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**(54) Title:** TEMPERATURE-CONTROLLED PLATE, USE OF A TEMPERATURE-CONTROLLED PLATE AND SELF-SERVICE DISPENSING SHELF SYSTEM COMPRISING SAID TEMPERATURE-CONTROLLED PLATE

**(54) Bezeichnung:** TEMPERIERPLATTE, VERWENDUNG EINER TEMPERIERPLATTE UND SELBSTBEDIENUNGS-AUSGABEREGAL MIT TEMPERIERPLATTE

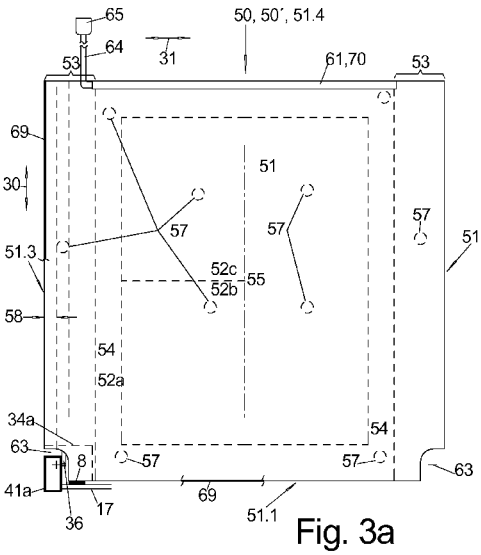


Fig. 3a

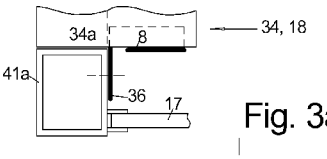


Fig. 3a1

**(57) Abstract:** In order to be able to keep products stored on the shelves (6) of a dispensing shelf system (1) hot or cold, the shelves (6) are designed as electrically operated temperature-controlled plates (50), said temperature-controlled plates (50) and the main frame (19) of the dispensing shelf system (1) being adapted to each other in a specific way.

**(57) Zusammenfassung:** Um in einem Ausgaberegal (1) auf den Regalböden (6) lagernde Produkte warmhalten oder kühlen zu können, sind die Regalböden (6) als elektrisch betriebene Temperierplatten (50) ausgebildet, wobei sowohl die Temperierplatten (50) als auch das vor allem Grundgestell (19) des Ausgaberegals (1) in spezifischer Weise aufeinander abgestimmt sind.

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*[Fortsetzung auf der nächsten Seite]*

**Veröffentlicht:**

— *mit internationalem Recherchenbericht (Artikel 21 Absatz 3)*

— *vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eingehen (Regel 48 Absatz 2 Buchstabe h)*

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# TEMPERATURE-CONTROL PANEL, USE OF A TEMPERATURE-CONTROL PANEL AND SELF-SERVICE DISPENSING SHELF WITH A TEMPERATURE-CONTROL PANEL

## FIELD

The disclosure relates to a temperature-control panel by means of which foodstuffs that are placed thereon can be temperature-controlled, preferably kept warm or also cooled, mostly in an electrical manner. An electrically operable cooling plate can for example be realized by means of Peltier elements.

## BACKGROUND

Known in the food service industry as well as in household applications are heating plates that are electrically heated and that can be made of different materials, in most cases of stainless steel, but also of glass.

Moreover, what is known in other fields are heating plates that have a layered structure made of two glass plates and a heating layer that is arranged in between them and that is very thin, in most cases substantially below a millimeter, and that is fixedly connected to the glass panels. The heating layer can consist of an electrically conductive material in the form of a foil, a scrim, a textile material, or a formable mass, e.g. containing particles of electrically conductive materials that are present therein to a sufficient amount. Such heating plates are for example used as heatable window panes in the automotive sector and in other applications.

However, in the present case, the focus is on the use of temperature-control panels, preferably heating plates, in the food self-service field, that is, as a compartment base in a dispenser shelf, so that this heating plate that is used as a shelf can in most cases also be touched by the customer who wishes to take out the product placed thereon, which entails risk of injury.

For, with respect to aspects of microbiology, the products placed thereon must be maintained at least at a core temperature of **65**°C to keep the microbial growth in the product low. However, this in turn means that – depending on the dimensions of the products placed thereon as well as their thermal conductivity – the heating plate has to

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be heated up to at least **100**°C, usually even up to **130**°C. With a heating plate of stainless steel having this temperature, touching contact would almost certainly lead to skin burns, and a stainless steel plate would also be disadvantageously strongly deformed at such a temperature.

For these reasons, what was taken recourse to in the past were approaches that were little efficient with respect to use, for example the product was taken out of the heating plate only by an operator, not by the customer him or herself, or the product was seized by using a tool that is held by the customer and extending into the dispensing shelf, wherein the direct access by the customer to the heating plate was prevented by suitable measures.

In addition, the heating plates known so far, in particular if they were made of glass plates, can be regulated only in the form of a single temperature zone, and they have a relatively wide edge that cannot be heated, which, on the one hand, is due to the manufacturing methods, but on the other hand is also provided for the purpose of creating an edge area with such a low temperature that allow for such a heating plate to be easily held with the hand as well as to be fixated in other devices without this other device being heated up strongly.

The reference to prior art in the background above is not and should not be taken as an acknowledgment or any form of suggestion that the referenced prior art forms part of the common general knowledge in Australia or in any other country.

## SUMMARY OF THE DISCLOSURE

Applicant has recognized it would be beneficial to provide, on the one hand, a suitable temperature-control panel (i.e. a panel whose temperature can be controlled) and, on the other hand, a suitable piece of furniture for self-servicing, in particular a dispenser shelf, with such a temperature-control panel as a shelf.

There is disclosed herein self-service dispensing shelf apparatus for the stocking, presentation and dispensing of hygienically safe food products (P) to a user, comprising

- a base frame having front and rear upright profiles,
- one or more shelves in the base frame,

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- at least one storage space for storage and presentation of the products (P) each on a shelf and visible to the user, with
  - a front side facing the user,
  - a rear side facing away from the user, and
  - a right side and a left side as seen in the depth direction, i.e., in the direction from the front to the rear of the storage space,
- at least one removal space for taking out products (P) from the dispensing shelf apparatus, which can also be the storage space,

wherein

- the storage space(s) and/or the removal space(s) are at least partially arranged in the interior of the base frame,
- several storage spaces and/or removal spaces are arranged on top of each other like tiers, which are separated from each other in height by the shelves arranged between them as separators,
- between the front and rear upright profiles of the base frame there are support strips running along the sides of the dispensing shelf apparatus for supporting the shelves,
- at least one shelf is a temperature control panel,
- the sides of the base frame are at least partially closed by multiple individual side plates,
- individual side plates are arranged so as to be slightly outwardly pivotable about a pivot axis extending in the depth direction, so that the lower edges of the side plates can be slightly pivoted outwardly in order to be able to lift the side edge of the panel upwards for removal in an inclined position,

and wherein

- between the front and rear upright profiles of the base frame there is provided a mounting arrangement for mounting a recourse protection device so as to be pivotable to a limited extent, and wherein the recourse protection device comprises at least one side plate suspended in this mounting arrangement.

Multiple removal spaces and/or storage spaces may be arranged above each other and may be respectively separated from each other in height by a shelf that may be, in particular, embodied as a temperature-control panel. The shelves that are embodied as temperature-control panels may be arranged at the base frame so as to be tilted upwards from the front to the back, that is, in the depth direction, and, with multiple shelves being

arranged above each other, the inclination of the shelves may increase from the lowermost shelf to the uppermost shelf, in particular increases continuously.

If the temperature-control panel is placed centrally in the shelf on the lateral support strips extending in the depth direction, it may rest on them up to a lateral overhang of the top side of the bearing strips of less than **8** mm, preferably less than **5** mm, even more preferably less than **2** mm, but in particular may not laterally project beyond the dimensions of the base frame. At least one front stop for the temperature-control panel may be present at the base frame, in particular the support strips or the front upright profile or a front cross bar that extends between two front upright profiles. Preferably, except for the uppermost temperature-control panel, the temperature-control panels inside a base frame may have the same length and width, or all temperature-control panels inside a base frame may have the same length and width. Preferably, the corner recesses in the front corners of the the temperature-control panel may be so large in the transverse direction that the facing side edges of the temperature-control panel can be lifted up to an oblique position of at least **20**°, advantageously **30**°, more advantageously **40**°, with respect to the horizontal by laterally displacing them to one side up until they stop against the base frame provided in this location.

The support strip, as viewed in its extension direction, may comprise a V-profile which in the mounted state may be open towards the outer side of the dispensing shelf, and in particular may be a bent sheet metal part, and a fixation appliance for attaching at an upright profile, in particular a plate-shaped screw lug with a passage opening, may be present at the front and rear end of the V-profile, and in particular in such a manner as to be respectively projecting beyond it, and wherein in particular the plane of the plate-shaped screw lug may extend at a right angle to the free ending area of the upper leg and preferably below the height of the upper leg. The plate-shaped screw lug may be offset backwards from the free outer end of the upper leg by an offset distance that maximally corresponds to the width of an upright profile, as viewed in the front view. The upper leg of the V-shape of the V-profile, as viewed in the extension direction of the V-profile, may extend in a straight manner from its free end up to a rounded tip of the V-profile over a distance that at least corresponds to the width of an upright profile, as viewed in the front view. At least in its free end area, the lower leg may extend obliquely outwards and in particular downwards to the upper leg, preferably at an angle of **20-60**°, preferably between **25** and **45**°, in particular to the free end section of the upper leg that extends in a straight manner.

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In the obliquely downwards tilted section of the lower leg at least at the ends of the support strip, respectively one attachment device for attaching a light bar at the outer side of this lower leg may be present. A front stop, which in particular may consist of the same material as the V-profile, may protrude upwards beyond the top side of the upper leg at the front end of the V-profile, in particular in front of it.

A data/power cable may lead out of a rear narrow side of the temperature-control panel. A control unit for the at least one temperature-control panel, which may also form the power supply unit for the temperature-control panel and/or the light bars, may be arranged in the base space below the lowermost shelf sideways in the rear area and so as to be pointing backwards. A cable channel, which may be made of a thermally insulating material such as a plastic material and inside of which the cables from the temperature-control panel may run to the control unit, may be arranged at the base frame, in particular the inner side of one of the rear upright profiles, and/or at least one of the rear upright profiles may be embodied as a hollow profile, and the cables may extend in the interior of the hollow upright profile.

A plug may be arranged at the free ends of the respective cables that are leading away from the temperature-control panel, and plug sockets that fit the plugs may be formed either at the control unit or at a socket connector that is attached at the base frame and in particular may be configured to be functionally combined with the cable channel. The control unit may be capable of maintaining a set air temperature up to a deviation of +/-**15**°, preferably +/-**10** °C, more preferably +/-**5** °C in the entire air space between two temperature-control panels. Light bars which radiate obliquely downwards and inwards and are used as a component of the edge-side air space heating may be arranged at the bottom side of the bearing strips.

At least one of the sides of the base frame may be closed by at least respectively one side plate by at least **70** %, preferably at least **80** %, more preferably by at least **90** %, and even better completely. A respective side plate, in particular one made of a translucent material such as translucent plastic material or glass, may be arranged between the bearing strips that are arranged above each other, with the side plate in particular ending at a distance above the bearing strip arranged below it. The side plate may be greater than the thickness (D) of the temperature-control panel in its lateral edge area, preferably twice as large, more preferably **2.5** times as large as this thickness (D).

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The side plate may be pivoted with the lower edge outwards relative to the base frame about a plate pivot axis extending in the depth direction and in the upper half of the side plate, in particular so far that the adjacent side edge of the temperature-control panel may be pivoted upwards past the side plate about the facing side edge of the temperature-control panel.

The reach back protection device which may be present in the dispensing shelf between the laterally adjacently arranged storage space on the one hand and the removal space on the other hand may be made of a planar material, in particular a panel of translucent plastic material or a glass panel, that may close the side surface of the air space of this storage space by at least **70** %, preferably by at least **80** %, more preferably by at least **90** %.

The back side of the dispensing shelf apparatus may be at least partially closed by a rear door which in particular may consist of glass and may be translucent at least from the outside to the inside, and is preferably mirror-coated when viewed from the inside, and/or the rear door may extend in height across the height of a compartment, and/or across the height of the total back side, at least in the storage area.

The dispensing shelf may have a cover plate that closes the top side of the uppermost storage space and that may consist of a thermally insulating material and/or may be embodied to be mirror-coated, as viewed from the bottom side. The back side of the dispensing shelf may not be closed below the lowermost compartment base, in particular the lowermost temperature-control panel. The lowermost temperature-control panel may rest on the support strips.

The front side of the dispensing shelf may be tilted at least in the upper area towards the vertical line and in particular also towards the back side of the dispensing shelf, with its lower edge being further away from the back side than its upper edge, and, in particular when multiple storage spaces are arranged above each other, this front side may be a flat, tilted front side that is continuous across multiple, in particular all, storage spaces, and/or the removal opening may be an access opening or a tool opening in a storage front plate, in particular a translucent front panel, that otherwise closes the front side, and/or a base space may be present under the lowermost storage space in the base frame, being closed on the front side by a base front plate, and/or at least in the area of

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the base space, at least one of the sides of the base frame may be closed by a side plate which is in particular attached at the base frame in a dismountable manner.

One, preferably only one, suspended cross bar may be present between the front upright profiles of the frame, which in particular may serve for attaching the price tag holder, and in particular may be arranged at such a height position that it is positioned in front of or below the front narrow side of the dividing element, in particular of the temperature-control panel, and/or a light bar extending in the depth direction may be attached at the bottom side of the bearing strip, in particular having LEDs as illumination means and/or lighting devices, in particular in the form of a light bar, may be attached at the cross bar, eradiating on the front edge area of the next temperature-control panel that is arranged below it.

Preferably, at least one of the main outer surfaces of the temperature-control panel, in particular both main outer surfaces – in the following referred to in short as the top side and the bottom side, since for the purpose of placing objects on the same such a temperature-control panel will be arranged substantially horizontally – are made of a material with a lower thermal conductivity than iron or steel, in particular stainless steel, and namely preferably of glass.

Of course, for this purpose, this material with the low thermal conductivity has to be provided not only at the outer surface but has to extend into the depth of the plate at least so far that the result in a lower thermal conductivity and thus slower heat dissipation to a touching body part, that is, at least up to a depth of half a millimeter, better of **1** mm, better of **2** or **3** mm.

Especially glass has, on the one hand, a considerably lower thermal conductivity, so that when touched immediate burns can often still be avoided as there is more time to react and to remove the hand from the hot temperature-control panel. Moreover, glass is considerably lighter and quicker to clean than a metal plate, in particular a stainless steel plate.

Further, the use of glass or also most other materials with a lower thermal conductivity than iron or steel has the advantage that these materials are usually not electrically conductive, so that in the event that any damage occurs to the electrically operated temperature-control panel which would lead to the outer surface of the temperature-

control panel being electrified, an electric shock upon being touched by a person is avoided.

For this reason, in this use, a heating plate can be heated up and run during operation at up to **100**°C, and up to approximately **130**°C, which is important for minimizing the germs in the products placed thereon.

Likewise, the air space above the heating plate, for example up to the next shelf that is arranged above it, can be maintained at a predefined target temperature range without problems and exclusively by convection, with its upper limit and lower limit being only maximally **20**°C, better maximally **10**°C, apart, which can preferably be achieved by the fact that the individual temperature-control areas within the temperature-control panel – as viewed in the top view – can be substantially controlled independently of each other with regard to their temperature by means of a control. Thus, through an edge area that is heated up relatively strongly which, however, is preferably arranged to be separated from the outer edge of the temperature-control panel through a non-heated edge area, a rising warm air curtain is formed that is circumferential in particular in the top view, which avoids the slightly less warm air in the inner area of the air space from flowing out outwards, and in this way avoids a temperature gradient from the inside of the air space to the outside.

The same can in reverse be analogously achieved with a cooling plate, and in this way the active generation of a circumferential flow by means of a fan can be foregone, which creates noise and consumes energy, and also stirs up more durst.

Further, by heating the temperature-control panel up to a very narrow, in particular non-heatable, edge area of maximally **3** cm, better of maximally only **2** cm, better of maximally only **1.5** cm, a very large heated usable area can be achieved on the temperature-control panel, and thus a very good utilization in the use as a shelf.

In this way, it is also possible to maintain the core area of the air space, that is, within the strongly heated, preferably circumferential, edge area, at only slightly above **65**°C in order to obtain and maintain the core temperature of **65**°C in the products, while in conventional heating, such as for example heater lamps, having a pronounced temperature gradient in the air space from the inside to the outside, the temperature has

to be set to be much higher in the core area of the air space in order to obtain a core temperature of **65**°C also at the products that are placed at the edge.

Particularly expedient for this use is a temperature-control panel which is preferably electrically operated and can be embodied as a heating plate as well as a cooling plate, with the temperature-control panel being composed of a glass upper plate and a glass lower plate and with a temperature-control layer, in particular a heating layer, being placed in between them, as has already been mentioned above.

In addition, the temperature-control panel – at least on its top side and its front narrow side that is facing towards the customer, or in general in all surface areas that can be reached by the customer – should be free of materials that have a higher thermal conductivity than the material of the top plate and bottom plate, that is, in particular it should have no attachment parts that are made of metal to avoid that these are heated up to the temperature of the glass plates, and thus to avoid that the customer is burned when touching contact occurs.

Preferably, not only one but multiple temperature sensors are provided in a manner distributed across the surface in the temperature-control panel itself to constantly control the temperature of the temperature-control panel and also to be able to inform the control which then can readjust the heating or cooling performance correspondingly – in particular independently of each other inside the individual temperature-control areas.

The control is preferably also capable of switching the temperature-control panels on and/or off at pre-definable points in time, as well as increasing or reducing the target temperature and in particular the heating or cooling performance at pre-definable points in time – in particular separately for the individual temperature-control areas.

Preferably in the strongly temperature-controlled edge area, which is preferably offset inwards from the non-temperature-controlled outermost edge area in the direction towards the center of the temperature-control panel, one or preferably multiple temperature sensors are arranged at a distance from each other, and likewise in the core area that is surrounded by the strongly heated edge area.

Preferably, temperature sensors are also provided in the non-heated edge area.

As far as an edge area is mentioned above, it is preferably respectively a circumferential edge area, but it could also be an edge area on individual sides, for example on the two opposing sides.

Thus, the temperature-control panel has a support area which extends along these side edges on two opposing sides – wherein its extension direction is referred to as the depth direction – and with which the temperature-control panel can be placed on two opposing sides on corresponding supports.

The support area is defined in that it is arranged at the bottom side of the temperature-control panel and has a protective coating, in particular a stainless steel plate, and a thermal insulating layer is preferably present between this protective coating and the temperature-control panel.

These support areas can have the same or a smaller width than the non-heated edge area of the temperature-control panel.

Preferably at its rear edge that extends between the two support areas, the temperature-control panel has an upwardly projecting rear stop to avoid that products placed on the temperature-control panel fall over a rear edge, wherein the rear stop preferably extends across more than **80**% of the length of the rear edge in its extension direction.

Preferably, the temperature-control panel has respectively one corner recess in its front two corner areas, in particular a rectangular recess with a rounded inner corner or a recess with an arc-shaped contour, in particular a contour with the shape of a quarter circle. As in most cases a dispensing shelf has a base frame that usually consists of profiles extending along the outer edges, mostly made of metal, the cross section of a front upright profile can respectively be accommodated in these corner recesses, so that the temperature-control panel can extend to the front at this height up to the front edge of the base frame, and can extend laterally up to the outer surfaces of the base frame at this height.

In this way, the non-heated outermost edge area is located for the most part in the area of the thickness and/or of the depth of the upright profiles, so that the area between the four upright profiles is usually almost completely available as a heated surface for the placement of products.

In the transversal direction, the corner recess is as large as or larger than the width of the non-heated outermost edge area, and preferably the corner recess is larger in the transversal direction than the cross section of the front upright profiles in this direction, which has advantages with respect to handling, as will be described later.

It is particularly advantageous if the temperature-control panel has temperature-control areas that can be controlled independently of each other, as viewed in the top view, so that for example also the core area of the temperature-control panel is divided into multiple temperature-control areas, for example when it is not necessary to temperature-control the entire surface of the temperature-control panel due to the number of the stored products, and above all it is of course possible in this manner to heat up a strongly heated edge area to a higher temperature than the less strongly heated core area, with these also representing areas of the temperature-control panel that can be separately controlled with respect to their temperature.

Since as a general rule the temperature-control panel is operated electrically, a cable, at least for the supply of power and preferably in addition for data transmission from the temperature sensors in the temperature-control panel to the control unit, leads away from the actual temperature-control panel and namely preferably out of its rear end. Usually, a plug is located at the free end of the cable, so that the cables of all temperature-control panels that are used in a shelf can respectively be plugged respectively independently of their number into corresponding plug sockets at a plug bar that can be arranged directly at the control unit.

At its bottom side, the temperature-control panel can have a planar insulation, in particular with an outer surface of stainless steel or plastic material, in the case that the radiation of heat downwards is to be minimized in this temperature-control panel, which is for example regularly the case in the lowermost temperature-control panel that is used in a dispensing shelf, whereas with all other levels the downward radiation is also desired, since in this way the air space of the compartments located below them is heated as well.

The top plate and bottom plate, in particular if they consist of glass, usually have the same thickness. However, when used as a heating plate, the top plate is preferably

embodied to be thinner than the bottom plate, and when used as a cooling plate, the top plate is preferably embodied to be thicker than the bottom plate.

Based on the example of a heating plate, it will become clear that, for one thing, much less time is needed for heating up the thinner top plate than for heating up the bottom side, and thus the heating plate can be put into operation much faster, and in particular that the heat storage prior to the heat being radiated into the environment becomes less in the top plate in this way, and in addition the heat dissipation via the laterally circumferentially narrower side surfaces is kept low.

To be able to use such a heating plate optimally in a self-service dispensing shelf, such a dispensing shelf is preferably designed in a specific way.

There is also disclosed herein a self-service dispensing shelf having the following features.

On the one hand, a base frame that preferably consist of a frame made of profiles, most often of metal profiles, that extend at least along the edges of the dispensing shelf which preferably has approximately the shape of an upended ashlar, wherein its front surface – at least in the upper area – preferably recedes obliquely upwards and backwards.

Correspondingly, the base frame comprises uprightly positioned, in particular vertically positioned, upright profiles on the one hand, as well as transverse profiles that extend horizontally in the transversal direction in front of the removing person, as well as depth profiles extending in the depth direction, that is, in the direction extending from the front side that is facing towards the removing person to the opposing back side of the dispensing shelf direction.

The dispensing shelf comprises at least one storage space and at least one removal space – wherein the storage space is often at the same time the removal space for the products –, with one or multiple products being directly removable from the storage space inside of which usually a plurality of products is located instead of first moving them from a storage space into which one cannot reach to a separate removal space.

In such a dispensing shelf, multiple storage spaces and/or take-out rooms are often arranged in levels above each other, separated from each other in height by mostly plate-

shaped shelves as dividing elements that are arranged in between them, and usually cover the total horizontal cross section of the dispensing shelf at this position.

A temperature-control panel according to the disclosure or also a simple, non-temperature-controlled bearing shell for the products stored thereon or therein can for example be used as such a shelf. Thus, in such a dispensing shelf, only one, a few, or all shelfs can be configured as – usually electrically operated – temperature-control panels.

These shelves or dividing elements usually rest on support bars that extend in the depth direction and can be accessed by the personnel from the back side, which is mostly the loading side of the shelf.

If a simple bearing shell is used as a shelf and thus as a dividing element between the levels, that is, storage spaces that are arranged above one another, the personnel can exchange an empty bearing shell from the back side for a bearing shell that is filled with products.

If a temperature-control panel, for example a heating plate, is used as a shelf and thus as a dividing element and is arranged on the support bars, it is not taken out of the dispensing shelf for filling it with products because it is connected to a power supply unit for the purpose of being supplied with power and also because it has a much greater weight and higher value than a simple bearing shell made of plastic material, and also because it is more prone to being damaged.

The releasable attachment, that is, an attachment that is releasable in a simple and fast manner and preferably without a tool, of as many components as possible, such as for example also the temperature-control panels, at the base frame is also relevant with respect to hygiene, as all removed components can be cleaned or can also be disinfected more intensively separately, and also the remaining rest of the dispensing shelf, in particular the base frame, can be cleaned particularly thoroughly.

The support bars and thus also the compartment bases themselves are usually arranged so as to be slanted upwards from the front to the back in the depth direction, so that the products placed thereon are presented to be better visible for the removing person. If multiple compartment bases are arranged above each other, their inclination preferably

increases from the bottom up, also to provide an improved visibility of the products placed thereon.

As for the design of the front of such dispensing shelfs, there are two possibilities, since the air that is heated up in the air space of a level that is heated or cooled e.g. by a heating plate, for example a storage space, is not supposed to be able to flow unrestricted towards the front – and also not in the other directions –, which would result in a very high energy loss over time.

The front side of a removal space, which can at the same time be a storage space, is either closed – preferably for each individual removal space or only over the height of two removal rooms, but not over all take-out rooms – by a storage front plate that is embodied as a door or a flap, which in most cases is embodied as a translucent storage front pane as, which may for example be made of glass and which the user opens in order to remove a product form the storage space and then closes it again, and which as a general rule closes by itself if it is no longer held open as a result of gravity.

To avoid that the impact of the door or flap is too hard even if it is dropped, a stop damper or a speed limitation device for the dropping is additionally mounted.

The other possibility consists in the front side of each individual storage space being not completely closed by one or two storage front plates or storage front panels which adjoin each other in their height, so that a tool opening remains open in the front side of each storage space, with a tool, in particular the shaft of a tool such as for example a slider or a spoon, extending through it.

The removing person holds the tool at the outer end and with the inner end of the tool then moves the desired product from the substantially closed storage space into a neighboring removal space which is separated by flap that can be swung open and into which the user can reach from the front side and remove the selected product.

The dispensing shelf is dimensioned in such a manner with respect to the positioning and dimensioning of its supports for the compartment bases relative to the dimensions of the temperature-control panel that, instead of a regular compartment base, such as for example a bearing shell for products, the temperature-control panel can be placed on

the same supports, in most cases the support or bearing strips that extend in the depth direction of the shelf.

However, here the dispensing shelf as well as its support or bearing strips or in general its supports are designed and dimensioned in relation to the dimensions of the temperature-control panel in such a manner that, in the (preferably centrally) inserted state, the temperature-control panel rests on these bearing strips apart from a free lateral edge area of less than respectively **8** mm, better of less than respectively **5** mm, better of less than respectively **2** mm, which respectively remains free on the top side of the bearing strips on the outside on both sides. However, preferably the temperature-control panel extends up to the outer edge of the bearing strips and/or up to the outer edge of the base frame or the upright profiles of the base frame or frame rack, but preferably not beyond the dimensions of the base frame.

Design of the support or bearing strip in the cross section.

Preferably, these bearing strips are designed in such a manner that each bearing strip at first has a V-profile, which in most cases is formed as a bent sheet metal part, and at the front and rear end of the V-profile respectively a fixation appliance, for example a screw lug by means of which the bearing strip can be attached respectively at a front and a rear upright profile, in particular screwed to the same. For this reason, the fixation appliance is usually a screw lug that is positioned perpendicularly to the one leg of the V-profile, which in the mounted state provides the support surface for a dividing element such as for example the temperature-control panel **50**. On the one hand, the other leg of the V-profile, which in the mounted state points in the direction towards the center of the shelf with the tip of its profile shape, so that the V-profile is open towards the outside, has the purpose that a light bar can be attached at the inwards and downwards oriented outer side of this other, lower leg.

The V-profile is open towards the outside and the lower leg extends obliquely, so that contaminations such as for example by crumbs of baked goods are prevented from collecting in the interior as far as possible.

For the same reason, in the area adjoining the tip of the profile, the upper leg is embodied to be slightly bent towards downwards and inwards, that is, in the direction towards the center of the shelf, to let any contaminations that fall thereon fall downwards onto the

next dividing elements. Correspondingly this one leg, which in the mounted state is the upper leg, is embodied to have a [cranked] profile, wherein the end area, which in the mounted state extends horizontally, has an extension that is at least as great as the width of an upright profile, preferably considerably wider, for example twice as wide, as viewed in the front view, so that a stop can be arranged in the additional width area at the front end of the V-profile, forming the front stop e.g. for the temperature-control panel that is placed thereon and projecting upwards over the upper side in the mounted state, the outer side of this leg.

In this manner, the lateral non-heated edge area of the temperature-control panel extends substantially above the bearing strips, and extends only a little or not at all into the free inner space between the inner corner edges of the upright profiles of the base frame, so that the surface of the top side of the temperature-control panel can be used almost without restrictions in the edge area for the placement of products thereon.

If the temperature-control panel is positioned not horizontally in the dispensing shelf, but rather so as to be slightly tilted upwards towards the back in the depth direction, for one thing, a front stop is necessary for positioning the temperature-control panel in the depth direction. It can be attached on a frontal obliquely extending stop bar, for example a cross bar on which also a price tag unit can be attached, or directly at the base frame, preferably its upright profile, or at the bearing strips. The front stop can in particular be adjustable with respect to its distance from the front end of the base frame of the front upright profile, for example to the front end of the same.

Preferably, also a rear stop for the temperature-control panel is present to avoid a backwards displacement of the temperature-control panel, in particular by the removing person. Such a rear stop is preferably attached at one of the bearing strips, in particular at both bearing strips.

Since manufacture of the temperature-control panels is elaborate, an effort is made to make do either with only one structural design or maximally two structural designs of the temperature-control panel in particular with respect to their dimensions – despite the varying length of the bearing strips in the depth direction from level to level, as for example caused by an obliquely positioned front side and different inclination angles of the bearing strips.

In this way, it is possible to design at least all temperature-control panels in the dispensing shelf that are located below the uppermost temperature-control panel to be the same with respect to the dimensions, which on some of the lower levels results in a passage behind the rear edge of the temperature-control panel up to the rear end of the base frame due to the different length of the bearing strips if the front edge and also the front stops for the temperature-control panel are arranged as far in the front as possible. If the storage spaces arranged above each other, that is, the air spaces of the individual levels, are supposed to take on the same temperature, these rear passages can remain air-permeable, if not, an air-impermeable closure must be realized here, for example by means of a closing plate.

The uppermost temperature-control panel is shorter in its length as measured in the depth direction. The lowermost temperature-control panel preferably has an insulation preferably on the entire bottom side, or it is not placed directly on its supports, in particular its bearing strips, but rather by placing a bearing shell or another, non-heated, compartment base in between, which restricts the heat radiation downwards, in this case with its lateral edge being located respectively in an insulating manner between the edge of the temperature-control panel and the bearing strip.

To ensure that the base frame, which in most cases consists of metal, is temperature-controlled along with that as little as possible by the temperature-control panel, all contact surfaces between the temperature-control panel and the base frame are, for one thing, kept as small as possible and, for another thing, thermally decoupled as much as possible by means of intermediate layers made of a thermally insulating material.

Due to the fact that the recesses in the front corner area of the temperature-control panel in the width direction are larger than the width of the cross section of the upright profile accommodated therein, to take out the temperature-control panel it can be pushed towards a side up to a stop of the upright profile in the recess that is present there, wherein in this case prior to that the side edge of the temperature-control panel has to be lifted and pushed over the adjacent temperature-control panel or the other dividing element present there in an analogous adjacent dispensing shelf.

However, then the other side of the temperature-control panel can be lifted up to a pivot angle of **20**°, **30**° or even of **40**°, even if a side wall had been present in the base frame

above this edge area of the temperature-control panel in the central state, as will be explained later.

This oblique position is required for the assembling technician to pull out the temperature-control panel backwards in between the rear upright profiles.

The power supply unit, which in most cases is a part of the electrical control unit for the electrically operated temperature-control panels, is located below the lowermost shelf, at least below the lowermost temperature-control panel in the base frame, in most cases in the base space and close to one of the sides of the base frame, oriented with the operating unit towards the operator standing behind the back side. This control unit and/or power supply unit can also supply other electrically operated components of the dispensing shelf, for example light sources, with current and control them.

The power cables and/or data cables, in most cases a combined data/power cable, with a plug being located at its free end in most cases, preferably leads out of the rear narrow side of the temperature-control panel not in its center, but close to one of its side edges. On this side, preferably at the upright profile, a cable channel is mounted by collecting the cables that are guided by the individual temperature-control panels, and leading them downwards, wherein an inlet opening for a cable is present in the cable channel preferably at the height of each rear edge of a temperature-control panel, wherein the cable channel can of course also be open across its entire length.

As a general rule, corresponding plug sockets are located inside the control unit that is located in the base space, or a corresponding plug socket bar is already arranged at the upright profile further above. The cable channel preferably consists of a thermally insulating and electrically non-conductive material, usually of a plastic material.

Instead of a separate cable channel, the upright profiles can also be configured as hollow profiles, and the corresponding hollow profile to which the control unit and also the cable outlets from the temperature-control panels are adjacent are used as a cable channel with corresponding outlet openings, in particular an open side of the cross section.

In this manner, the operator, which as a general rule operates on the back side of the shelf, can set the operating unit, preferably each individual temperature-control panel, with the desired temperature or temperature range, and preferably is also shown the

temperatures of the individual temperature-control panels, preferably from each of the individual temperature sensors present there and thus in the individual temperature-control areas, on a display unit.

The control should be capable of maintaining the set target temperature at the temperature-control panel up to a deviation of +/- **15**°C, better of +/- **10**°C, better of +/- **5**°C at the temperature-control panel, on the one hand, and – if also in the air space, for example attached at the base frame, a temperature sensor that is connected to the control is present – also the temperature in the air space.

Also, light bars extending in the depth direction can be arranged at the bottom side of the bearing strips, radiating obliquely downwards and inwards and illuminating the products on the next shelf below, in particular the next temperature-control panel below.

Since these light bars also emit heat – depending on the used illumination means (LEDs or conventional illumination means) to a greater or lesser extent – exactly in the lateral edge area in which the curtain of rising warm air is supposed to be generated, these light bars contribute to increasing the temperature especially in the air space of this edge area. By means of corresponding sensors, this temperature can be measured, and the temperature in the strongly heated lateral edge area of the temperature-control panel can be controlled correspondingly, in particular it can be controlled to be lower than if light sources eradiating from above are present.

Such an air curtain is necessary in particular in the case that the air space at the side surfaces of the base frame is open and not delimited.

However, preferably the sides of the base frame are at least partially closed by one continuous or by multiple individual side plates, preferably across at least **70**%, better at least **80**%, better at least **90**% of the side surface of a rack or at least the side surface of each individual level, that is, each individual storage space.

Such individual side plates – in particular side panels made of a translucent material such as translucent plastic material or translucent glass – can be arranged in a fixed and unmovable manner at the base frame on each level, or can also be arranged so as to be pivotable slightly outwards about a pivot axis extending in the depth direction, so that the lower edge of the side plate can be slightly pivoted outwards, so that the side edge of

the temperature-control panel can be lifted upwards past it to take out products in the obliquely positioned state.

This pivot axis can be the same pivot axis at which also the reach back protection device can be mounted in such a side surface in the base frame of the dispensing shelf and also the side plate can in particular additionally have the function of a reach back protection device if the pivot range is correspondingly defined, as is explained based on the drawings.

Preferably, also such a single side plate closes the side surface of this storage space by at least **70**%, better by at least **80**%, better by at least **90**% per level.

Also, the back side of the dispensing shelf is usually closed by a single-wing or double-wing rear door, which preferably extends over the entire height of the storage area in which the storage spaces are located, or again divided over the height of respectively one level, that is, over the height of each storage space. Such a rear door preferably consists of mirror-coated glass which is, however, translucent in one direction, so that such a rear door is translucent from the back side for the operator, so that the loading state of the individual shelfs can be checked, but is not translucent, but mirror-coated for the customer standing in front of the dispensing shelf.

Here, on the grip side, the usually rectangular rear doors have an indentation extending along its rim that is located there and serving for letting the rear door of a directly neighboring base frame, which has its hinge on this side, enter the recess [with its hinge] when the neighboring rear door is opened, so that a distance between the base frames can be forgone and the use of the space is improved.

In contrast to that, the back side of the shelf below the lowermost compartment base, in particular below the lowermost temperature-control panel, is usually open, and this base space can be accessed from the back.

If the front side of the storage space is also entirely or partially open, a warm air curtain is required there as well, which can also be created here by a strongly heated front edge area of the heating plate and/or lighting devices that irradiate this front edge area from above, thus emitting heat.

The top side of the shelf – which is preferably tilted obliquely backwards – is closed with a cover plate, which preferably consists of a thermally insulating material and/or of a mirror that is mirror-coated towards the bottom side.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, embodiments according to the disclosure are described in more detail by way of example. Herein:

Figure **1**a: shows the dispensing shelf in the side view, that is, as viewed in the width direction, with a first front design,

Figure **1**b: shows the dispensing shelf in the front view, that is, as viewed in the depth direction from the front,

Figure **1**b**1**: shows an enlarged view of Fig. **1**b,

Figure **1**c: shows the dispensing shelf in the side view with a second front design,

Figure **2**a: shows a reach back protection device with a side plate,

Figure **2**b: shows a reach back protection device with a fixedly mounted side plate,

Figures **3**a–c: show a temperature-control panel in different views,

Figure **3**a**1**: shows an enlarged view of Fig. **3**a,

Figures **4**a–c: show sections through different edge designs of a temperature-control panel,

DETAILED DESCRIPTION

Figure **1**a shows a side view and Figure **1**b shows a front view of a single dispensing shelf **1**, from which it can initially be seen that the dispensing shelf **1** has a frame-like base frame **19** which consists of profiles **41** that are welded or screwed together, namely of vertically extending upright profiles **41**a, depth profiles **41**b that extend in the depth

direction **30,** as well as transverse profiles **41**c that extend in the width direction **31**, the transversal direction.

In this manner, a base frame **19** is created, which is rectangular in the front view, that is, having left and right upright struts **41**a that extend in parallel to each other as well as horizontally extending depth profiles **41**b, as well as cross struts **41**c.

The transverse profiles **41**c, which extend between the rear as well as the front upright profiles **41**a, are present in the height only at the upper end as well as in the lower half, at approximately a third of the total height of the dispensing shelf **1**, which is approximately as tall as a person, so that the lower transverse profile **41**c is located approximately at the knee height of an adult user **100** who stands in front of it, or slightly higher.

It can also be seen in the side view of Figure **1**a that the depth profiles **41**b are also only present at two positions, namely between the upper ends of the front and rear upright profiles **41**a as well as approximately at the same height as the lower transverse profile **41**c in Figure **1**b.

In the side view, a depth profile **41**b could additionally also be present at the lower ends of the sides of the front and rear upright profiles **41**a. However, there is no additional transverse profile **41**c present at the height of the lower ends of the upright profiles **41**a, as can be seen in Figure **1**b, so as not to compromise accessibility from the front between the upright struts **41**a in the base area **12**‘ slightly above the ground.

The side view of Figure **1**a shows that, in the side view, the base frame **19** is not rectangular in total but only in the lower area, that is, up to the lower of the two depth profiles **41**b, and has a vertical front side **3** there, while from there on upwards and thus in the largest part of the front side **3,** it is formed to be tilted, that is, in this area the frontal upright profile **41**a comes closer to the rear, continuously vertical upright profile **41**a in the upwards direction.

Further, the depth profiles **41**b that connect the upper ends of the upright profiles **41**a do not extend horizontally, but so as to be slightly tilted from the front side **3** towards the back side **22** of the base frame **19**. This top side of the dispensing shelf **1** is closed by a cover plate **42** that is placed onto the base frame **19** from above.

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The front side **3** of the base frame **19** in front of which the user **100** stands, intending to take out products P from the dispensing shelf **1**, can be completely open or more or less closed, as will be explained in the following, and the side surfaces can likewise be open or closed.

The back side **22**, from which the dispensing shelf **1** is usually filled with products by the operator, is either open or closed by rear doors **15** or flaps that are to be opened, as will also be explained.

Above the lower depth profile **41**b and the transverse profile **41**c, on different heights between the left as well as between the right front and rear upright profiles **41**a and respectively left and right at the same height, bearing strips **18** are attached, usually screwed on, at the upright profiles **41**a on which – as shown in Figure **1**b**1** as viewed from the front – plate-shaped dividing elements **6**, such as for example temperature-control panels **50**, for products P to be placed thereon and sold are placed with their edge area.

Here, the bearing strips **18** and thus the dividing elements **6** are arranged so as to be tilted downwards from the back side **22** towards the front side **3**, and namely with an increasing inclination from the uppermost to the lowermost bearing strip **18**, wherein the lowermost bearing strip **18** can also be arranged horizontally, as shown in Figure **1**a.

Thus, the dividing elements **6**, here temperature-control panels **50** or also simple bearing shells **6** for products P, divide the inner space of the dispensing shelf **1** in the height into individual levels or compartments, whereby individual storage spaces **2** for the products P are created, namely between the individual dividing elements **6** as well as between the uppermost dividing element **6** and the upper end of the base frame **19** of the dispensing shelf **1**, that is, usually the cover plate **42**.

The area below the lowermost dividing element **6** is referred to as a base space **12**, so that the dispensing shelf **1** is divided into a storage area **2**‘ and a base area **12**‘ also in the height.

The front side **3** is usually closed in the base area **12**‘ by a front plate **16**, which, however, can be opened due to the front plate **16** being openable and in the present case being

embodied as a flap and attached in a pivotable manner at the base frame, in particular the lower transverse profile **41**c, by means of one or multiple hinges **21** at its upper edge.

In the opened state, this facilitates access into the base space **12** from the front, either to clean the base surface **200** therein or to stock goods there. The closing process of the front plate **16** is slowed by a closing damper **25**, thus dampening the impact.

As shown in Figure **1**b at the left side of the dispensing shelf **1**, the sides of the dispensing shelf **1** can be closed if needed by means of a lateral side plate **20** on one or both sides, respectively as required either only in the base area **12**‘ or also in the storage area **2**‘, which, among other things, depends on whether multiple such dispensing shelves **1** are positioned next to each other as viewed in the front view of Figure **1**b and/or whether or not in that case the adjacent storage spaces **2** have to be separated from each other.

Among other things, this depends on whether bearing shells **6** or dividing elements with another function, for example temperature-control panels **50** – heating plates for keeping products P warm or cooling plates for cooling products P – are used as the dividing elements, since in that case a respective storage space **2** may have to be mostly closed towards all sides already for reasons of thermal insulation.

Thus, the front view of Figure **1**b shows a side plate **20** that extends continuously over the entire height of the base frame **19** which in that case, however, has to rest externally on the side surface of the base frame **19** as a general rule, which is not optimal when multiple base frames **19** have to be placed next to each other.

In contrast, what can be seen in Figure **1**a in the upper two storage spaces **2** or take-out rooms **4** are respectively individual side plates **20**, in this case formed as at least partially translucent side panels **20**, that are inserted into the free space between the front and rear upright profiles **41**a that delimit this storage space **2** in the side view as well as the bearing strip **18** extending above and below it, in the uppermost storage space **2** between the depth profile **41**b located above it and the bearing strip **18** located below it, which will be explained in more detail based on Figures **2**a, b.

In Figure **1**a, the two upper levels are shown simultaneously as storage space **2** and removal space **4** at the same time, with the storage front plate **11** that respectively closes this space **2**, **4** on the front side **3**, extending across the entire front surface of this space

**2**, **4** and being formed as a door with a lateral hinge that can be opened by the removing person **100** to then be able to directly take out a product P, in the present case a food product that is filled into a kind of small basket.

To ensure that the storage front plate **11** does not unintentionally remain open and the heat which is generated by the heating plate **50** that is respectively provided there as a shelf and thus a dividing element **6** escapes from the storage and removal space **2**, **4**, these storage front plates **11** – no matter whether in the design as a door like in Figure **1**a, or as a flap like in Figure **1**c – are formed in such a manner that they automatically close, in particular due to gravity, upon being released.

To ensure that the impact on the front upright profile **41**a does not become too hard, a stop damper **27**, which may for example consist of plastic material and onto which the storage front plate impacts (Figure **1**a), is attached on the front side of the upright profile **41**a, in particular adhesively attached, preferably in the solution as a door.

For it to be reliably kept in the closed state, a magnet **26** is attached at the storage front plate **11** on the side that is facing the base frame **19** in the area of the upright profile **41**a which is sufficiently strong to hold the storage front plate **11** in this position on the base frame **19** made of iron when it comes to rest at the stop damper **27**.

As shown in Figure **1**a, the magnet **26** is arranged in such a manner that it comes to rest against the stop damper **27** which, however, does not necessarily have to be the case: The magnet **26** could also be arranged so as to be offset with respect to the stop damper **27**, so that in the closed state the storage front plate **11** rests directly at the stop damper **27** if the magnet **26** is thinner than the stop damper **27**.

In Figure **1**a, in the lowermost level of the storage area **2**', the space that is delimited downwards by the lower depth profile **41**b and the stop bar **18** arranged above it is shown to be only used as a storage space **2**, so that accordingly the removing person **100** is not supposed to and not able to directly reach from the front side **3** into this storage space **2**, but rather only by means of a tool **37** extending into this storage space **2** from the outside, such as a slider **33** which extends through a narrow tool opening **14** in the storage front plate **11**. The removing person **100** can hold this tool at the outer end outside of the dispensing shelf **1** and, with the end that is located in the dispensing shelf **1**, that is, inside the storage space **2**, displace a products P located therein, and namely

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into a removal space **4** that in the view direction of Figure **1**a is located in front or behind it, e.g. of a further base frame **19** attached at the side, as shown based on Figures **2**a, b.

In this case, the removing person **100** should of course as far as possible not be able to open the storage front plate **11**, but it should still be possible to be open it for cleaning purposes etc. at least by the personnel.

For this reason, the storage front plate **11**, which in this case is also embodied as a door, is secured with a control mechanism **48** at its free end at one of the upright profiles **41**a, as shown in the enlarged view.

Here, for example at the base frame **19,** a displaceable in particular pivotable, e.g. L-shaped latch **45** is attached, with its cranked extension **45**a meshing in the locked state into a recess **46** that is attached at the inner side of the storage front plate **11**.

Thus, this latch mechanism **48** cannot be opened at all through the tool opening **14** or can only be opened with much effort, and is usually opened by the personnel from the back side **22** of the dispensing shelf **1** that is either designed to be open at the rear, or is opened.

Especially when temperature-control panels **50** are used as dividing elements **6** in the dispensing shelf **1**, but also independently of whether this is the case, the back side **22** of the dispensing shelf **1** is also supposed to be closable.

For this reason, in Figure **1**a the back side **22** is closed by a separate rear door **15** which extends on the back side of the base frame **19** across a height of each compartment, that is, each level, and which is usually also embodied as a panel that is translucent at least from the outside towards the inside to make it possible for the personnel to see the loading state in the interior of the storage space **2** or removal space **4**.

As can also be seen in Figure **1**a, the temperature-control panels **50**, **50'** that are used on each level as a shelf **6** have different lengths in their extension in the depth – or more precisely in the extension direction of the bearing strips **18** on which they respectively rest –, which, among other things, is due to the increasing inclination of the bearing strips

**18** from the lowermost, non-tilted, to the uppermost bearing strip **18,** as well as due to the tilted front side.

However, because – despite the increasing inclination of the bearing strips **18** due to the stronger effect of the inclination of the front side **3** – the length of the bearing strips **18** decreases from the bottom up, the length of the shortest, uppermost temperature-control panels **50** is chosen such that they extend substantially across the entire length of their bearing strips **18**.

Thus, the second temperature-control panel **50** from above and all temperature-control panels **50** located below it are slightly longer than the uppermost temperature-control panel **50**, but are all of the same length, that means that they have the same length in their depth direction, that is, in the mounted state in the extension direction of the bearing strips **18**, and namely are chosen in such a manner that the second temperature-control panel **50** from above substantially extends across the entire length of its bearing strips **18**.

Since a front stop **8** for the front edge of the temperature-control panels **50** is formed at the bearing strips **18** respectively at the front end – in the side view of Figure **1**a in a non-visible position arranged in the depth area of the front upright profile **41**a –, [and] the third bearing strip **18** from above and the bearing strips **18** that are positioned further downwards are even longer, what results behind the rear end of the temperature-control panels **50** in the third and fourth bearing strip **18** from above is a respectively increasing gap to the back side of the dispensing shelf **1**.

This is tolerated in order to reduce the number of different lengths and thus structural designs of the temperature-control panels **50,** and is safe as long as both storage spaces **2**, that is, below and above the temperature-control panel **50** that are dividing them as well as the gaps behind it, are temperature-controlled to approximately the same temperature. If this is not the case, this gap has to be closed by means of a fitting covering strip which preferably extends continuously from the left to the right bearing strip **18**.

The temperature-control panel **50**‘ resting at the lowermost level and thus the lowermost bearing strip **18**, which in most cases extends horizontally, is additionally insulated on its

bottom side to avoid radiation of heat – in a heating plate **50** – downwards into the base space **12**.

Figures **3**a, b show the design of the temperature-control panels **50**, **50**‘ in detail, and namely Figure **3**a in the top view from above, that is, onto the main plane **51**‘ of the temperature-control panel, Figure **3**b in the front view in a partially sectioned manner, and Figure **3**c in the side view.

This clearly shows that the temperature-control panel **50**, **50**‘ respectively consists of a composite plate **51**, that is, quasi the main plate at which diverse attachment parts are attached.

It is referred to as a composite plate **51** because – as shown in Figures **4**a - c in the cross section – this composite plate **51** consists of a flat top plate **51**a and a flat bottom plate **51**b, which are preferably both glass plates, and which, together with a temperature-control layer **56** that is fixedly attached between then, from the composite plate **51** which has a main plane **51'** that is positioned in parallel to the top side and/or the bottom side of the composite plate **51** which usually extend in parallel to each other. Thus, as a general rule, the main plane **51'** of the composite plate **51** is also the main plane of the temperature-control panel **50**, since the attachment parts present in addition to the composite plate **51** have a much lower extension as compared to the composite plate **51**.

The temperature-control layer **56** can be made of any desired material, but contains electrically conductive elements **56**a, for example heating wires **56**a that can be heated by means of electrical current, and heat up the top plate **51**a and the bottom plate **51**b to the desired temperature.

To measure this temperature, temperature sensors **57** are further arranged between the top plate **51**a and the bottom plate **51**b, with their signals reaching the control unit **66** and the associated power supply unit **43** to which the temperature-control panels **50** are connected, preferably via the cable that conducts the electrical current to the conductive elements **56**a.

The temperature sensors **57** are preferably arranged in the adhesive layer **68** to which the temperature-control layer **56** is adhesively bonded respectively opposite one of the glass plates, preferably on its bottom side and on its top side.

Further, the left end of the sectional renderings of Figures **4**a-c show solutions for covering the temperature-control layer **56** that is visible and accessible from the front face.

In a first solution according to Figure **4**a, a cover strip **69**, which is preferably made of stainless steel, extends across the entire thickness D, that is, height, of the composite plate **51**, but does not project beyond the same in height, and also does not surround the upper or lower edge of the composite plate **51**, since inner corners and inner edges at which dirt can collect would be formed in this way.

However, this solution has the disadvantage that such a cover strip **69**, especially if it is made of a material with a higher thermal conductivity than glass, can cause burns easier when touched than when e.g. the top side of the top plate **51**a made of glass is touched. Especially with the frontal narrow side of the composite plate **51**, the temperature-control panel **50**, this frontal narrow side should preferably be protected, e.g. by a cross bar **17** that is arranged in front of it in the base frame **19** and extends at a small distance in front of the cover strip **69**.

In Figure **1**c, such a cross bar **17,** which can be attached between a left and a right front upright profile **41**a, preferably by simply suspending it, is shown in an enlarged sectional rendering as being positioned too low for this function, serving preferably as a price tag holder as a price tag unit **28** can be attached thereat, as can be seen in this sectional rendering.

It consists of a price tag holder **23** in the form of a plastic material profile that is cranked multiple times in the cross section and extends in the same direction, the width direction **31**, as the cross bar **17**.

In the upper area of the price tag holder **23,** it is cranked three times by respectively approximately **90**°, so that what results is an almost closed, approximately rectangular inner contour into which the cross section of the cross bar **17** fits. Since the material of

the price tag holder **23** is sufficiently elastic, this multiply cranked structure can be bent open so far that the price tag holder **23** can be pinned onto the cross bar **17** from above.

In the lower area, the price tag holder **23** is cranked once by approximately **180**° and thus forms a U-shaped pocket that is open upwards, and into which the price tag **24** for the products offered in the corresponding level, usually the level below the cross bar **17**, can be inserted from above.

Thus, the entire price tag unit **23** is located in the area of the dimensions of the base frame **19**, since the cross bar **17** is positioned not in front, but in the depth area of the front upright profiles **41**a, and is thus protected behind the front storage front doors **11**.

To protect the frontal narrow side of the temperature-control panel **50**, the cross bar **17** could be arranged higher so as to cover the same.

Figure **1**c further shows another design of the front side **3** of a dispensing shelf **1**, namely where the storage front plates **11** are respectively embodied as a plate that is to be opened by being pivotable horizontally, extending respectively over a height of the front surface of one of the storage spaces **2** and / or take-out rooms **4**.

In this solution, a damper for slowing down the gravity-caused closing motion is present preferably in the joint of each of these storage front plates **11** embodied as flaps, that is, about the plate pivot axis **47**.

In a second variant, Figure **4**b shows a cover strip **69**‘ that is offset backwards with respect to the frontmost front face of top plate **51**a and bottom plate **51**b, and in this way can be touched less easily.

Here, the cover strip **69**‘, which is also bar-shaped, that is, rectangular in the cross section, either extends only in the thickness area of the temperature-control layer **56** and the adhesive layers **68**, or the glass plates are chamfered at their rim that is respectively facing the other glass plate – as shown in Figure **4**c -, so that the backwards offset cover strip **69**“ can have a rhombic or triangular cross-sectional shape, and can be better adhesively bonded to the glass plates **51**a, **51**b due to their larger contact surface with them.

In the renderings of Figures **3**a, b, c such optional cover strips **69**, which are in particular arranged along the front side and/or also the side surfaces, are indicated only in partial areas.

Instead of stainless steel, such cover strips **69** can also consist of a different material, with its thermal conductivity preferably being not greater than that of glass, in particular of plastic material. In particular in the structural design according to Figure **4**c, such a cover strip **69** made of a paste-like material, such as for example silicone, can be applied and subsequently cured.

Figures **3**a, b, c primarily show the other attachment parts at the composite plate **51**, which in most cases consist of stainless steel sheets.

For one thing, the protective coating **59** in the form of a stainless steel strip that is visible in the front view of Figure **3**b in the left area and that extends in the edge area along one of the side edges **51.2**,**51.3** of the composite plate **51**, namely in the support area **58** or also in a slightly wider or more narrow design, in the depth direction **30** preferably across the entire extension of the composite plate **51** on its bottom side.

The width of the protective coating **59**, that is, the support area **58**, can be of the same size or larger, wider or narrower than the surface with which the temperature-control panel **50** laterally rests on the bearing strips **18** in the mounted state.

At the back side, that is, along the rear edge **51.4**, of the composite plate **51,** a rear profile **70** is arranged, extending in the transversal direction **31** and in most cases being made as bent sheet metal parts from stainless steel, and having multiple functions.

For one thing, the rear profile **70** projects as a rear bar **61** – substantially across the entire width of the rear edge **51.4** of the composite plate **51** – upwards beyond its top side, and is supposed to prevent that products P placed on the composite plate **51** are accidentally pushed back so far backwards by the removing person **100** that they are dropped down over the rear edge **51.4** of the composite plate **51**.

For another thing, a cable **64** that provides current to the temperature-control layer **56** extends out from the rear area, in particular the rearward narrow side, of the composite

plate **51**, as shown in Figure **4**a, and in most cases does so not in a corner area of the composite plate **51**, but in the central area.

To guide this cable **64** to the side, that is, to one of the rear upright profiles **41**a at which a cable channel **29** is attached in a vertically extending manner for guiding these cables **64**, this rear profile **70** is at the same time used as a cable guide at the bottom side of the composite plate **51** via which it extends downwards and outwards, as can be seen in Figure **3**c.

As viewed in the side view, that is, in the extension direction of this rear profile **70**, for this purpose, the rear profile **70** has the cross sectional shape of a U-shaped cable duct **71** that is open towards the back in the area below the composite plate **51**, so that the cable **64** can be placed inside it and can be guided towards the side.

This rear profile **70** is attached, preferably adhesively bonded, with the upper leg of the U-shaped cable duct **71** only at the bottom side of the composite plate **51**, and has the cross-sectional shape that is shown in Figure **3**c, consisting of the U-shaped cable duct **71** and the rear bar **61** that projects upwards from the free end of its upper legs.

A further attachment part can be a protective cover **59,** which does not extend only over the support area **58** as a strip extending in the depth direction along the bottom side of the composite plate **51**, as shown in Figure **3**b in the left area, but substantially across the entire bottom side of the composite plate **51**, and of course also in the support area **58**, where it is supposed to provide a thermal insulation against the bearing strips **18** on top of which the temperature-control panel **50** rests.

This is necessary in the lowermost of multiple temperature-control panels **50** in a dispensing shelf **1** to prevent any heat radiation of a heating plate downwards into the non-heated storage space **2** which is located below it, in most cases in the lowermost level, to avoid a radiation of heat into the base space **12** located below.

Such a continuous protective coating **59** is then preferably embodied as a tray with a dipped portion in the central area, where in this way an insulating layer **60** of thermally insulating material is present in the created distance between bottom side of the composite plate **51** and the sunk-in central area of the tub-shaped protective cover **59**.

The edges that are curved upwards and extend in parallel to the main plane of the tub-shaped protective cover **59** are preferably present in the side areas – for the function as an intermediate layer between the composite plate **51** and the supporting bearing strips **18** in the support area **58** – and in the front area – as a visual protection towards the front to avoid that the insulating layer **60** can be seen – and preferably also in the area of the back side, that is, present circumferentially.

Due to the overhang downwards over the bottom side of the composite plate **51,** the cable duct **71** at the same time forms a gripping bar **62** at which the personnel can grip the temperature-control panel **50** and pull it backwards out of the base frame **19**.

Further, it can be seen in the top view of Figure **3**a that the two front corners of the composite plate **51** of the temperature-control panel **50** have respectively one corner recess **63**, extending in a rectangular manner with the legs in parallel to the outer edges of the composite plate **51** and having a rounded inner corner, with the latter serving to prevent the generation of interior tensions in the glass plates.

The extension of the recess **63** in the width direction **31** is larger than the width of the upright profiles **41**a, as viewed in the top view from above, and the extension in the depth direction **30** is larger than the extension of the front upright profile **41**a which extends in the depth direction **30** partially and in the width direction **31** completely inside the corner recess **63**.

In the state in which it is inserted into the dispensing shelf **1,** the temperature-control panel **50** is preferably positioned in the base frame in such a manner that the usually obliquely forwards tilted temperature-control panel **50** abuts at each side at a front stop **8** with the front edge **51.1** of its composite plate **51** – which in Figure **3**a is only shown on one side –, with the front stop **8** being preferably attached at the bearing strip **18** (see Figure **2**a, b), so that, with its cross section, the frontal upright profile **41**a is located partially in the corner recess **63** without touching the composite plate **51**. However, the front edge of the composite plate **51** is offset backwards with respect to the front edge of the cross section of the front upright profile **41**a, so that the cross bar **17** with the price tag unit **28** can still be accommodated in the forwards overhang of the front upright profile **41**a, as shown in the enlarged rendering of a section in Figure **1**c.

The width of the composite plate **51** as measured in the width direction **31** and thus the width of the temperature-control panel **50** is chosen in such a manner that, in the mounted state, it extends up to or close to the outer edges of the bearing strips **18** on which it rests, but not to beyond the base frame **19**.

The top view of Figure **3**a onto the composite plate **51** further shows the possibly present temperature-control areas **52**a, b that are to be temperature-controlling independently of each other.

For one thing, due to manufacturing reasons, each composite plate **51** has a non-heated, because un-heatable, edge area **53** that is present at least on two facing sides, in this case extending along the depth direction **30**. The width of this non-heated edge area **53** is larger than the width of the support area **58** in which for example the composite plate **51** is supposed to rest on the bearing strip **18** located below.

However, the area located inside, that is, between the two non-heated edge areas **53**, is preferably not only one single temperature-control area.

Rather, preferably there is a ring-shaped circumferential heated edge area **54** located between the non-heated edge areas **53**, that is, inside the non-heated edge areas **53**, and also if they are present at all four rims of the preferably rectangular composite plate **51**, and this heated edge area **54** encloses a core area **55**. In this manner, the heated edge area **54** can be heated up to a higher temperature than the core area **55**, independently of whether it extends only in the depth direction or only along the width direction or is formed as a circumferential area, and in this way a kind of warm air curtain from the strongly heated edge area **54** can be created, which reduces the cooling at the cooler lateral boundaries such as side plates **20**, rear door **15**, or front plate **11**.

Figure **2**a, b as well as Figure **1**c show how the bearing strips **18** can be designed.

For one thing, the bearing strip **18** comprises a V-profile **34** that is arranged horizontally in the mounted state and substantially extends in the depth direction **30**, in the case of a tilted arrangement of the bearing strip **18** with respect to the depth direction of course as viewed in the extension direction of the bearing strips **18**.

This V-profile **34** is usually a bent sheet metal part and has an upper leg **34**a and a lower leg **34**b, wherein the V-profile **34** points inwards with the tip **13** of its cross-sectional shape, that is, towards the center of the dispensing shelf **1**, and points outwards with its open side.

The upper leg **34**a has a bent profile with an obtuse angle, so that in the mounted state the free end area of this upper leg **34** extends horizontally up to the crank portion with its cross section, while, due to the crank portion, the area that extends thereat in the direction of the tip **13** drops off obliquely downwards in the direction towards the center of the dispensing shelf **1**.

Here, the horizontally extending end area is wider than the width of a front upright profile **41**a regarded in this front view up to the outer edge of which this free end area of the upper leg **34**a extends if the fixation appliance **36** that extends downwards from the bottom side of this end area and thus of the upper leg **34**a, namely a vertically positioned plate-shaped screw lug **36,** is screwed on the inwards pointing surface of such an upright profile **41**a.

In that case, a front stop **8** projects upwards over the top side of the upper leg **34**a within the remaining distance in the width direction **31** between the inner-side surface of the upright profile **41**a and the crank portion in the upper leg **34**a, for placing the temperature-control panel **50.**

For this reason, the screw lug **36** that projects forwards beyond the frontal end of the upper leg **34**a (see Figures **3**a and **3**a**1**) and the front stop **8** on the front side of the V-profile **34** can be manufactured as a combined bent sheet metal part, which only has to be welded on preferably at the bottom side of the upper legs **34**a, as can also be seen in the top view of Figure **1**b**2**.

The fixation appliance **36**, in particular in the form of the plate-shaped screw lug **36**, usually has no upwards projecting stop part at the rear end of the bearing strip **18**, that is, of the V-profile **34**, in which it projects backwards beyond the rear end of the V-profile.

The lower leg **34**b extends in principle obliquely outwards and downwards, but optionally concretely only in its outer end area, since the lower leg **34**b also has a cranking with an obtuse angle, as a result of which the area between the upper end of the obliquely tilted

end area and the tip **13** of the V-profile **34** extends in an approximately horizontal manner.

A light bar **40** is attached at the obliquely tilted end area on the bottom side of the lower leg **34**b, for which purpose an attachment device **32,** e.g. in the form of an aperture, is present at each end of the V-profile **34**.

Like in Figure **1**a, also in Figure **1**c, the base front plate **16** is shown attached as a flap at its upper edge at the height of the lowermost depth profile **41**b so as to be pivotable via a hinge.

The power supply **43** and control unit **66** for the electrically operated temperature-control panels **50** in a dispensing shelf **1** are accommodated inside the base space **12**, as shown in Figures **1**a, b, c.

For this purpose, the cables **64** of the individual temperature-control panels **50** that are guided downwards in the cable channel **29** to the control unit **66** and the power supply **43** – and that are dimensioned to be sufficiently long for this purpose –respectively have a plug **65** at their free end.

Either as a separate structural component or at the back side of the power supply unit **43** – which in most cases is formed integrally together with the control unit **66** –, fitting plug sockets **67**a to **67**d are located, into which respectively a plug **65** of an temperature-control panel **50**, **50**‘ can be inserted and above all can also be pulled out of it if this temperature-control panel **50**, **50**‘ is either to be replaced by another temperature-control panel **50**, **50**‘ or another dividing element **6**, such as for example a simple bearing shell **6**, is to be inserted in its stead in the dispensing shelf **1**.

If the control unit **66** and the power supply unit **43** are designed integrally – as shown in Figures **1**a, **1**b, **1**c – it is usually mounted in the base space **12** in the upper area at the base frame **19** with a backwards pointing operating unit **66**a in its front side, as indicated in Figure **1**a, in which the necessary display elements and switches as well as controllers are provided, and the plug bar **67** with the individual plug sockets **67**a to **67**d is arranged either on the front side of the combined unit **66**, **43**, as shown in Figure **1**b – in that case, however, offset backwards at a sufficient distance from the front side **3** of the base space

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**12** to facilitate insertion of the plug **65** – or on the side surface of the combined unit **66**, **43**, as shown in Figure **1**c.

Figures **2**a, **2**b further show detailed renderings of the side plates **20,** which are indicated in Figure **1**a in the upper two levels, in different attachment types in the vertical section.

In Figure **2**b, the attachment of the side plate **20** is shown by way of example for one of the compartments, that is, of the levels, of the dispensing shelf **1** at the height between two dividing elements **6** in the form of temperature-control panels **50** which with their lateral support areas **59** rest on bearing strips **18** that are screwed on at the inner surfaces of an upright profile **41**a in the front and in the back.

Here, the side plate **20** is located in the width area of the front and rear upright profiles **41**a, and with its front and rear rim is held in its position by means of two clamp parts **39** that in most cases are present in a manner arranged above and at a distance to each other in height and are attached at the upright profile **41**a, as can be seen in Figure **1**a.

In the enlarged view of Figure **2**b it can be seen that these can be two individual angular profiles which are attached with one leg at the upright profile **41**a and with the other two facing legs clamp in the side plate **20** in between them, for example.

The side plates **20** can also have holes through which a screw connection with respect to the at least one angle profile can be realized, which, however, is to be avoided in order to avoid contamination-relevant rims and individual parts.

Thus, the side plate **20** – in most cases formed as a translucent side panel **20** – is fixated in an immovable manner between the front and the rear upright profiles **41**a, and also substantially fills the height distance between the temperature-control panels **50** located above and below it.

This solution will be chosen if the storage space **2** is at the same time the removal space **4**, that is, if the products P are taken out from the front side, for example in the case that a single dispensing shelf is set up.

In contrast, Figure **2**a shows a solution in which a removal space **4** – preferably accommodated in a further dispensing shelf **1** – is located laterally next to the inner space that is only used as a storage space **2** in the compartment of a dispensing shelf **1**.

In that case, a reach back protection device **9** is present between the two spaces **2**, **4**, so that the removing person **100** has to first push the product P that is placed in the storage space **2** on the temperature-control panel **50** to take it out by means of a tool **37**, such as for example a slider **33** (see also Figure **1**a), which substantially extends through the closed front side **3**, namely has to first push it from the storage space **2** into an adjoining removal space **4** onto a dividing element **6** present there –which does not need to be heated – to then be able to reach into the removal space **4** from the front side and take out the desired product from the same.

To avoid that the product is pushed back from the removal space **4** into the storage space **2**, the side plate **20** is arranged as a reach back protection device **9** between the frontal and rear upright profile **41**a in a manner to be pivotable about a pivot axis **49** that usually extends horizontally. As viewed in the front view of Figure **2**a, the pivot axis **49** is located laterally outside the side plate **20** and is mounted in a pivotable manner in a fitting hat profile that is attached, for example in an adhesive manner, at the rear and front end of the side plate **20** on the outer side of the same.

The pivot axis **49** projects respectively in the direction of the central area of the side plate **20** from a base plate **72** that extends vertically in the width direction in front and behind the front and rear end of the side plate **20** and is arranged at respectively one of the facing outer surfaces of one of the upright profiles **41**a.

This base plate **72** forms a suspension device **10** together with a carrier pin **73** that projects from the upright profile **41**a in the direction towards the other front or rear upright profile **41**a in the depth direction **30**.

For this purpose, the base plate **72** has an L-shaped recess **74** that opens into one of its side edges and that is dimensioned in such a manner that the unit consisting of side plate **20** and base plates **72** that are attached thereat in the front and in the back can be suspended on the front and rear carrier pin **73** at the front and rear upright profile **41**a by the two base plates **72** being respectively pushed over a carrier pin **73** with the orifice of

their L-shaped recess until the carrier pin **73** rests in the upwards pointing closed end of the L-shaped recess **74**.

Here, the carrier pin **73** is still located in the height area of the side plate **20**, and since also the carrier pin **73** as well as the pivot axis **49** are located on the outer side of the side plate **20** (as viewed in the depth direction) with respect to the center of the dispensing shelf **1**, the carrier pin **73** acts as a stop for the upper end of the side plate **20** located above the pivot axis **49** if the side plate **20** is pivoted about the pivot axis **49**.

Thus, the suspended part of the side plate **20** located below the pivot axis **49** can be pivoted in the direction of the storage space **2** only by a small angle, namely until its upper area touches the carrier pin **73**, which of course has to extend in the depth direction **30** up into the depth area of the side plate **20**.

However, this small pivotation of the side plate **20** is not sufficient to push a product that is already present in the removal space **4** back into the storage space **2,** or to reach from the removal space **4** into the storage space **2** with the hand.

However, in contrast to that, the side plate **20** can be pivoted to an unlimited degree, that is, also up to a horizontal position, in the other direction, that is, with the lower end of the side plate **20** in the direction towards the removal space **4**, so that the product P can be easily pushed under it into the removal space **4**, also pushing the side plate **20** in front of it until it is pivoted back over the product P into its vertically suspended start position.

However, this pivotability of the side plate **20** with the lower area outwards with respect to the dispensing shelf has a second important function when it comes to temperature-control panels **50** as dividing elements **6**.

For, due to the non-heated lateral edge area **53,** these temperature-control panels **50** reach all the way up to or to close to the outer edge of the base frame and thus of the upright profiles **41**a.

For taking out the temperature-control panels **50** backwards from the base frame **19,** they accordingly have to be positioned obliquely at first, so that they can be passed in between the rear upright profiles **41**a.

But since the perpendicularly positioned or suspended side plate **20** is located in the width area of the upright profile **41**a in the normal state, and thus in the width direction **31** above of the [lateral] edge area of the temperature-control panel **50**, it is only possible if the lower area of the side plate can be pivoted outwards so far with respect to the dispensing shelf **1** that the edge area of the temperature-control panel **50** located below it can be pivoted upwards past the pivoted side plate **20** into the oblique position that is necessary for taking out the temperature-control panel **50** backwards, as shown in Figure **2**a by a dashed line.

(Temperature-control panel = heating plate or cooling plate)

In the present description and claims, the term “comprising” shall be understood to have a broad meaning similar to the term “including” and will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps. This definition also applies to variations on the term “comprising” such as “comprise” and “comprises”.

PARTS LIST

| | |
|---|---|
| 1 | dispensing shelf |
| 2 | storage space |
| 2' | storage area |
| 3 | front side of the storage space |
| 4 | removal space |
| 5 | removal opening |
| 6 | bearing shell, dividing element, compartment base |
| 7 | rear stop |
| 8 | front stop |
| 9 | reach back protection device |
| 10 | suspension device |
| 11 | disc, storage front plate |
| 12 | base space |
| 12' | base area |
| 13 | tip |
| 14 | tool opening |
| 15 | rear door |
| 16 | base front plate |
| 17 | cross bar |
| 18 | bearing strip |
| 19 | frame, base frame |
| 20 | side plate |
| 21 | hinge |
| 22 | back side |
| 23 | price tag holder |
| 24 | price tag |
| 25 | closing damper |
| 26 | magnet |
| 27 | stop damper |
| 28 | price tag unit |
| 29 | cable channel |
| 30 | depth direction |
| 31 | width direction, transversal direction |

| | |
|---|---|
| 32 | attachment device |
| 33 | spoon, slider |
| 34 | V-profile |
| 34a | upper leg |
| 34b | lower leg |
| 35 | stop |
| 36 | fixation appliance, screw lug |
| 37 | tool |
| 38 | offset distance |
| 39 | clamp part |
| 40 | light bar |
| 41 | profile |
| 41a | upright profile |
| 41b | depth profile |
| 41c | cross profile |
| 42 | cover plate |
| 43 | power supply unit |
| 44 | vertical line |
| 45 | latch |
| 46 | recess |
| 47 | plate pivot axis |
| 48 | latch mechanism |
| 49 | pivot axis |
| 50 | temperature-control panel |
| 51 | composite plate |
| 51.1 | front edge |
| 51.2/3 | side edge |
| 51.4 | rear edge |
| 51‘ | main plane |
| 51a | top plate |
| 51b | bottom plate |
| 52a, b | temperature-control area |
| 53 | non-heated edge area |
| 54 | heated edge area |
| 55 | core area |
| 55 | temperature-control layer |

| | |
|---|---|
| 56a | heating wire, electrically conductive element |
| 56 | temperature sensor |
| 57 | support area |
| 58 | protective coating, stainless steel plate |
| 59 | insulating layer |
| 60 | rear bar |
| 61 | gripping bar |
| 62 | corner recess |
| 63 | cable |
| 64 | plug |
| 65 | control unit |
| 66a | operating unit |
| 66 | socket connector |
| 67a, b | plug socket |
| 67 | adhesive layer |
| 69 | cover strip |
| 70 | rear profile |
| 71 | cable duct |
| 72 | base plate |
| 73 | carrier pin |
| 74 | recess |
| 100 | user, such as a customer or person removing or taking an item from the shelf |
| 101 | hand |
| 200 | base surface |
| D | thickness |
| P | product |

**CLAIMS:**

1. Self-service dispensing shelf apparatus for the stocking, presentation and dispensing of hygienically safe food products (P) to a user, comprising

- a base frame having front and rear upright profiles,
- one or more shelves in the base frame,
- at least one storage space for storage and presentation of the products (P) each on a shelf and visible to the user, with
  - a front side facing the user,
  - a rear side facing away from the user, and
  - a right side and a left side as seen in the depth direction, i.e., in the direction from the front to the rear of the storage space,
- at least one removal space for taking out products (P) from the dispensing shelf apparatus, which can also be the storage space,

wherein

- the storage space(s) and/or the removal space(s) are at least partially arranged in the interior of the base frame,
- several storage spaces and/or removal spaces are arranged on top of each other like tiers, which are separated from each other in height by the shelves arranged between them as separators,
- between the front and rear upright profiles of the base frame there are support strips running along the sides of the dispensing shelf apparatus for supporting the shelves,
- at least one shelf is a temperature control panel,
- the sides of the base frame are at least partially closed by multiple individual side plates,
- individual side plates are arranged so as to be slightly outwardly pivotable about a pivot axis extending in the depth direction, so that the lower edges of the side plates can be slightly pivoted outwardly in order to be able to lift the side edge of the panel upwards for removal in an inclined position,

and wherein

- between the front and rear upright profiles of the base frame there is provided a mounting arrangement for mounting a recourse protection device so as to be pivotable to a limited extent, and wherein the recourse protection device comprises at least one side plate suspended in this mounting arrangement.

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2. Dispensing shelf apparatus according to claim 1, wherein

– a plurality of removal spaces and/or storage spaces are arranged one above the other and are separated from each other in height by a shelf that is a temperature-control panel,

and/or

– the shelves that are temperature-control panels are arranged on the base frame so as to rise from the front to the rear, i.e., into the depth, and, in the case of several shelves one above the other, the inclination of the shelves increases from the lowest shelf to the uppermost shelf, preferably increases continuously.

3. Dispensing shelf apparatus according to claim 1 or claim 2,

wherein

– if a temperature-control panel is placed centrally in relation to the apparatus and lateral support strips extending in the depth direction, this panel rests on the support strips except for a lateral projection of the upper side of the support strips of less than 8 mm, preferably less than 5 mm, and more preferably less than 2 mm, but does not project laterally beyond the dimensions of the base frame.

4. Dispensing shelf apparatus according to any one of claims 1 to 3,

wherein

– at least one front stop for the temperature-control panel is provided on the base frame, preferably on the support strips or the front upright profile or a front transverse bar which runs between two front upright profiles,

and/or

– the temperature-control panels within a base frame are of equal length and width except for the uppermost temperature-control panel, or all temperature-control panels within a base frame are of equal length and width.

5. Dispensing shelf apparatus according to any one of claims to 1 to 4,

wherein

– corner recesses are provided in the front corners of the temperature-control panel in the transverse direction and are so large that, by lateral displacement to one side until they abut against the base frame there, the opposite side edges of the temperature-control panel can be raised up to an inclined position of at least 20°, preferably at least 30°, more preferably at least 40°, with respect to the horizontal.

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6. Dispensing shelf apparatus according to any one of claims 1 to 5,
wherein
– each support strip has a V-profile with an upper leg and a lower leg and which, in the assembled state, is open towards the outside of the dispensing shelf apparatus, and preferably is a bent sheet metal part,
and
– a fixing device for fixing to an upright profile, in the form of a plate-shaped screw lug with a through-opening, is provided at the front and rear ends of the V-profile, and preferably projecting beyond them in each case,
– wherein the plane of the plate-shaped screw lug extends at a right angle to the freely ending region of the upper leg and preferably below the height of the upper leg,
– and the plate-shaped screw tab is set back from the free outer end of the upper leg by an offset distance which corresponds at most to the width of an upright profile viewed in front view,
wherein
– the upper leg of the V-shape of the V-profile, viewed in the direction of extension of the V-profile, extends straight from its free end to a rounded tip of the V-profile over a distance which corresponds at least to the width of an upright profile, viewed in front view.

7. Dispensing shelf apparatus according to claim 6,
wherein
– the lower leg, at least in its free end region, extends obliquely outwards and downwards relative to the upper leg, preferably at an angle of between 20 and 60°, more preferably between 25 and 45°, relative to a straight, free end section of the upper leg,
– in the obliquely downwardly inclined section of the lower leg, at least at the ends of the support strip, there is in each case a fastening device for attaching a light strip to the outside of this lower leg,

– at, or in front of, the end of the V-profile, a front stop, which preferably consists of the same material as the V-profile, projects upwards beyond the upper side of the upper leg.

8. Dispensing shelf apparatus according to claim 7,

wherein

– a data/power cable leads out of a rear narrow side of the temperature-control panel,

and/or

– a control unit for the at least one temperature-control panel, which also forms a power supply unit for the temperature-control panel and/or the light strip(s), is arranged in a base space below the lowermost shelf in the rear area laterally and with the control unit facing backwards,

and/or

– at least one of the rear upright profiles is formed as a hollow profile and the cable runs inside the hollow upright profile.

9. Dispensing shelf apparatus according claim 8,

wherein

– light strips are arranged on the underside of the support strips and radiate obliquely downwards inwardly, and are used for edge-side air space heating,

and/or

– a plug is arranged at the free end of the cable leading away from the temperature-control panel, and a plug socket that fits the plug is formed either at the control unit or at a socket connector that is attached at the base frame.

10. Dispensing shelf apparatus according to any one of claims 1 to 9,

wherein

– between the support strips arranged one above the other there is arranged in each case a side plate, which ends at a distance above the support strip located below it, and which is greater than the thickness (D) of the temperature-control panel in its lateral edge region, preferably twice as great, more preferably 2.5 times as great as this thickness (D),

and/or

– the side plate is pivotable about a plate pivot axis extending in the depth direction and extending in the upper half of the side plate relative to the base frame, with the lower edge outwards to such an extent that an adjacent side edge of the temperature-control panel can be pivoted upwards past the side plate about the opposite side edge of the temperature-control panel.

11. Dispensing shelf apparatus according to any one of claims 1 to 10,

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wherein

– at least one of the sides of the base frame is closed by at least one respective side plate to at least 70 %, preferably at least 80 %, more preferably at least 90 %, and even more preferably completely closed,

and/or

– the recourse protection device is present in the dispensing shelf apparatus between a laterally adjacent storage space on the one hand and removal space on the other hand , and consists of a flat material, preferably a pane of transparent plastic or a glass pane, which closes a side surface of the air space of this storage space by at least 70 %, preferably by at least 80 %, and more preferably by at least 90 %.

12. Dispensing shelf apparatus according to any one of claims 1 to 11,

wherein

– the rear side of the dispensing shelf is at least partially closed by a rear door which is transparent at least from the outside to the inside, and preferably mirrored when viewed from the inside.

13. Dispensing shelf apparatus according to any one of claims 1 to 12,

wherein

– the dispensing shelf apparatus has a cover plate which closes the upper side of the uppermost storage space and is made of thermally insulating material and/or is of mirrored design when viewed from the underside,

and/or

– the lowermost temperature-control panel rests on the support strips with the edges of a shelf in between, with the shelf arranged with its open side facing upwards.

14. Dispensing shelf apparatus according to any one of claims 1 to 13,

wherein

– the front side of the dispensing shelf apparatus is inclined at least in the upper region to the vertical and preferably also to the rear side of the dispensing shelf apparatus, in that its lower edge is further away from the rear side than its upper edge, and, in the case of several storage spaces arranged one above the other, this front side is a flat, inclined front side which is continuous over several, preferably all, storage spaces,

and/or

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– a removal opening, which is an engagement opening or a tool opening, is provided in a supply front panel, which is preferably a transparent front panel, which otherwise closes the front side.

15. Dispensing shelf apparatus according to any one of claims 1 to 14, wherein

– one, preferably only one, transverse bar suspended between the front upright profiles of the frame is arranged at such a height position that it is located in front of or below a front narrow side of the shelf, preferably the temperature-control panel,

and/or

– fixed to the transverse bar are luminaires, preferably in the form of a light strip, which radiate onto the front edge region of the next temperature-control panel that is arranged below.

16. Dispensing shelf apparatus according to any one of claims 1 to 15, wherein

– the temperature-control panel comprises a plate composite with a glass top plate and a glass bottom plate and a tempering layer, preferably a heating layer, arranged therebetween and firmly connected to the top plate and bottom plate,

– the plate composite of the temperature-control panel has, in its main plane, an outer unheated edge region of less than 3 cm, preferably less than 2 cm.

17. Dispensing shelf apparatus according to claim 16, wherein

– the temperature-control panel has a heated edge region, which is located further inwardly in the main plane than the unheated edge region, is independently controllable with respect to its temperature with respect to the central region located further inwardly than the heated edge region, and is preferably heatable to a higher temperature,

and/or

– in a top view of the temperature-control panel, particularly within the central region, there are temperature control areas which can be independently temperature-controlled, particularly the heated edge area lying further inwards with respect to the unheated edge area and/or the at least one central region lying further inwards with respect to heated edge area and/or the at least one central

region lying further inwards with respect to the unheated edge area, i.e. towards the centre of the temperature-control panel as seen in the top view.

18. Dispensing shelf apparatus according to any one of claims 1 to 17, wherein

– the temperature-control panel has a plurality of temperature sensors, preferably at least one in each temperature range, which are connected to a control unit for automatic regulation according to the set temperature or temperature range set at the control unit and/or in the periods set at the control unit.

19. Dispensing shelf apparatus according to any one of claims 1 to 18, wherein

– a protective coating, preferably a stainless steel plate, is provided on the underside of the temperature-control panel in a support area which preferably extends in the depth direction and is present on both sides, and which preferably has the same or a smaller width than the unheated edge area, and preferably the protective coating is equal to or smaller than the support area,

and/or

– a thermal insulation layer is arranged between the protective coating and the temperature-control panel.

20. Dispensing shelf apparatus according to any one of claims 1 to 19, wherein

– the temperature-control panel has an upwardly projecting rear stop on its rear edge, which extends in total over more than half, preferably more than 80%, of the extent of the rear edge.

21. Dispensing shelf apparatus according to claim 16 or claim 17, wherein

– the plate composite of the temperature-control panel has in each of its front corner regions a corner recess, and preferably the corner recesses in the front corners in the transverse direction are equal to or larger than the width of the unheated edge area.

22. Dispensing shelf apparatus according to claim 16 or claim 17, wherein

– the temperature-control panel has a thermal insulation layer on its underside, preferably with an outer surface of stainless steel or in the form of a trough with a peripheral edge which rests on the underside of the plate composite of the temperature-control panel,

and/or

– the upper plate of the temperature-control panel is thinner than the lower plate when it is a hot plate and thicker when it is a cooling plate.

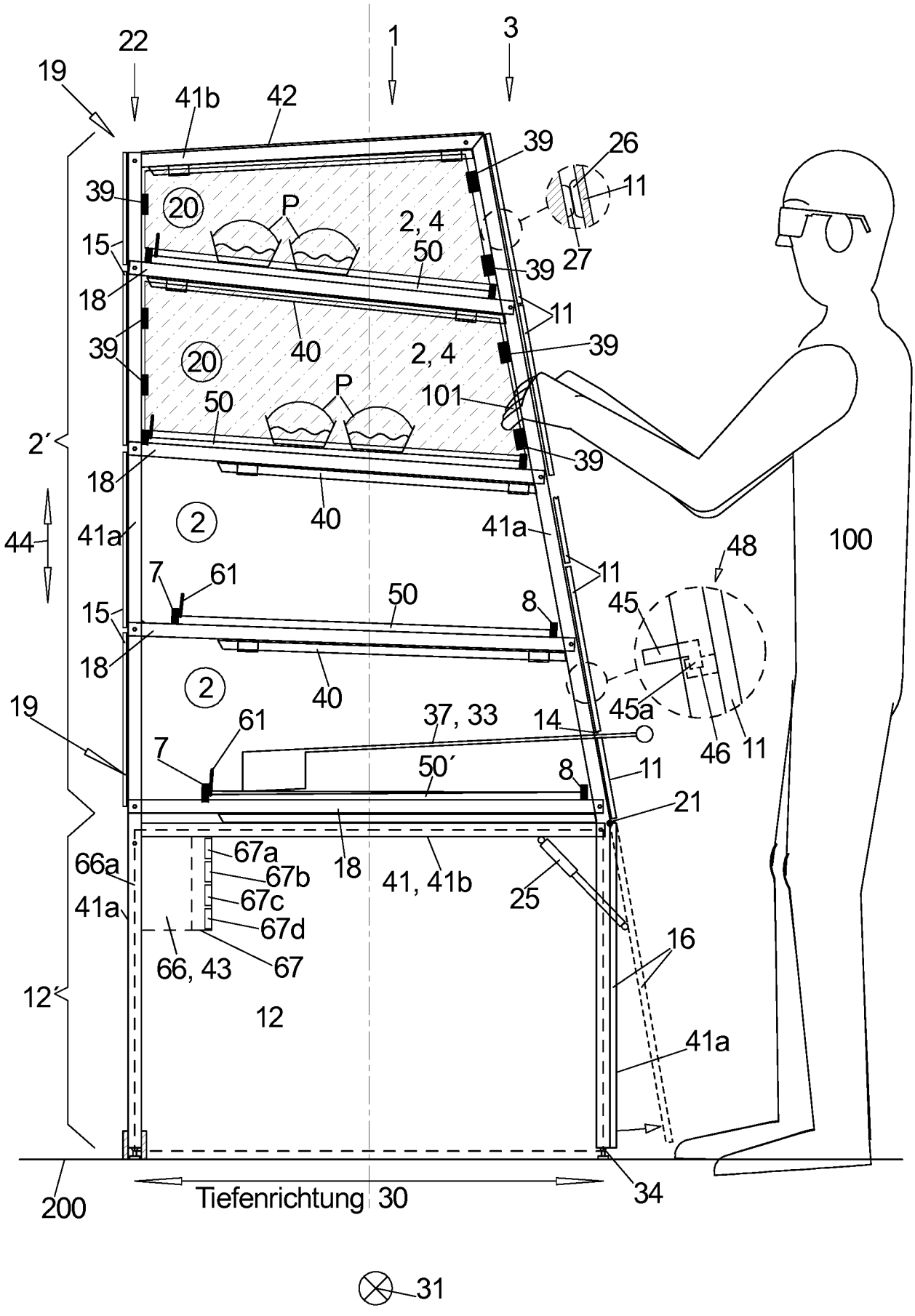
22
1
3
19
41b
42
39
26
11
20
P
2, 4
50
27
15
18
40
101
2´
44
41a
2
48
100
7
61
45
8
45a
46
37, 33
14
50´
21
66a
67a
67b
67c
67d
66, 43
67
41, 41b
25
16
12´
12
Tiefenrichtung 30
34
200
31

Fig. 1a

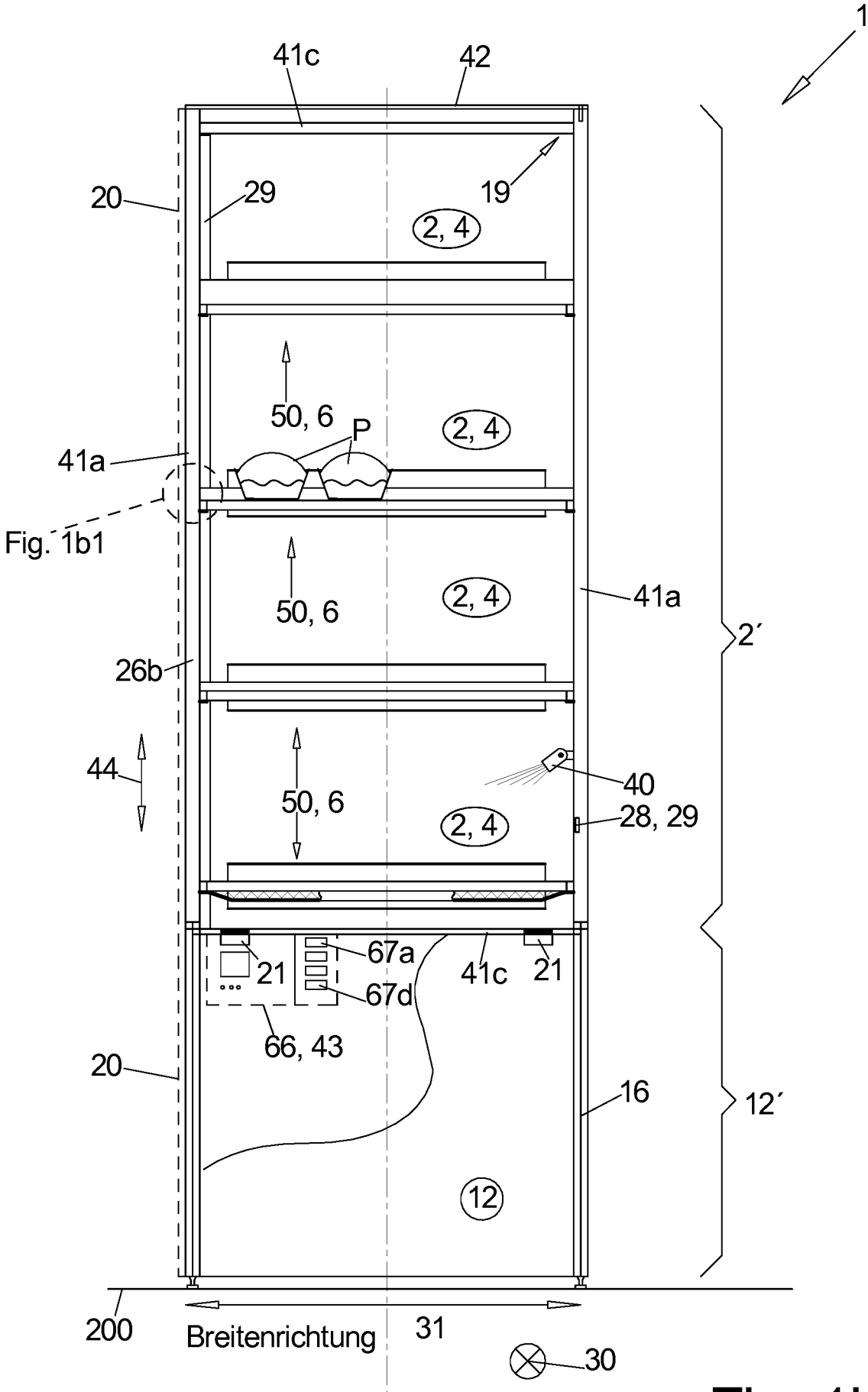
1
41c
42
20
29
19
2, 4
50, 6
P
2, 4
41a
Fig. 1b1
50, 6
2, 4
41a
2´
26b
44
50, 6
40
2, 4
28, 29
21
67a
41c
21
67d
66, 43
20
16
12´
12
200
Breitenrichtung
31
30

Fig. 1b

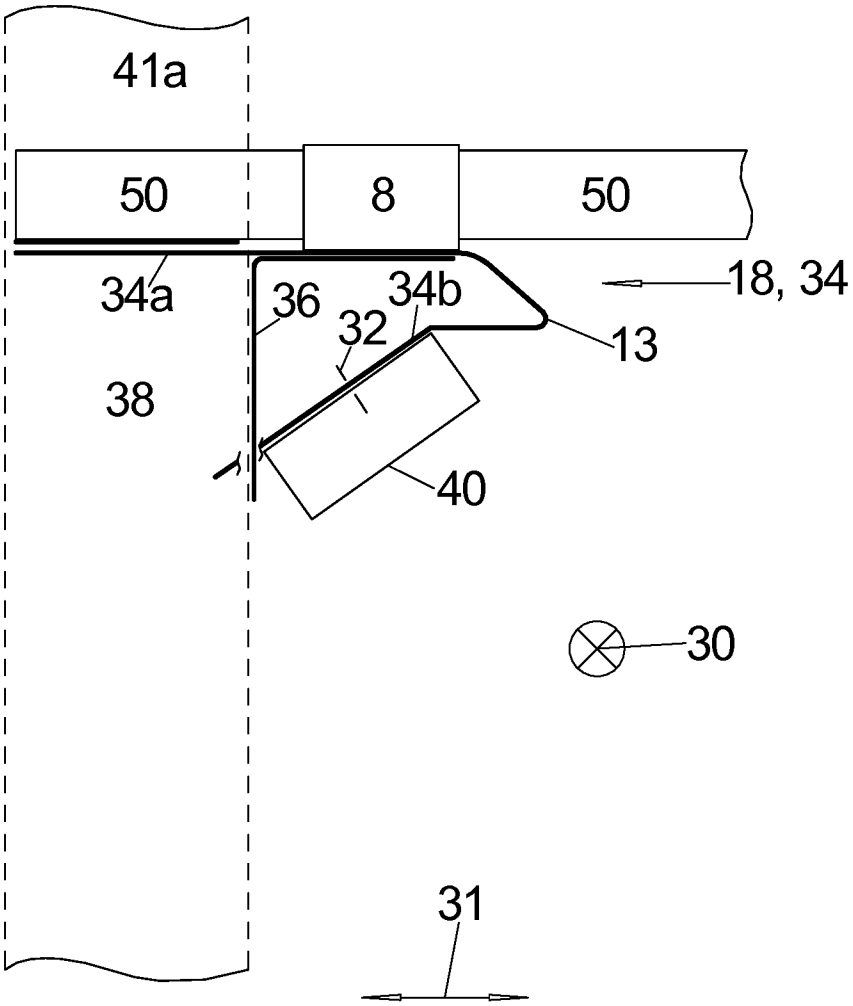


Fig. 1b1

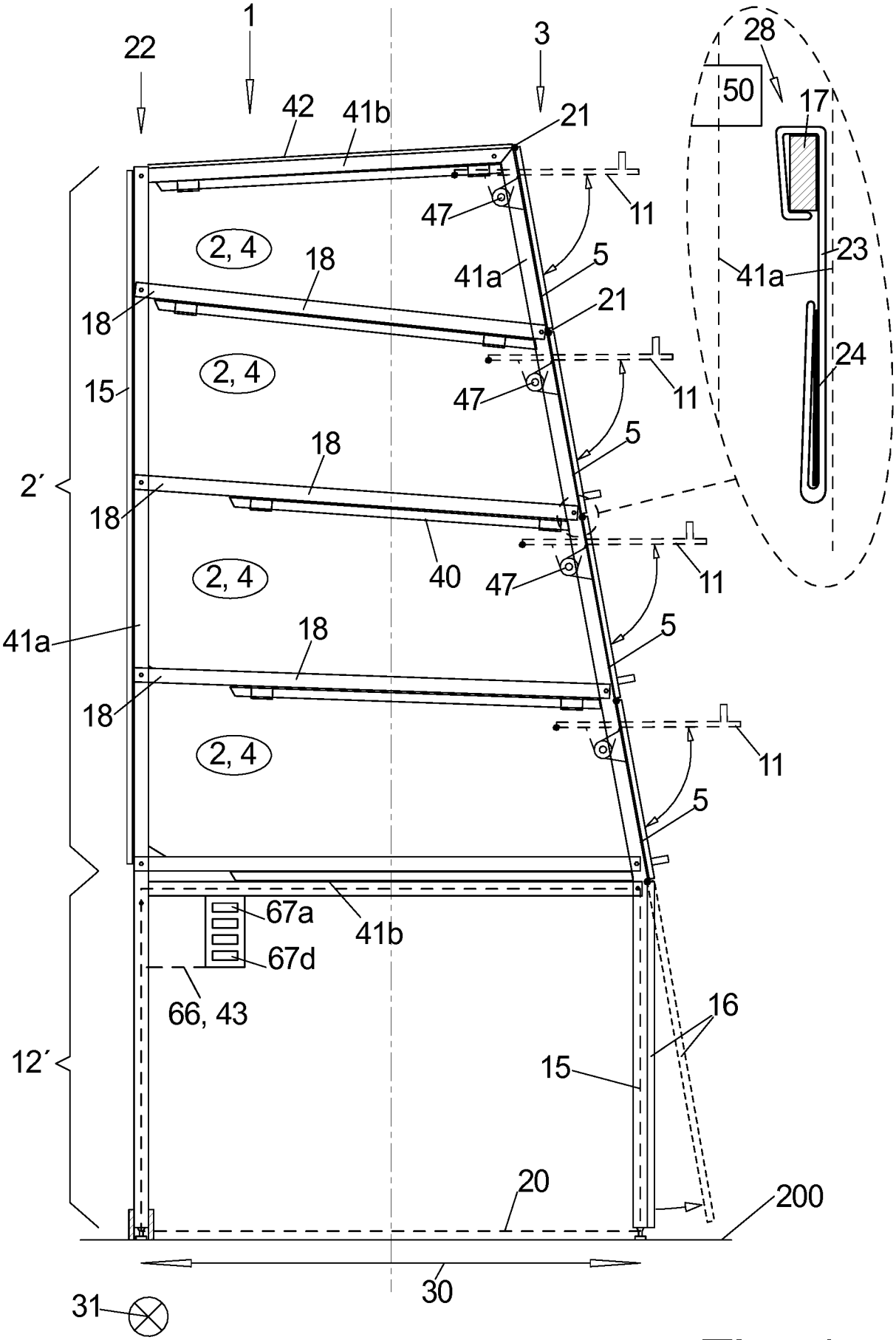
1
22
3
28
50
17
42
41b
21
47
11
2, 4
18
41a
5
23
24
15
2´
40
67a
67d
66, 43
12´
16
20
200
30
31

Fig. 1c

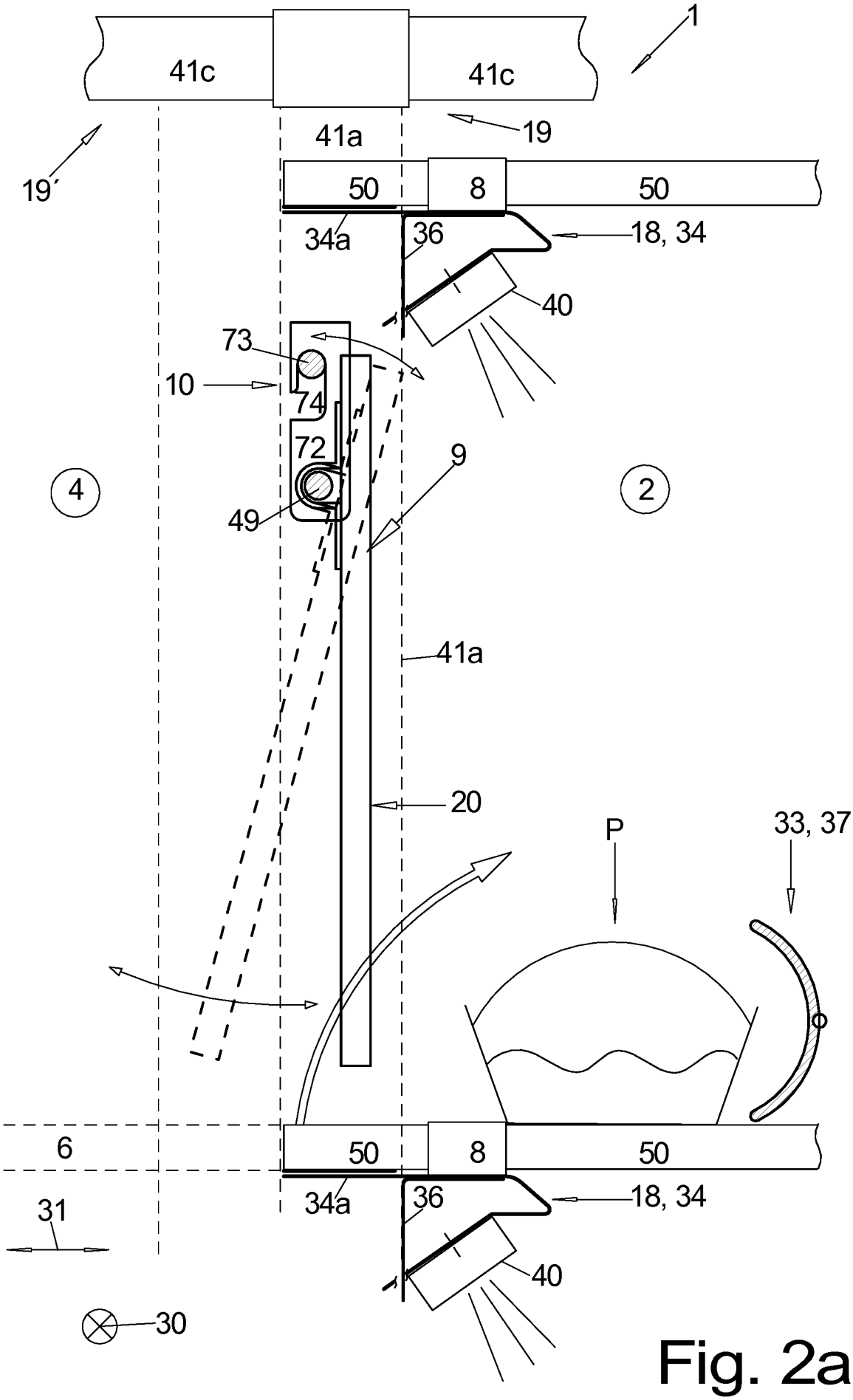
1
41c
41c
19
19´
41a
50
8
50
34a
36
18, 34
40
73
10
74
72
9
4
2
49
41a
20
P
33, 37
6
50
8
50
34a
36
18, 34
31
40
30

Fig. 2a

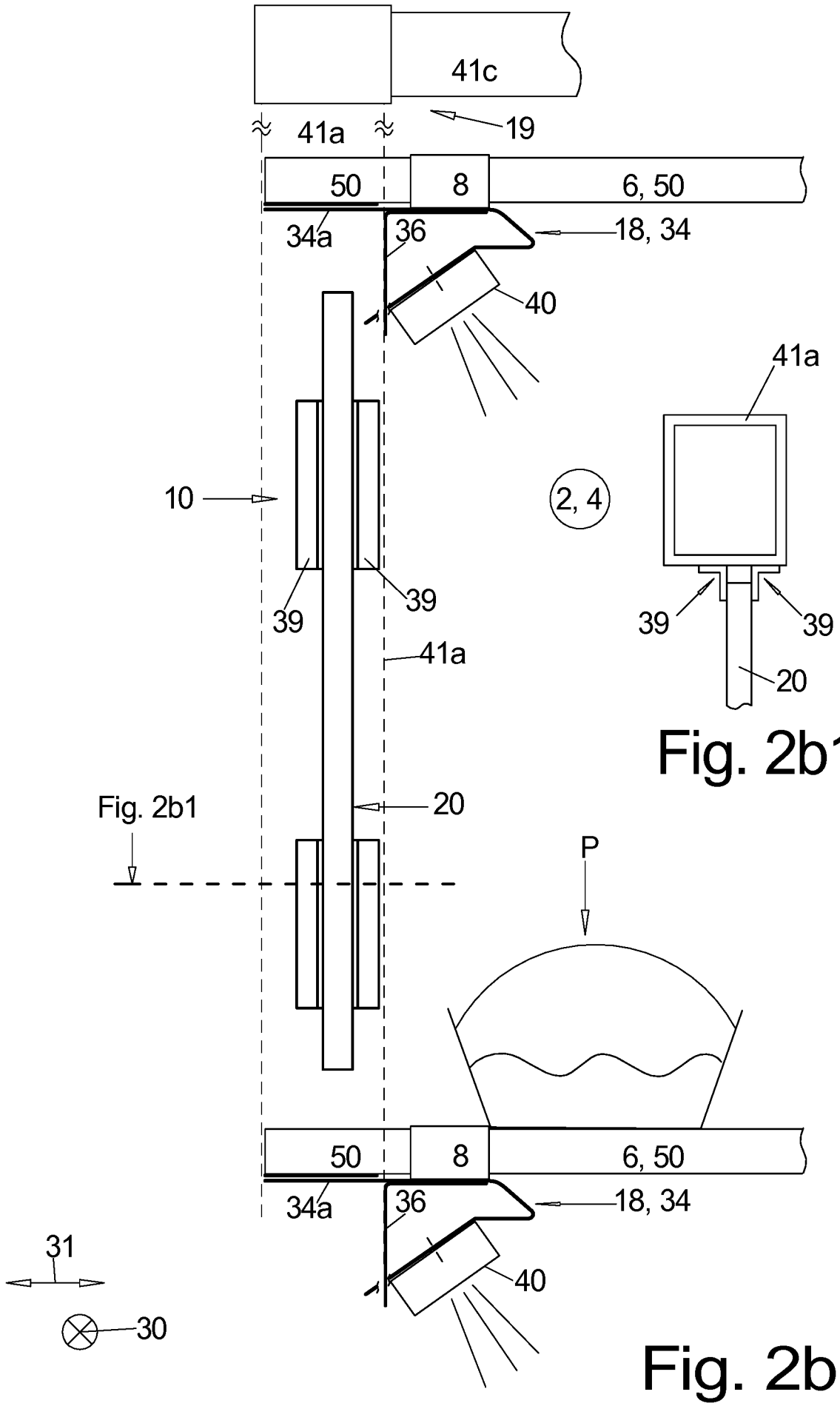


Fig. 2b1

Fig. 2b

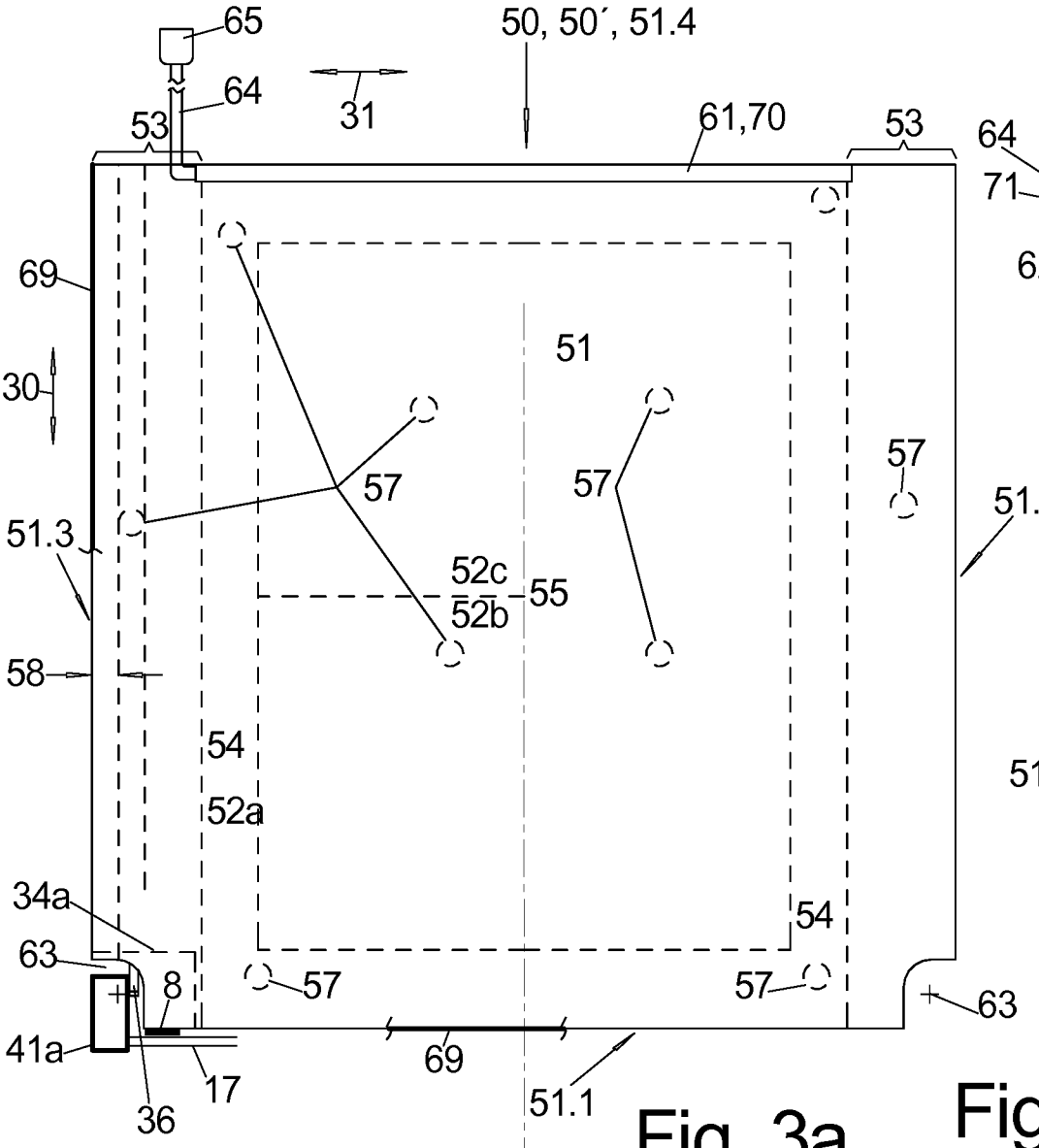


Fig. 3a

Fig. 3c

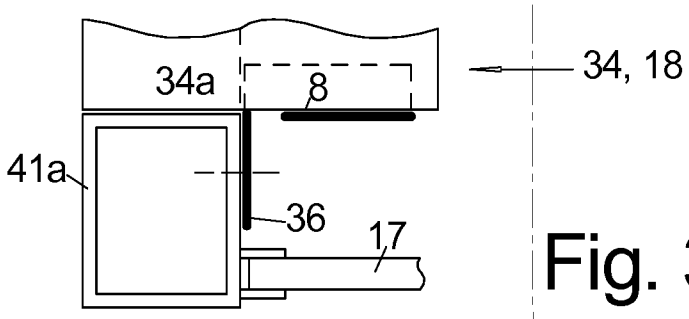


Fig. 3a1

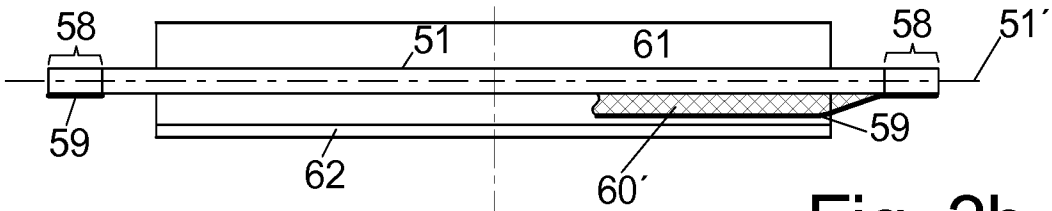


Fig. 3b

Fig. 4a

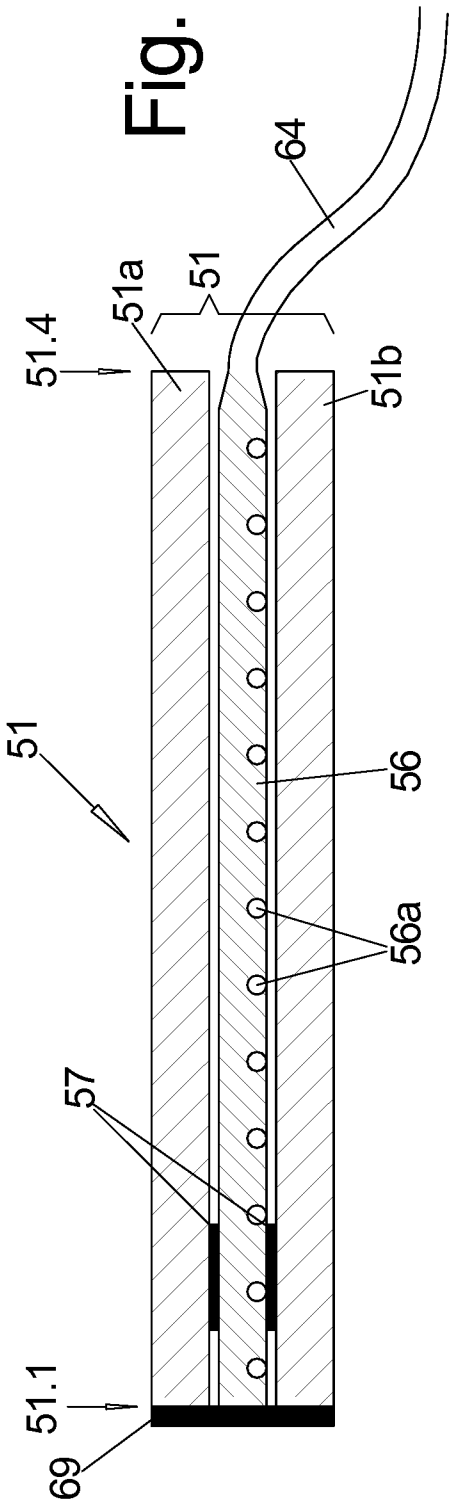


Fig. 4b

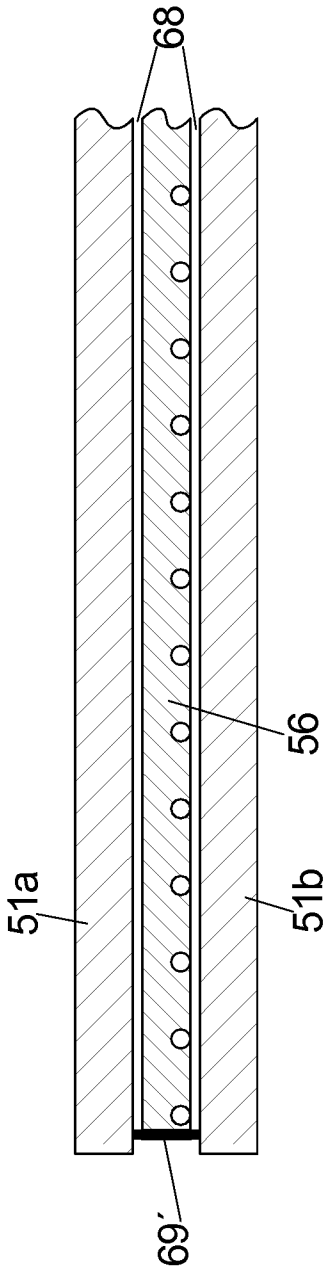


Fig. 4c