31A, 31B, the same functional effects can be obtained as in the case where the glass tray 301 is held by the lower tray holders 32A, 32B.

[0105] Although the glass tray 301 is held by the lower tray holders 32A, 32B in this embodiment, yet the metal tray 201 can also be held by the lower tray holders 32A, 32B.

[0106] Also in the case where the metal tray 201 is held by the lower tray holders 32A, 32B, the same functional effects can be obtained as in the case where the glass tray 301 is held by the lower tray holders 32A, 32B.

[0107] Both the first upper protrusions 33A, 33B and the second upper protrusions 34A, 34B are provided on the inner surface of the heating cabinet 8 in this embodiment. However, only one of the first upper protrusions 33A, 33B and the second upper protrusions 34A, 34B may be provided on the inner surface of the heating cabinet 8.

[0108] Both the first lower protrusions 35A, 35B and the second lower protrusions 36A, 36B are provided on the inner surface of the heating cabinet 8 in this embodiment. However, only one of the first lower protrusions 35A, 35B and the second lower protrusions 36A, 36B may be provided on the inner surface of the heating cabinet 8.

[0109] The contact of the first upper protrusions 33A, 33B with the fore end faces of the stoppers 203A, 203B is released by tilting the metal tray 201 so that the forward side of the metal tray 201 becomes higher than the deeper side of the metal tray 201 in this embodiment. However, it is also allowable that, for example, shape or position of the first upper protrusions 33A, 33B, the stoppers 203A, 203B and the like may be changed in such a fashion that the contact is released by tilting the metal tray 201 so that the deeper side of the metal tray 201 becomes higher than the forward side of the metal tray 201.

[0110] The contact of the second lower protrusions 36A, 36B with the first inclined end faces 303A, 303B of the stoppers 302A, 302B is released by tilting the glass tray 301 so that the forward side of the glass tray 301 becomes higher than the deeper side of the glass tray 301 in this embodiment. However, it is also allowable that, for example, shape or position of the second lower protrusions 36A, 36B, the stoppers 302A, 302B and the like may be changed in such a fashion that the contact is released by tilting the glass tray 301 so that the deeper side of the glass tray 301 becomes higher than the forward side of the glass tray 301.

[0111] The present invention is applicable to, for example, not only ovens, cooking ranges, microwave ovens and other cookers using steam or superheated steam, but also ovens, cooking ranges, microwave ovens and other cookers using neither steam nor superheated steam.

REFERENCE SIGNS LIST

[0112]

1 casing
2 handle-attached door
8 heating cabinet
8a opening
8b air supply opening
8c exhaust port
8d right side wall
8e left side wall
23 heating object
31A, 31B upper tray holder
32A, 32B lower tray holder
33A, 33B first upper protrusion
34A, 34B second upper protrusion
35A, 35B first lower protrusion
36A, 36B second lower protrusion
201 metal tray
202 tray body
202a bottom portion
202b side portion
202c flange portion
202d through hole
203A, 203B, 203C, 203D stopper
301 glass tray
301a bottom portion
301b right side portion
301c left side portion
301d right end portion
301e left end portion
302A, 302B, 302C, 302D stopper
303A, 303B, 303C, 303D first inclined end face
304A, 304B, 304C, 304D second inclined end face

Claims

1. A cooker comprising:

a casing (1);
a heating cabinet (8) provided in the casing (1) and having an opening (8a) on its front side;
a door (2) for opening and closing the opening (8a) of the heating cabinet (8);
a tray (201, 301) to be removably placed in the heating cabinet for mounting thereon a heating object (23), which is to be heated;
holding parts (31A, 31B, 32A, 32B) provided on an inner surface of the heating cabinet (8) and serving for holding the tray (201, 301) in the heating cabinet (8); and
restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) provided on the inner surface of the heating cabinet (8) and serving for, when put into contact with part of the tray (201, 301), restricting forward moves of the tray (201, 301), wherein
in process of pulling out the tray (201, 301) from within the heating cabinet (8), the tray (201, 301) is tilted in a direction other than a forward direction in a state that the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) are in contact with the part of the tray (201, 301), whereby the contact of the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) with the part of the tray (201, 301) is released, thus allowing the tray (201, 301) to be pulled out of the heating cabinet (8).

2. The cooker as claimed in Claim 1, wherein
the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) are to be put into contact with an upper side of the tray (201, 301) to restrict vertical pivoting of the tray (201, 301).

3. The cooker as claimed in Claim 1 or 2, wherein
the tray (201, 301) has a tray body (202, 301a, 301b, 301c, 301d, 301e), and first stoppers (203A, 203B, 203C, 203D, 302A, 302B, 302C, 302D) provided on the tray body (301a, 301b, 301c, 301d, 301e), and
the part of the tray (201, 301) serves as the first stoppers (203A, 203B, 203C, 203D, 302A, 302B, 302C, 302D).

4. The cooker as claimed in Claim 3, wherein
the first stoppers (302A, 302B, 302C, 302D) are provided on a lower surface of the tray body (301a, 301b, 301c, 301d, 301e).

5. The cooker as claimed in Claim 4, wherein
the first stoppers (302A, 302B, 302C, 302D) have first end faces (303A, 303B, 303C, 303D) which are to be put into contact with the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) when the tray (301) is pulled out from within the heating cabinet (8), and second end faces (304A, 304B, 304C, 304D) which are to be put into contact with the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) when the tray (301) is put into the heating cabinet (8), and
an angle formed by the second end faces (304A, 304B, 304C, 304D) of the first stoppers (302A, 302B, 302C, 302D) against a pulling-in/out direction of the tray (301) is smaller than an angle formed by the first end faces (303A, 303B, 303C, 303D) of the first stoppers (302A, 302B, 302C, 302D) against the pulling-in/out direction of the tray (301).

6. The cooker as claimed in Claim 3, wherein
the first stoppers (203A, 203B, 203C, 203D, 302A, 302B, 302C, 302D) are provided on an upper surface of the tray body (202).

7. The cooker as claimed in Claim 6, wherein
an outer peripheral edge of the tray (201) has a generally rectangular shape, and
the first stoppers (203A, 203B, 203C, 203D) are positioned at rear-side corner portions of the tray (201, 301).

8. The cooker as claimed in Claim 7, wherein
the four corner portions of the tray (201) are generally identical in shape to one another.

9. The cooker as claimed in any one of Claims 6 to 8, wherein
the tray (201) has second stoppers (203A, 203B, 203C, 203D) for positioning in the heating cabinet (8).

10. The cooker as claimed in any one of Claims 3 to 9, wherein
the first stoppers (203A, 203B, 203C, 203D) are provided integrally with the tray body (202).

11. The cooker as claimed in any one of Claims 1 to 10, wherein
the restricting parts (33A, 33B, 34A, 34B, 35A, 35B, 36A, 36B) are positioned near the opening (8a) of the heating cabinet (8).

Fig.1

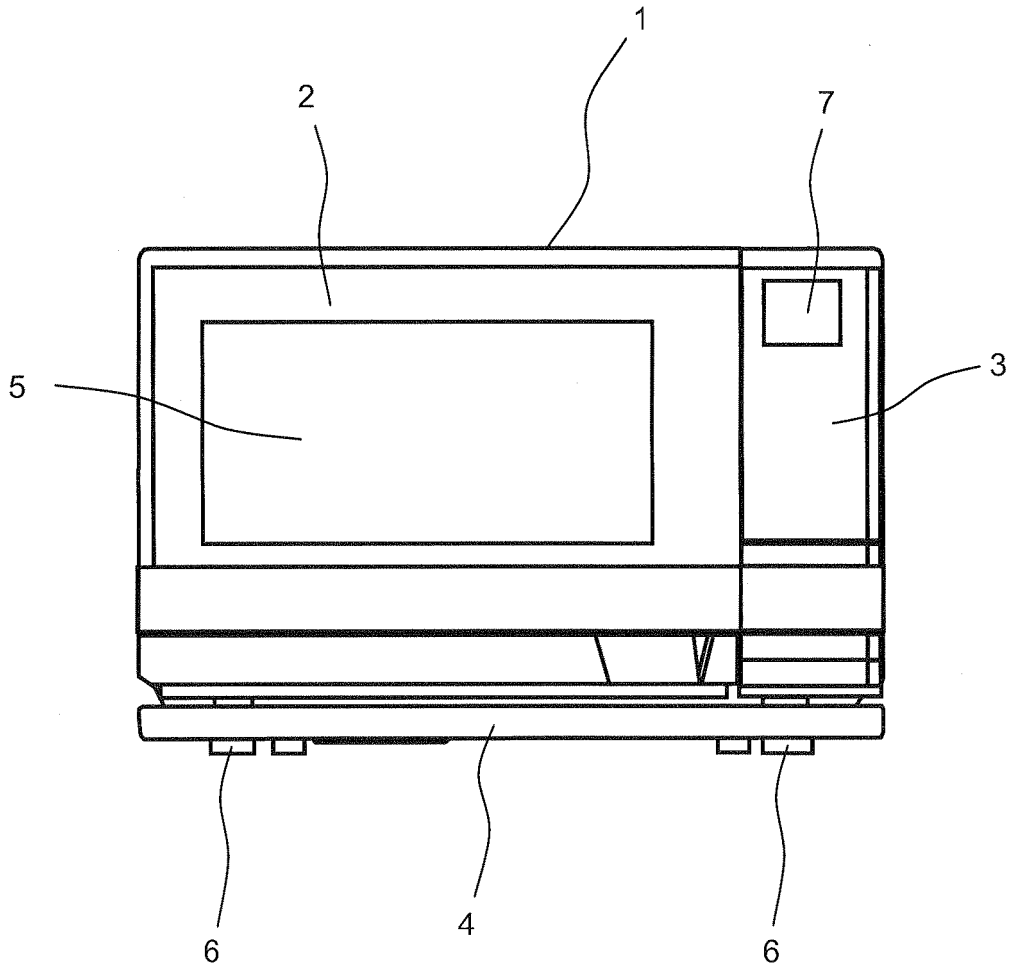


Fig.2

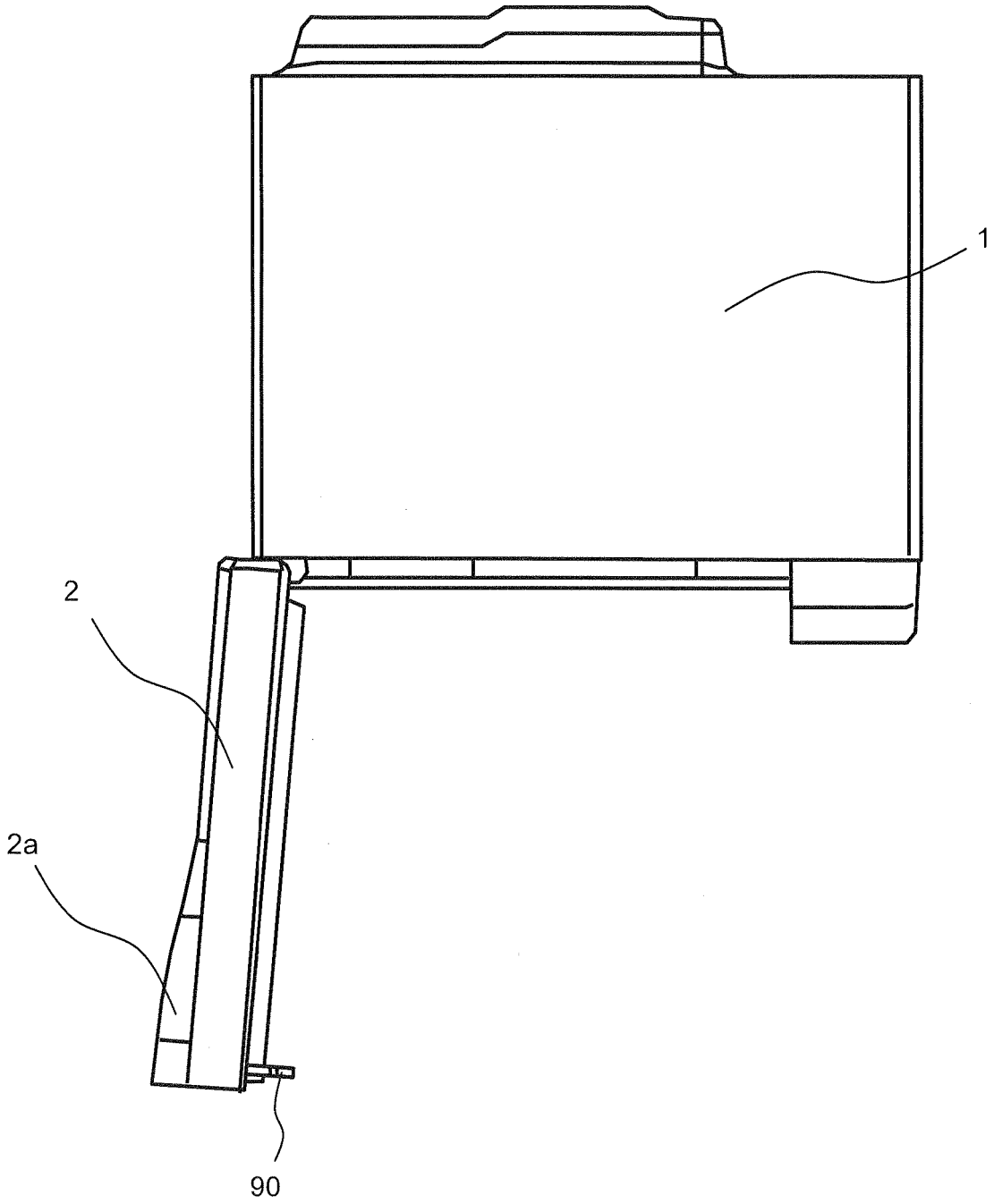


Fig.3

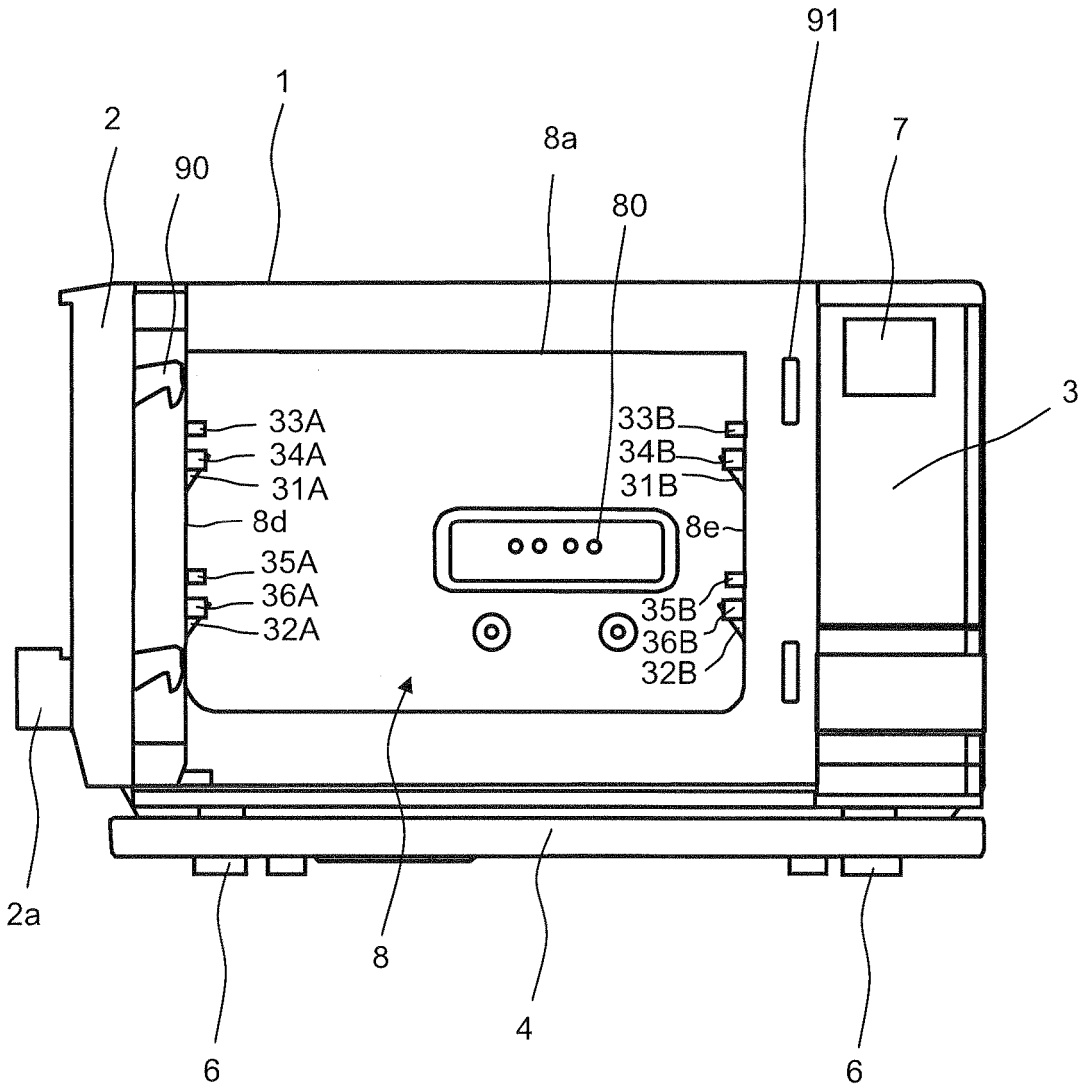

91
1
2
90
8a
80
7
3
33A
34A
31A
8d
35A
36A
32A
33B
34B
31B
8e
35B
36B
32B
2a
8
4
6
6

Fig.4

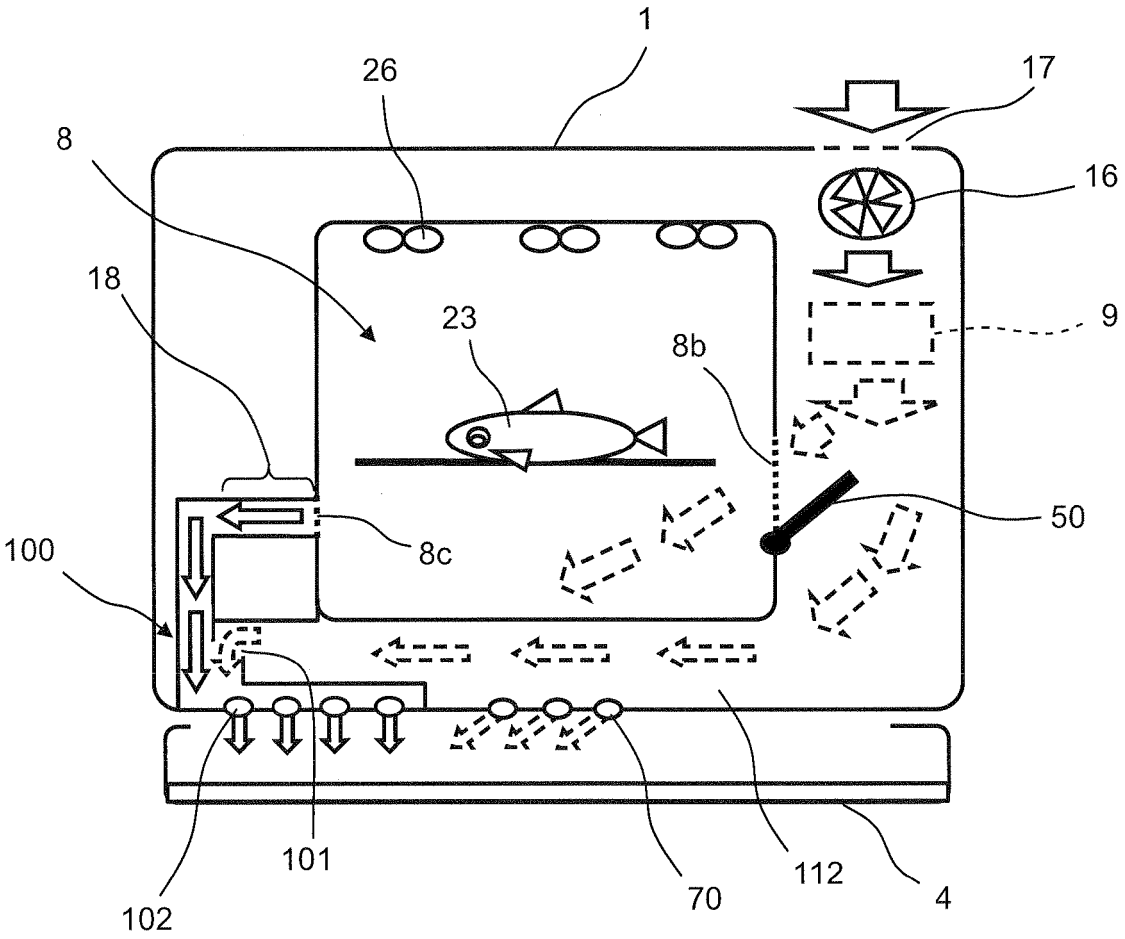


Fig.5

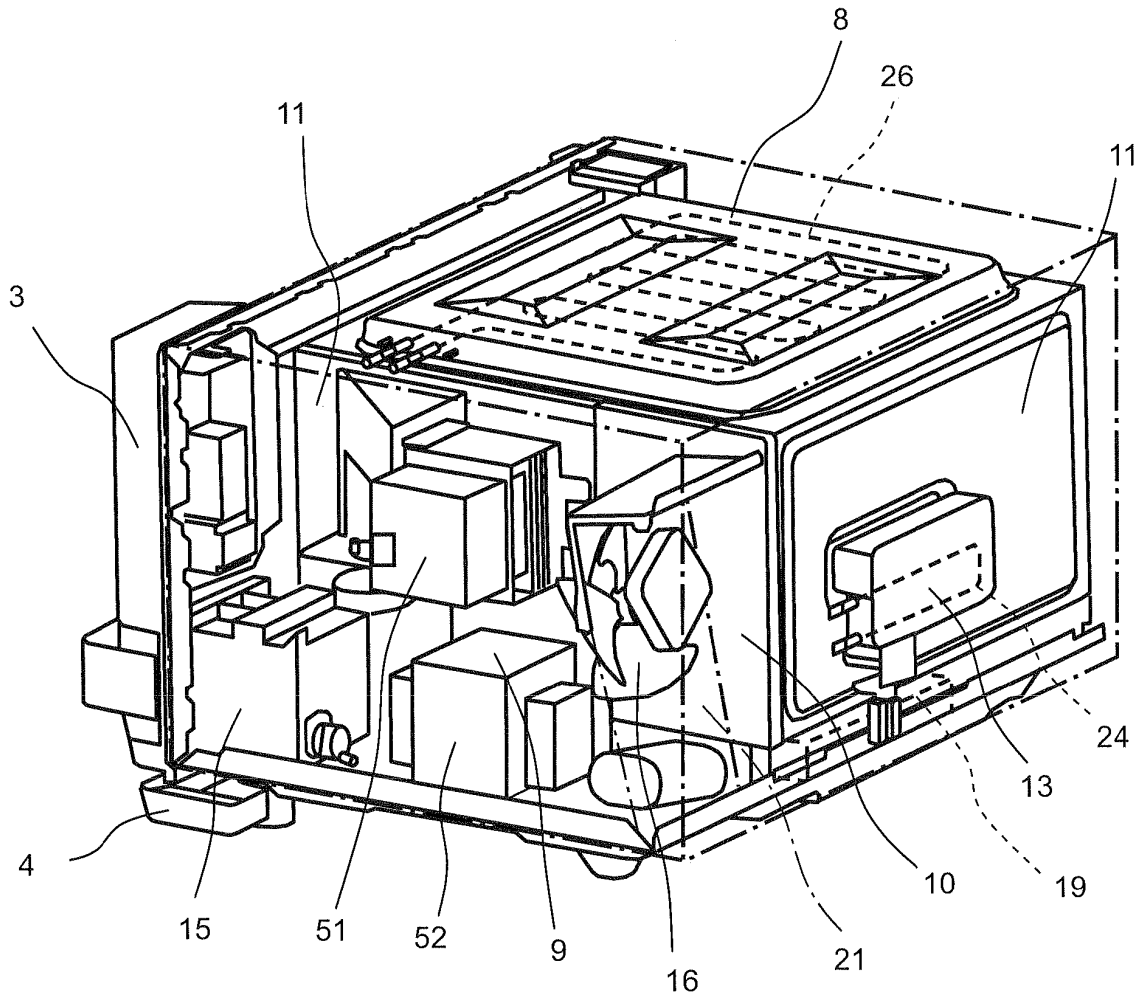


Fig.6

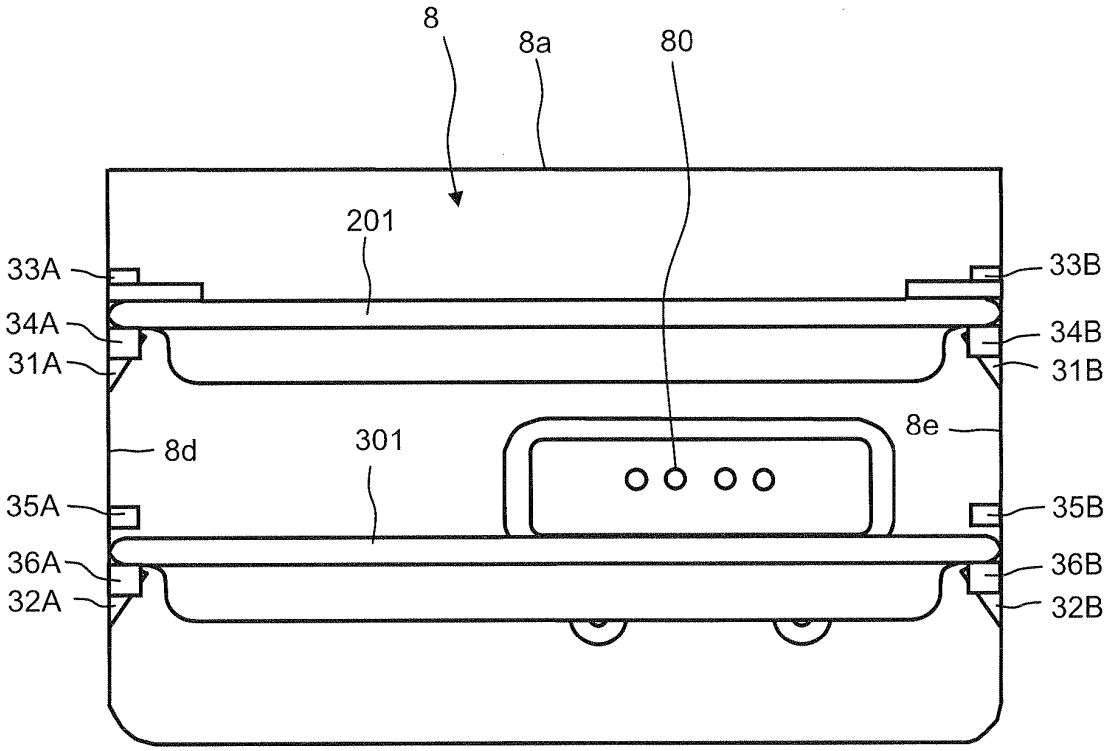

8
8a
80
201
33A
33B
34A
34B
31A
31B
8d
301
8e
35A
35B
36A
36B
32A
32B

Fig.7

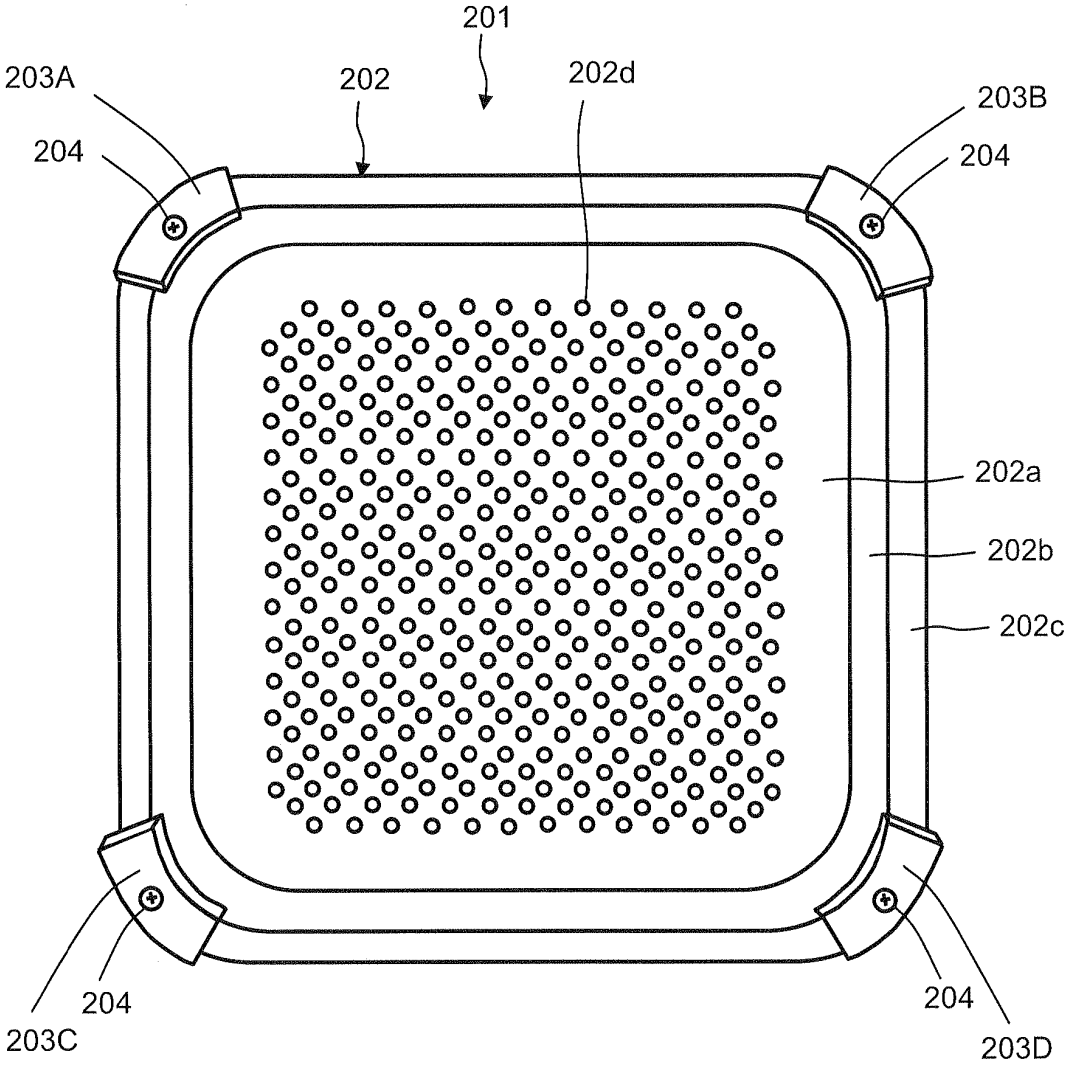

201
203A
202
202d
203B
204
204
202a
202b
202c
204
204
203C
203D

Fig.8

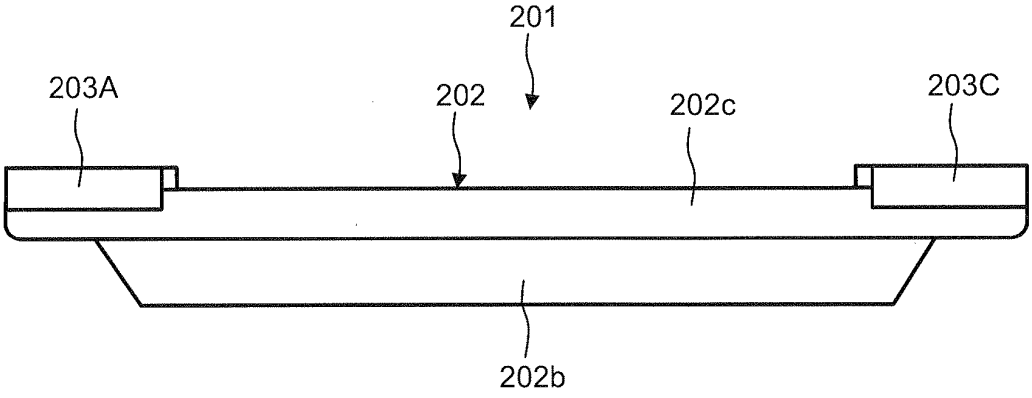


Fig.9

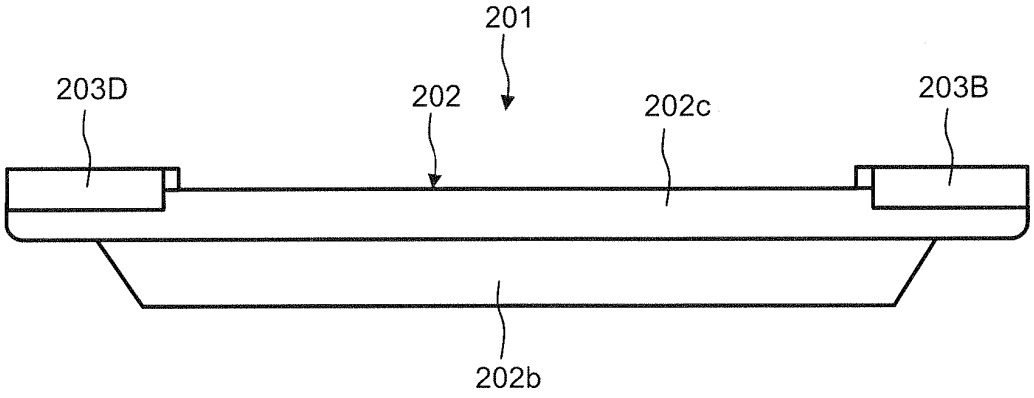


Fig.10

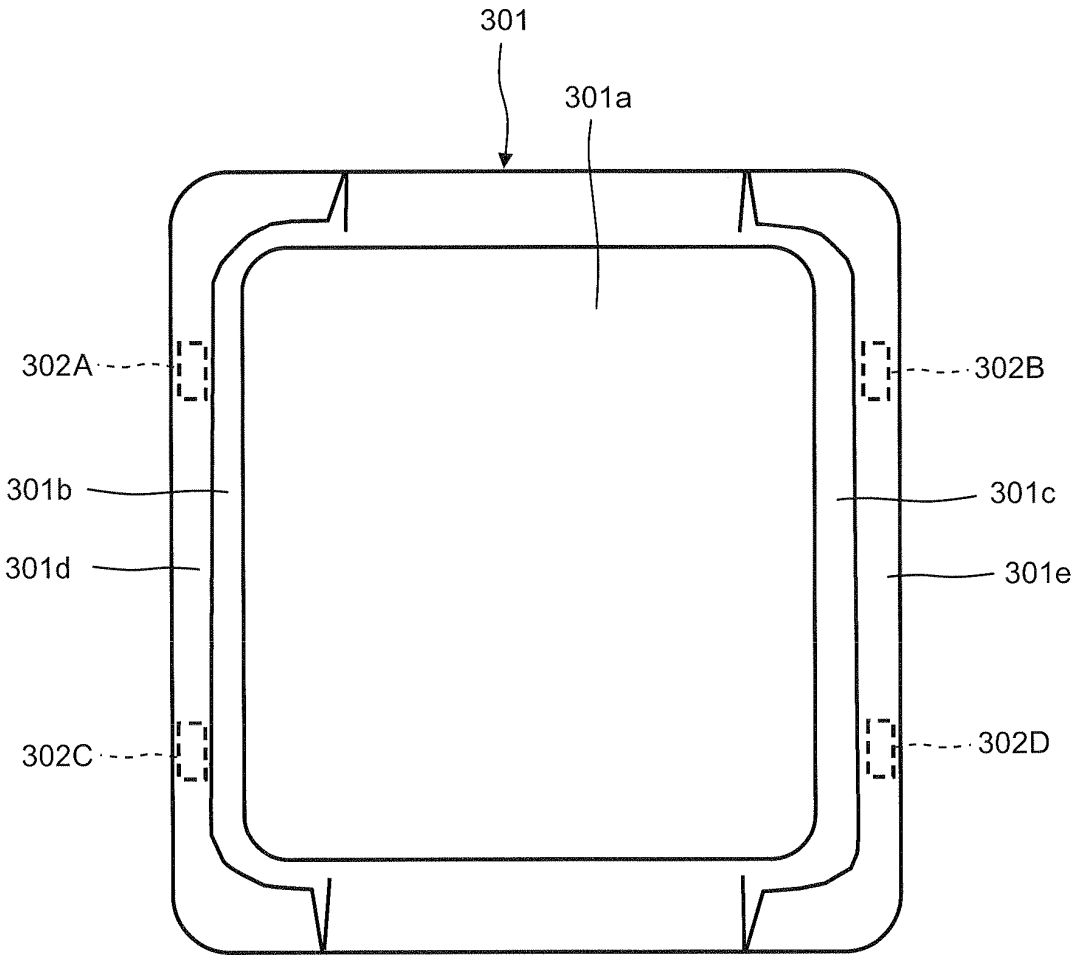


Fig.11

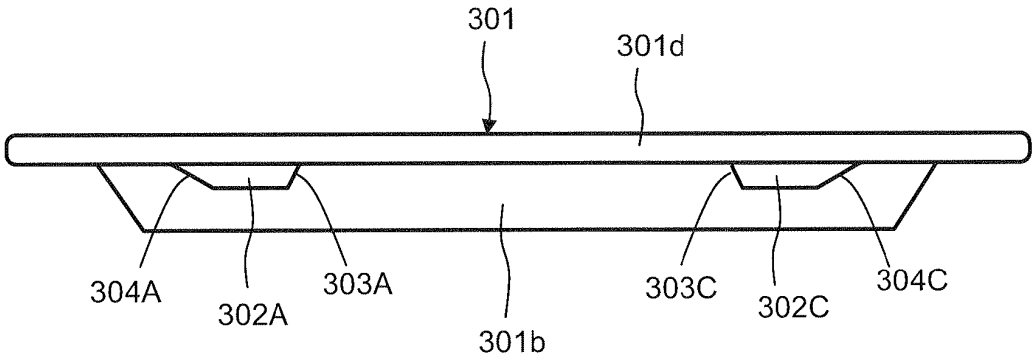

301
301d
304A
302A
303A
301b
303C
302C
304C

Fig.12

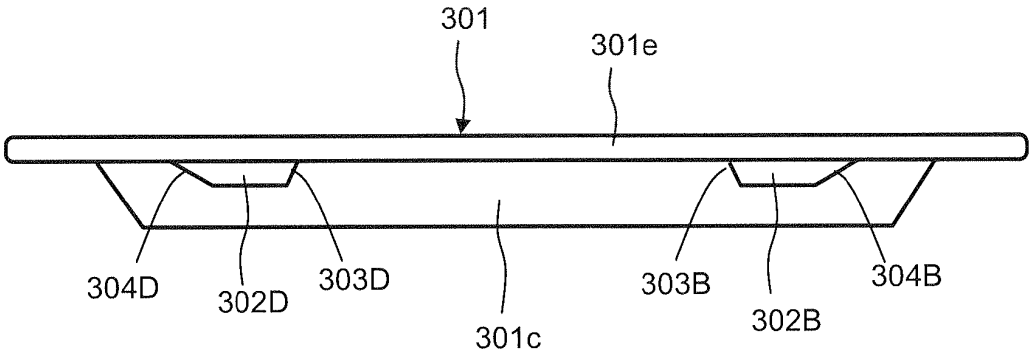

301
301e
304D
302D
303D
301c
303B
302B
304B

Fig.13

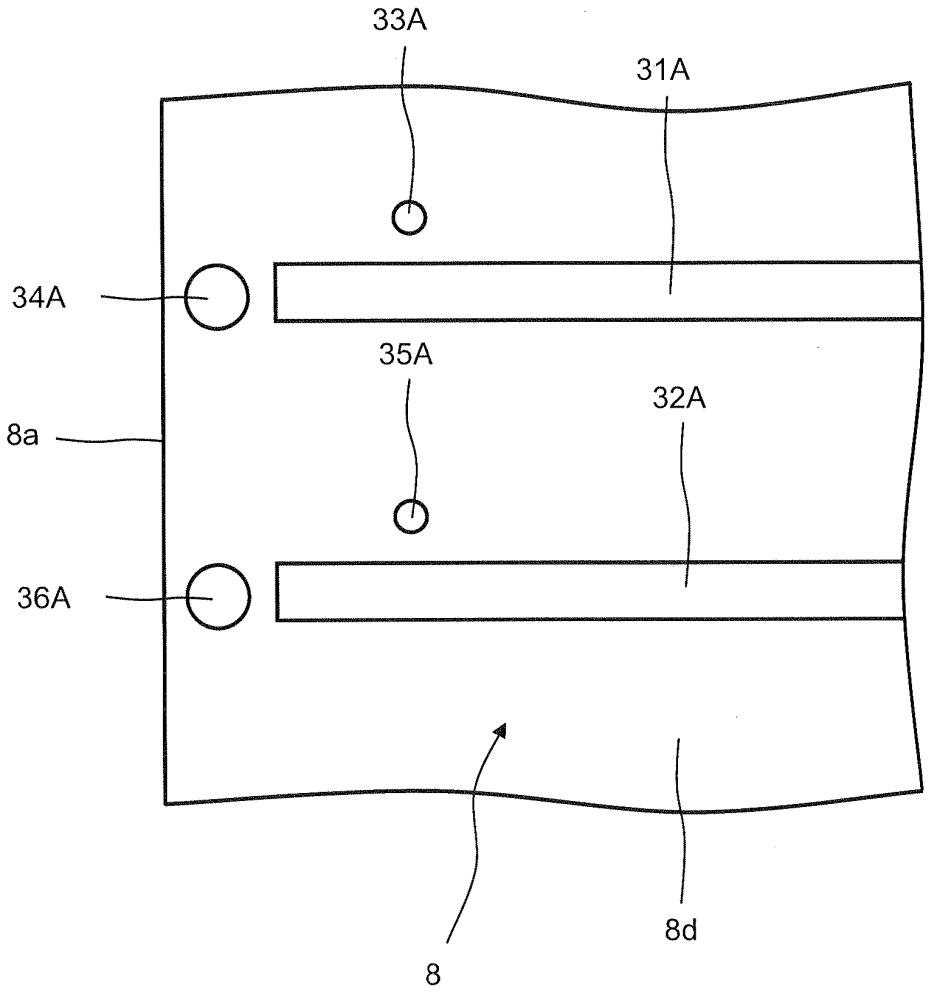


Fig.14

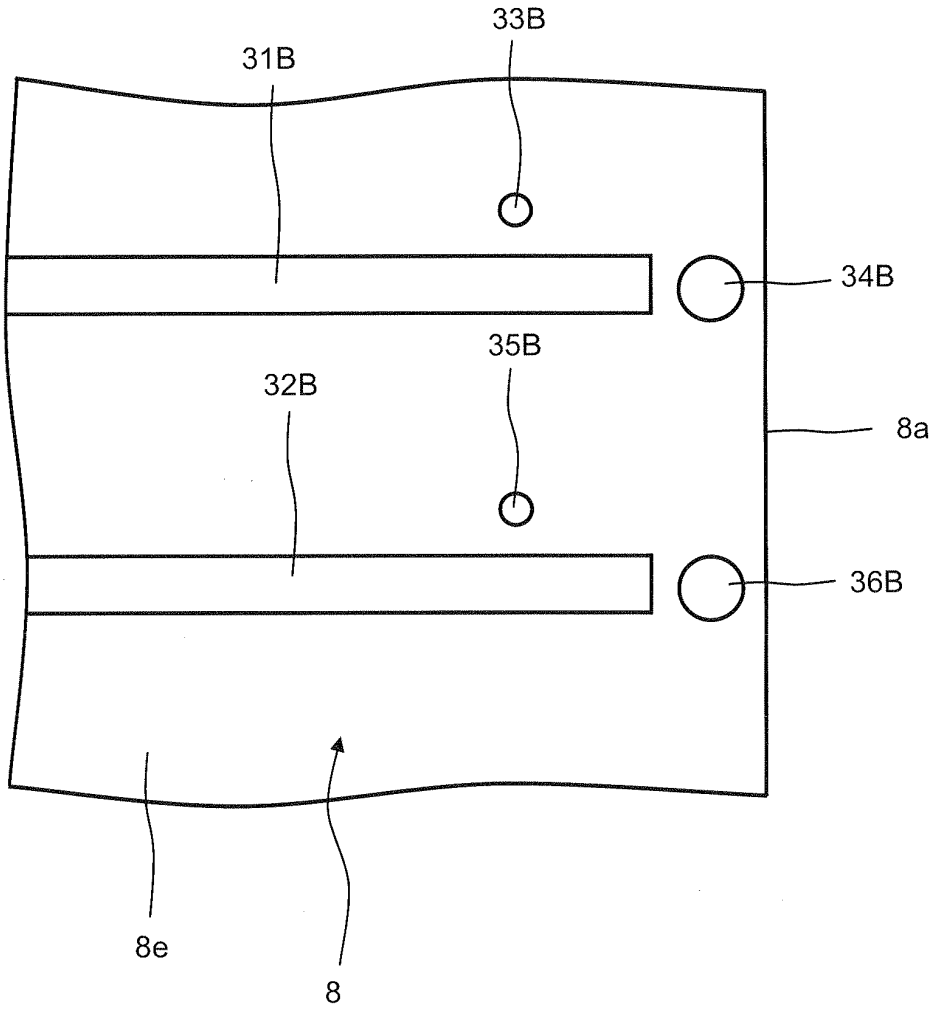


Fig.15

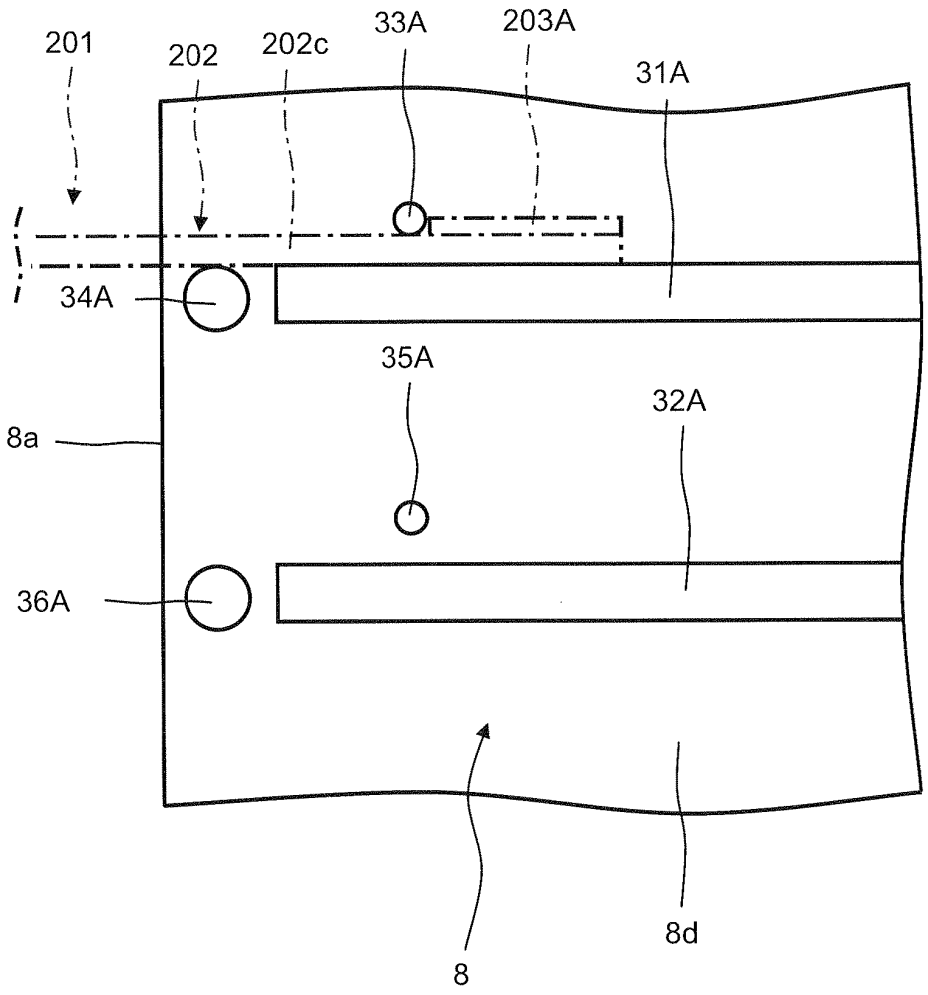


Fig.16

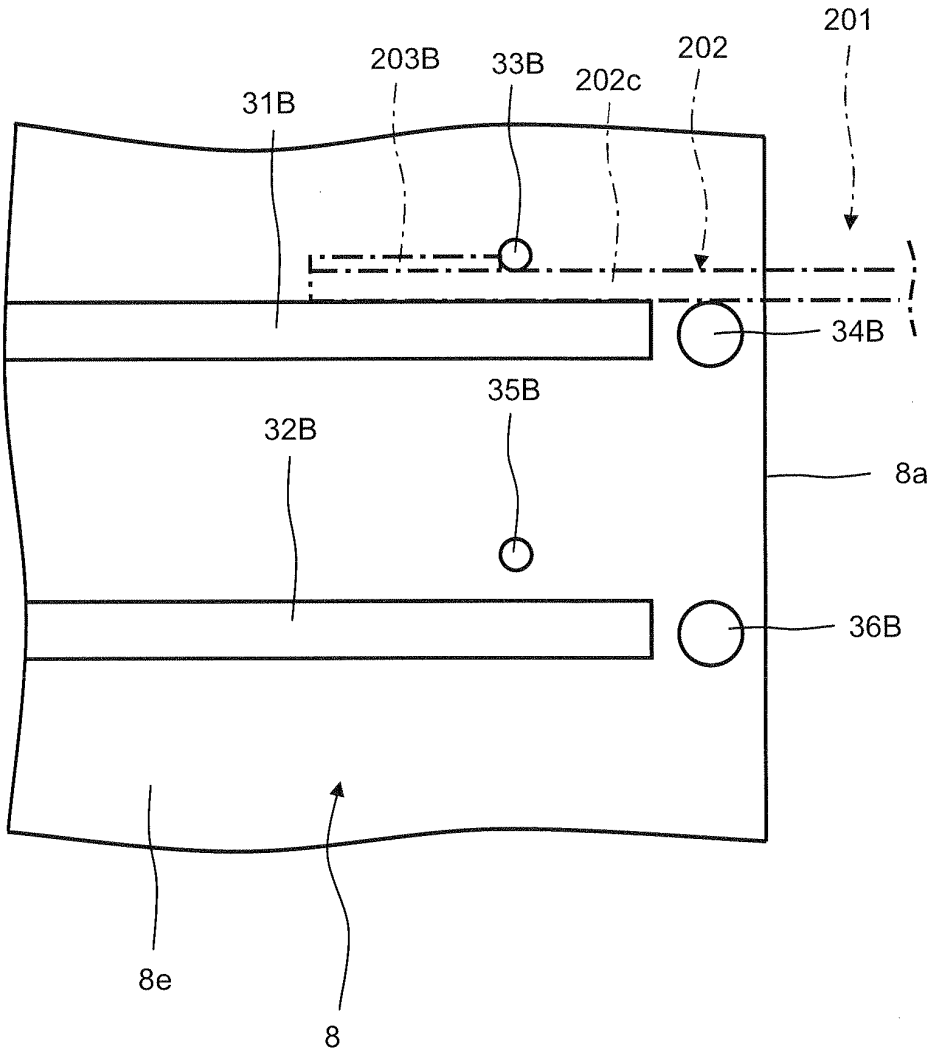


Fig.17

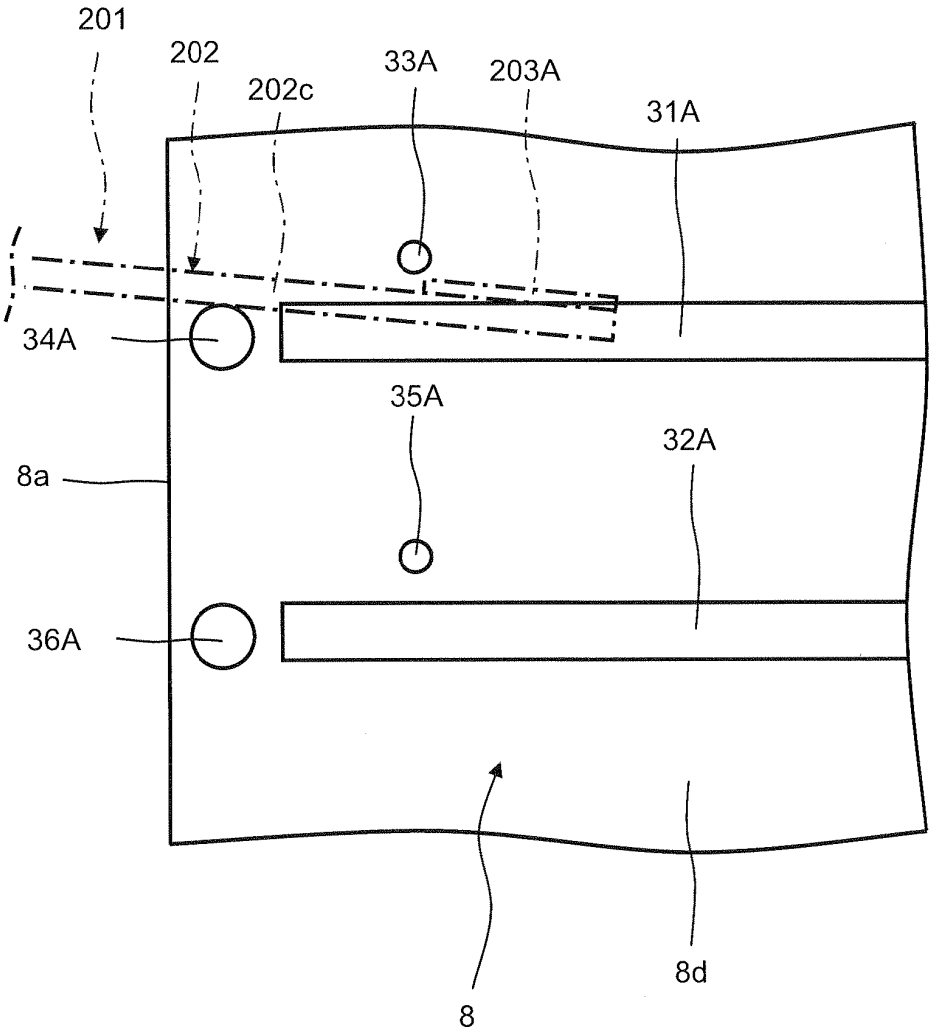


Fig.18

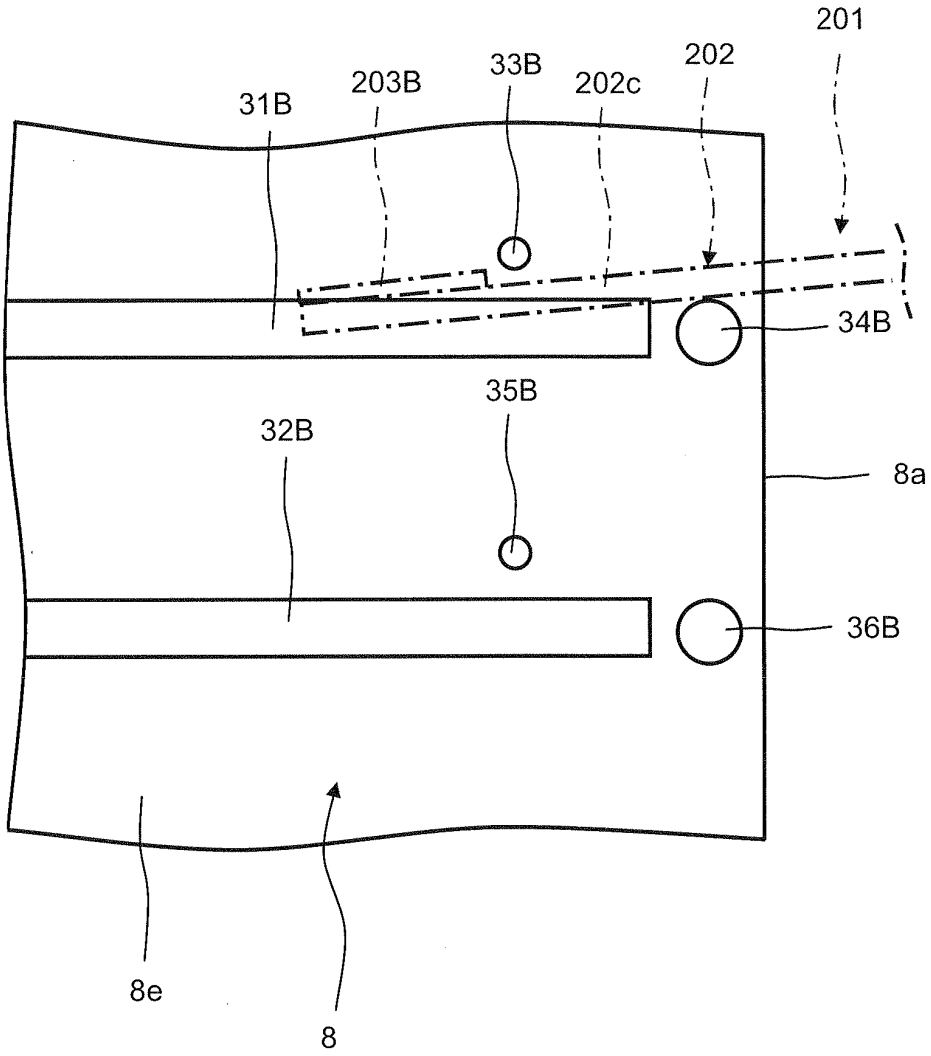


Fig.19

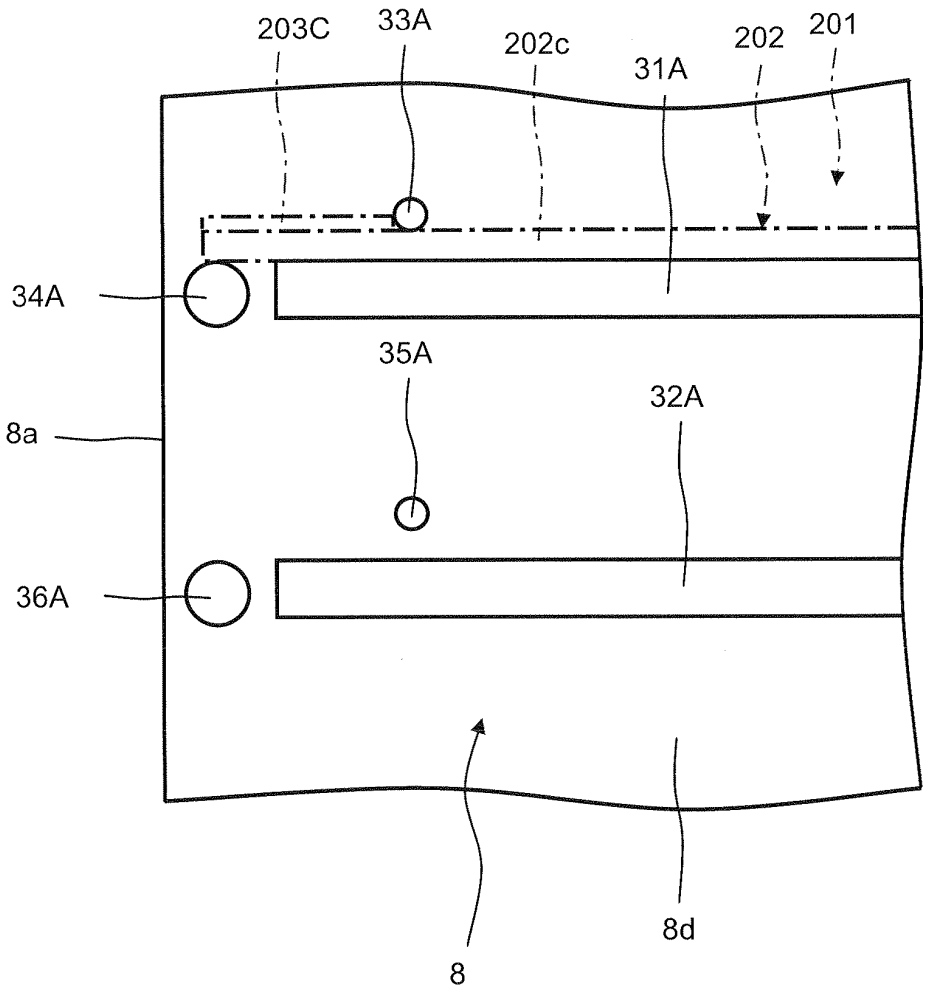


Fig.20

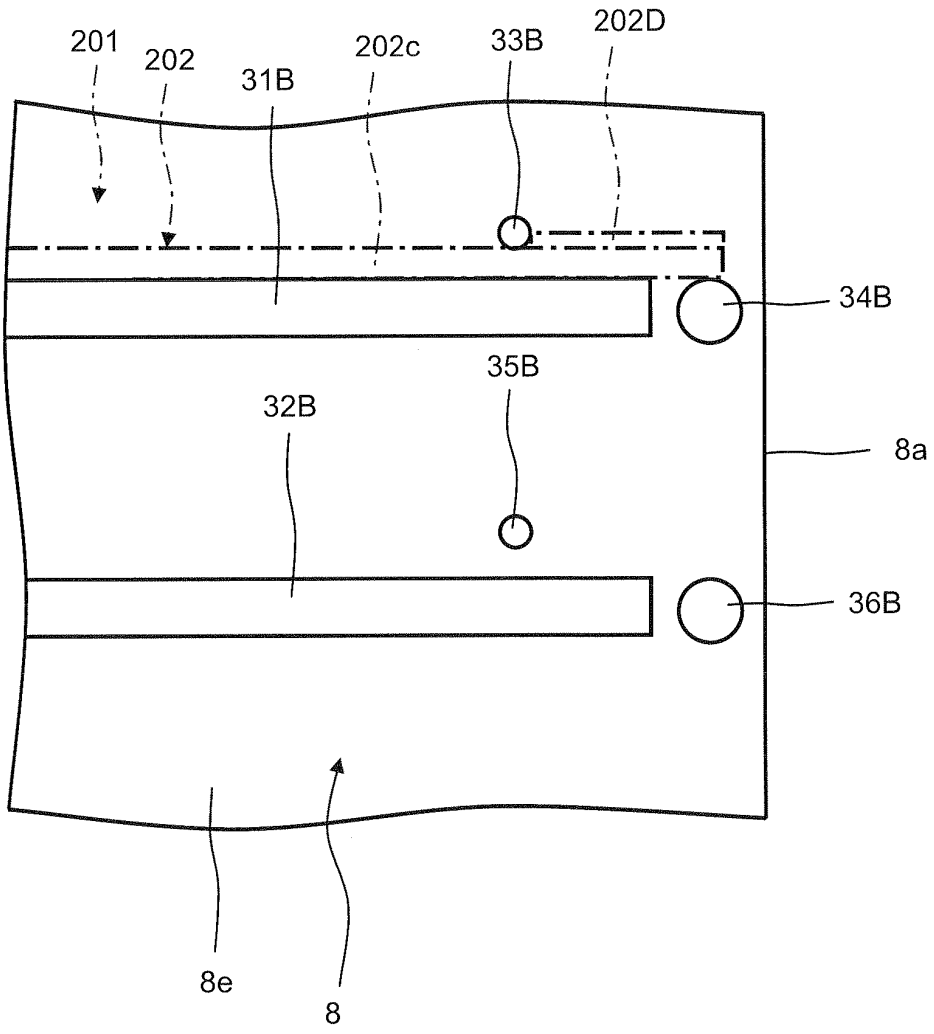


Fig.21

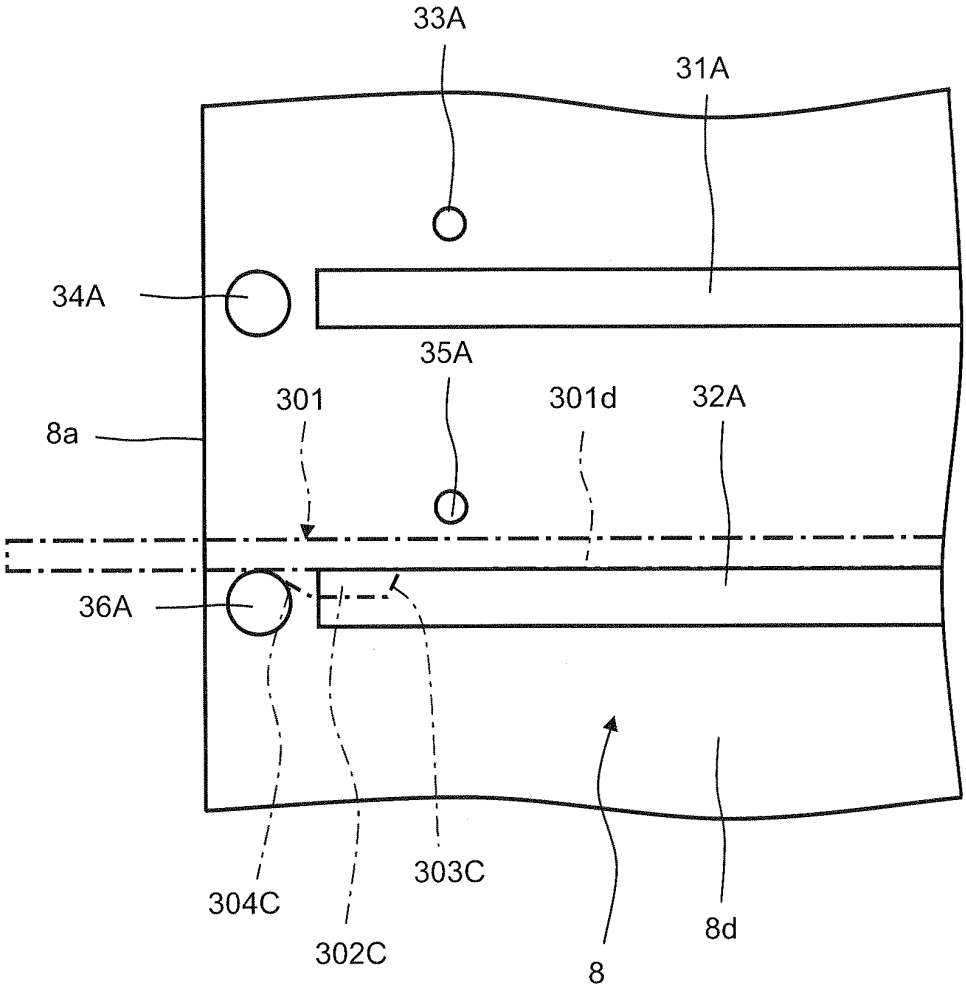


Fig.22

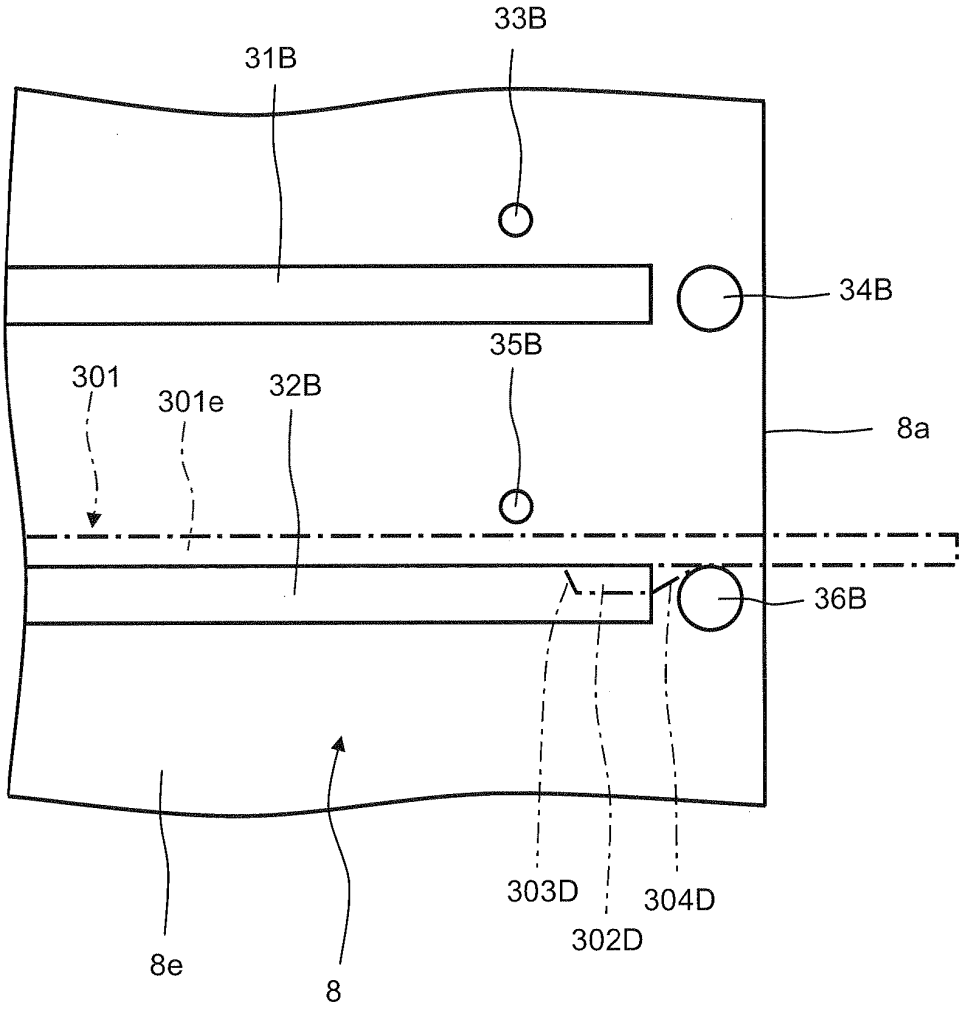


Fig.23

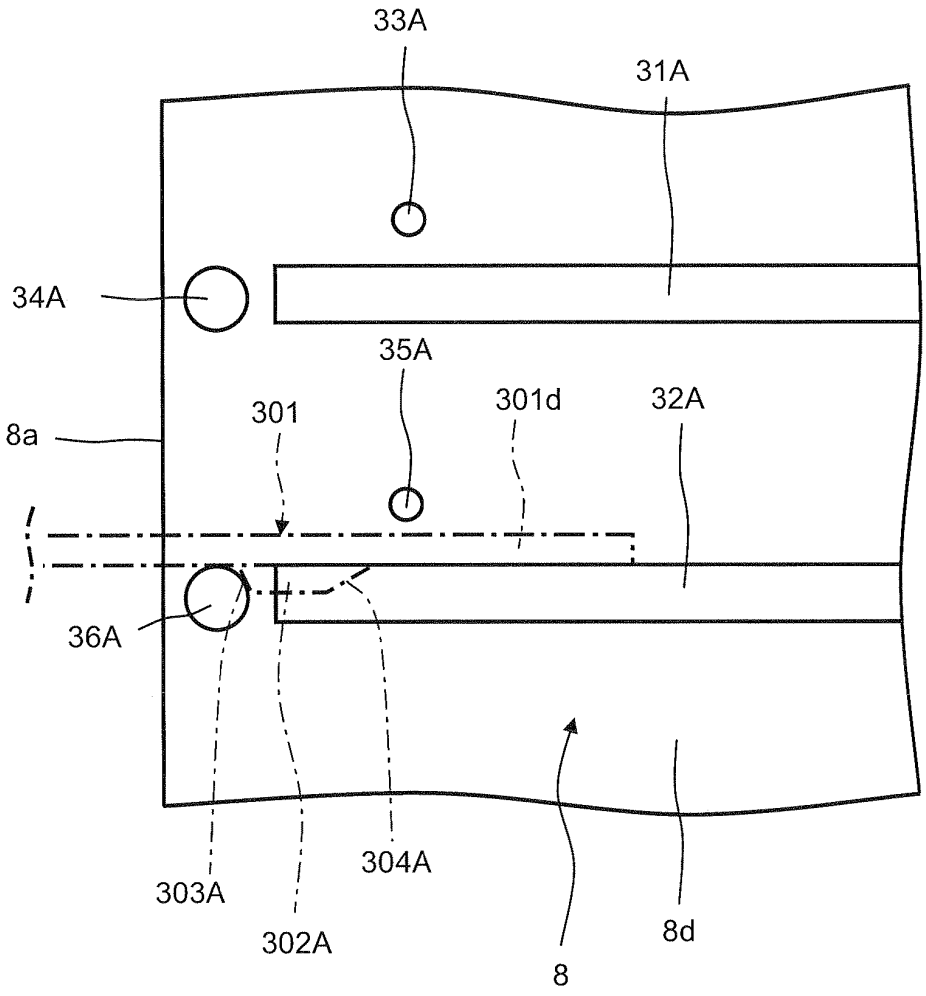


Fig.24

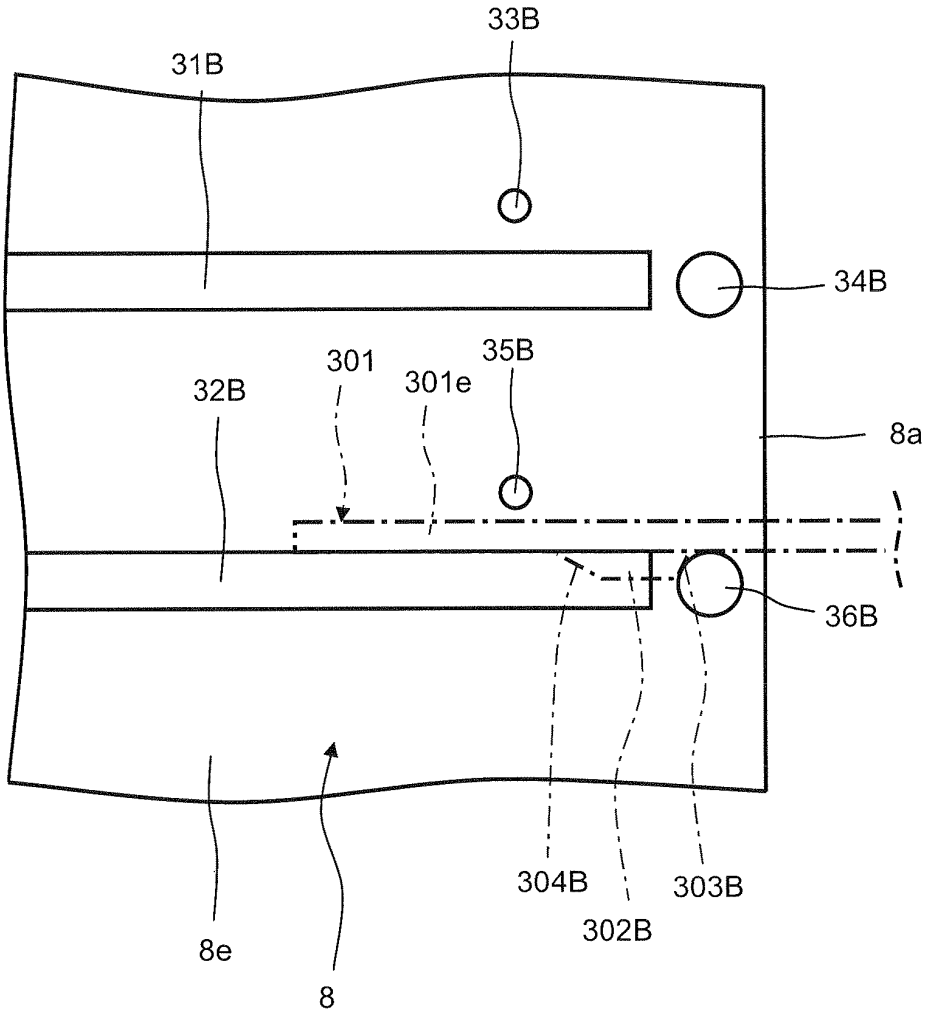


Fig.25

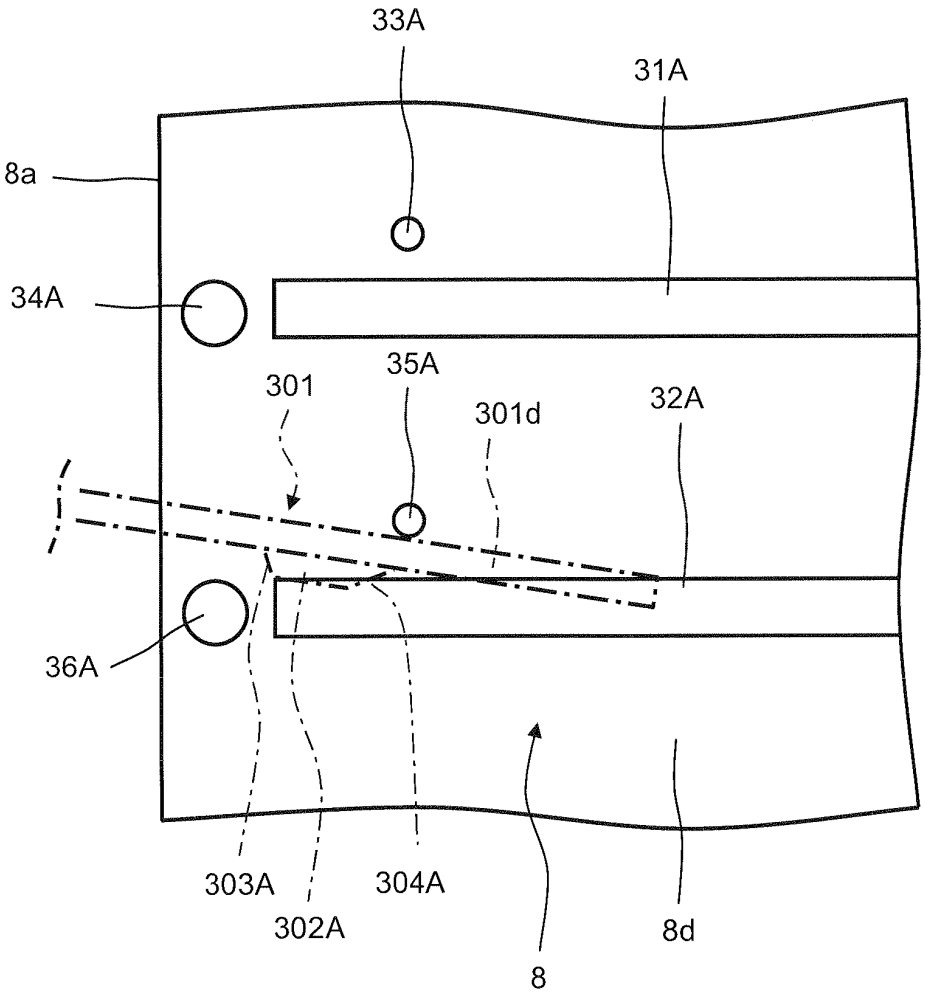


Fig.26

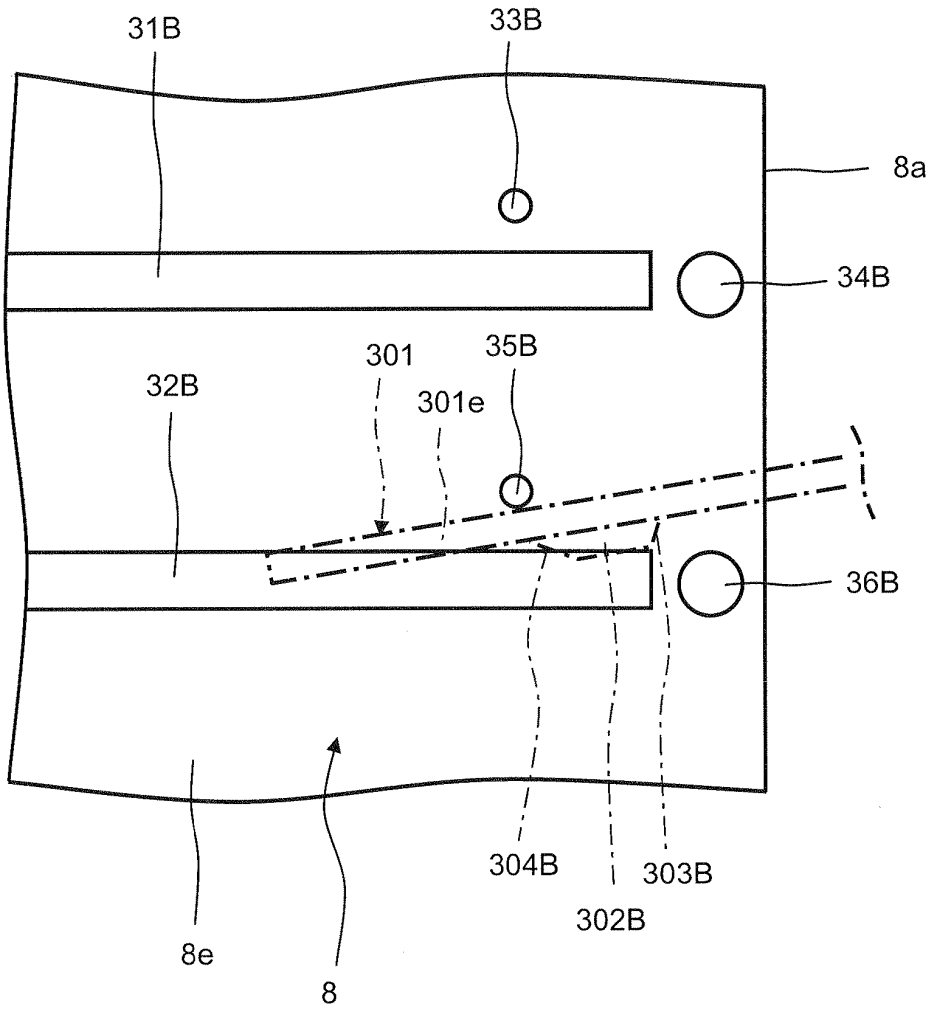


Fig.27

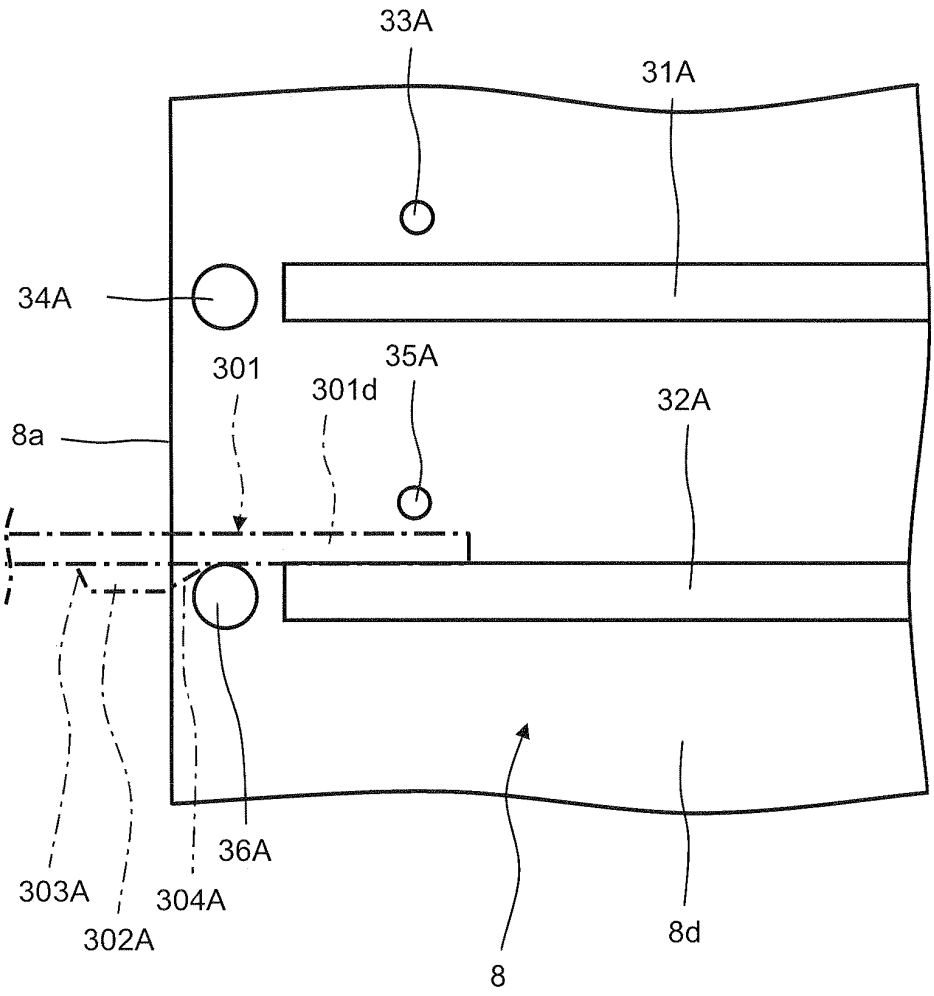
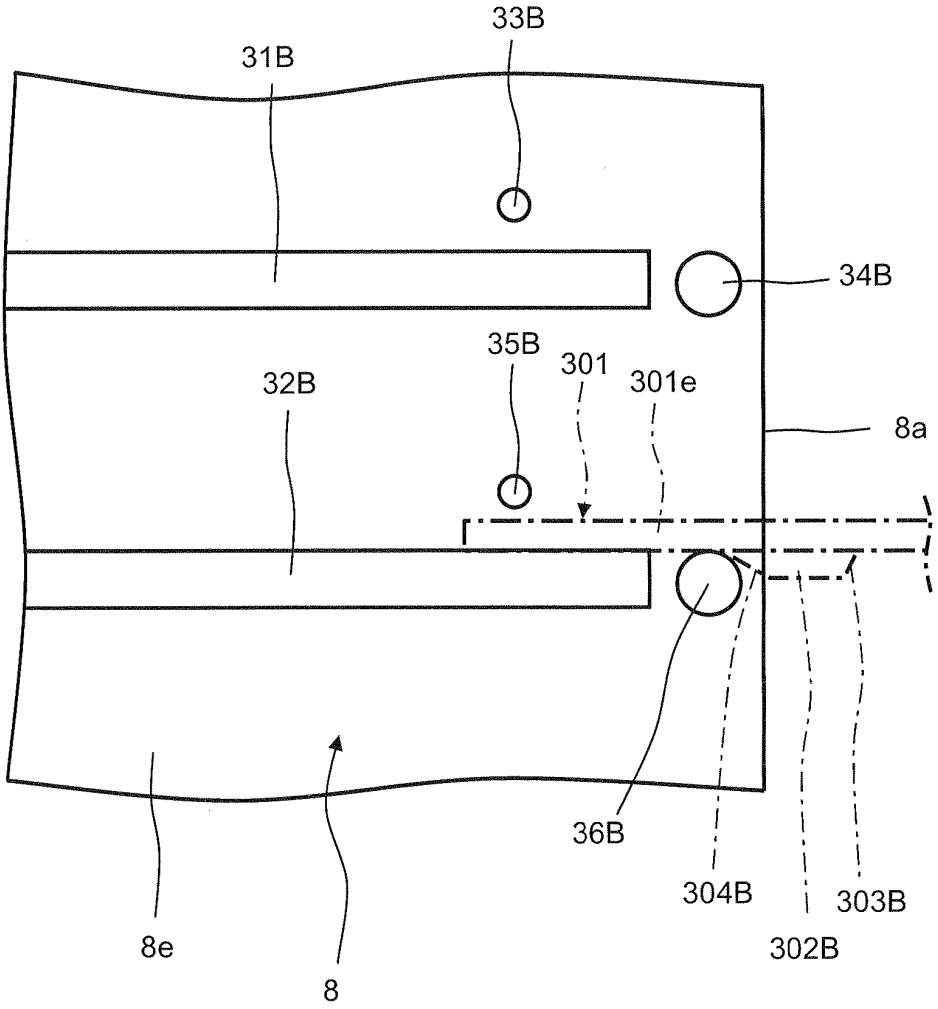


Fig.28



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/052365

A. CLASSIFICATION OF SUBJECT MATTER
F24C15/16(2006.01)i, *F24C7/02*(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24C15/16, F24C7/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2013
Kokai Jitsuyo Shinan Koho	1971-2013	Toroku Jitsuyo Shinan Koho	1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 040262/1979(Laid-open No. 140912/1980) (Mitsubishi Electric Corp.), 08 October 1980 (08.10.1980), entire text (Family: none)	1-3,10,11
X Y	JP 6-209865 A (Matsushita Electric Industrial Co., Ltd.), 02 August 1994 (02.08.1994), entire text (Family: none)	1-3,10,11 4,5

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 April, 2013 (09.04.13)	16 April, 2013 (16.04.13)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/052365

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 011094/1976(Laid-open No. 102964/1977) (Matsushita Electric Industrial Co., Ltd.), 04 August 1977 (04.08.1977), entire text (Family: none)	4,5

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/052365

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
(See extra sheet.)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-5, 10 and 11

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2013/052365

Continuation of Box No.III of continuation of first sheet(2)

Document 1 (CD-ROM of the specification and drawings annexed to the request of Japanese Utility Model Application No. 040262/1979(Laid-open No. 140912/1980) (Mitsubishi Electric Corp.), 08 October 1980 (08.10.1980), entire text) discloses a heating cooker which includes: a door, provided in a casing, for closing and opening an opening part of a heating chamber that has the opening part at a front side thereof; a rack, removably provided in the heating chamber, for carrying thereon an object to be heated; a supporting part, provided on an inner side of the heating chamber, for supporting a rack in the heating chamber; and a stopper, provided on an inner side of the heating chamber, for regulating a forward movement of the rack by abutting against a part of the rack; wherein when drawing the rack out of the heating chamber, the abutting contact of the stopper with a hooking part of the rack is released by tilting the rack in a direction different from a forward direction in a state that the stopper abuts against a part of the rack, so that the rack can be drawn to the outside of the heating chamber.

Document 2 (JP 6-209865 A (Matsushita Electric Industrial Co., Ltd.), 02 August 1994 (02.08.1994), entire text) discloses a feature of including: a cooking chamber, which is provided in a roaster case and has an opening part on a front side thereof; a door for closing and opening the opening part of the cooking chamber; a saucer, removably provided in the cooking chamber, for carrying thereon an object to be heated; a supporting part (roaster case bottom), provided on an inner side of the cooking chamber, for supporting the saucer in the cooking chamber; and a side protruded part, provided on an inner side of the cooking chamber, for serving as a regulating part which abuts against a part of the saucer so as to regulate a forward movement of the saucer.

Also, although Document 2 fails to clearly disclose the relations among the saucer, the regulating part, etc. at a time when the saucer is drawn from the cooking chamber, it discloses at least a matter that a saucer is detachable from the cooking chamber (paragraph [0024], etc.). Considering this and Fig. 5, 6, etc., it is acknowledged that the abutting contact of the regulating part is released by tilting the saucer in a direction different from the forward direction (upward), so that the saucer can be drawn to the outside of the cooking chamber.

Therefore, the invention in claim 1 cannot be considered to be novel in the light of the invention disclosed in the document 1 or 2, and does not have a special technical feature.

Consequently, two inventions (invention groups) each having a special technical feature indicated below are involved in claims.

(Invention 1) the inventions of claims 1-5, 10 and 11

(Invention 2) the inventions of claims 1-3 and 6-9

Form PCT/ISA/210 (extra sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2011163697 A **[0002] [0004]**