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(54) A COOLING ARRANGEMENT, A COOLING ASSEMBLY AND A FOOD BAR ARRANGEMENT COMPRISING SUCH A COOLING ARRANGEMENT

KÜHLANORDNUNG, KÜHLANLAGE UND LEBENSMITTELTHEKENANORDNUNG MIT SOLCH EINER KÜHLANLAGE

SYSTÈME DE REFROIDISSEMENT, ENSEMBLE DE REFROIDISSEMENT ET SYSTÈME DE BARRES ALIMENTAIRES COMPRENANT CE SYSTÈME DE REFROIDISSEMENT

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Description

TECHNICAL FIELD

[0001] The present invention relates to a cooling arrangement, e.g. for a food bar arrangement or similar, having the features of the first part of claim 1. The invention also relates to a cooling assembly according to the first part of claim 17, and to a food bar arrangement with such a cooling arrangement having the features of the first part of claim 19.

BACKGROUND

[0002] In recent times it has become more and more popular to offer fresh food, salads, fruit vegetables, chicken, but also cooked and prepared food, or so called healthy food, from what often is called a salad bar, where the customer can pick and compose a meal from a number of different products kept in canteens or pans. However, since the food products may remain for some time in the canteens, which may be accessed by quite a large number of persons, the requirements as to an appropriate and hygienic storage capability are high. Furthermore the food products have to be kept under such conditions, and at such a temperature, that bacterial growth is prevented and the products can be kept fresh, appetizing and are not ruined or deteriorated in any way due to the storing.

[0003] To be able to maintain an accurate temperature, e.g. above 0° (to avoid that the products be frozen), but below 8°C, several different arrangements have been proposed.

[0004] Some known arrangements use cooling elements below the canteens, but it is difficult to obtain an even temperature distribution in the food stored in the canteens, i.e. throughout the canteens, independently of the location of the food and of the canteens. Covering arrangements used to cover and protect the canteens with content are frequently opened by customers accessing the food, each time during a shorter or a longer time period, which makes it even more difficult to obtain and maintain an even temperature distribution throughout the food bar.

[0005] Known arrangements therefor also use fan blowers for blowing cold air onto the products e.g. from above, or from below or sideways onto the canteens. This is however not an entirely satisfactory solution for several reasons. First, it is not satisfactory from a hygienic point of view, bearing in mind that several individuals serve themselves from the canteens which means that air contaminated with bacteria etc. may be blown onto the food. Also other particles, e.g. dust may be blown onto the food. Second, due to the air flow, the food products may be dried out, and ruined, at least from an aesthetical point of view and the products will not look fresh, which may reduce the willingness of customers to buy and consume the products. Some articles may even loose taste and undergo unwanted changes.

[0006] Examples of known cooling arrangements are disclosed in US1909875A1 and EP1629750A1.

[0007] These factors contribute in shortening the time period the products can be kept in the canteens, and they may have to be disposed of, even if they actually could have been stored for a longer time period, if stored under appropriate conditions.

[0008] Third, it is a waste of energy to have fan blowers active all the time and it is difficult to keep an even temperature distribution. An uneven temperature distribution may also contribute to the production of harmful microorganisms.

[0009] When covering arrangements or lids are opened to provide access to the food products, air of a higher temperature will enter the canteens, which means that even more cooling is required. If fans are used, the products will then be even more exposed to cool air, and the drying effect will be further increased, which means that the time period that the products can be stored in the food bar will be even shorter. In addition thereto, when the covering arrangements are opened, this will contribute to an even more uneven temperature distribution.

[0010] The more often the food bar is accessed, i.e. the more often the cover is opened, the more difficult it will be to maintain an even temperature distribution, and the losses in cooling power will be further increased. In known arrangements the transfer of cooling power from a cooling arrangement may be as low as 30% or even less, the losses thus being considerable. There may also be a considerable spread in the cooling capacity in different parts of a cooling arrangement, or a cooling element, located close to products in e.g. a food bar, which results in it being extremely difficult to control the temperature in food bar canteens or similar holding the products, particularly if the allowed or desirable temperature interval within which the temperature may vary is small.

SUMMARY

[0011] It is therefore an object of the present invention to provide a cooling arrangement, particularly, but not exclusively, for a food bar arrangement, and as initially referred to, through which one or more of the above mentioned problems can be solved.

[0012] A particular object is to provide a cooling arrangement through which a stable, even, temperature distribution can be provided, throughout the cooling arrangement itself, and also throughout the products to be cooled, e.g. kept in canteens or pans.

[0013] It is a particular object to provide a cooling arrangement through which the refrigerating or cooling capacity is controllable or adjustable.

[0014] It is further a particular object to provide a cooling arrangement through which losses in refrigerating or cooling capacity, particularly produced due to a covering arrangement being opened, e.g. to provide access to the products, can be reduced as compared to for known ar-

rangements.

[0015] It is also an object to provide a cooling arrangement through which an even temperature distribution in the products can be maintained also when covering elements of a covering arrangement are opened and closed.

[0016] Still further it is an object to provide a cooling arrangement through which an increased cooling transfer capacity is provided as compared to known arrangements.

[0017] Other particular objects are to provide a cooling arrangement which allows a reliable operation, which is easy to fabricate, install and mount, and which has excellent properties as far as maintenance and cleaning is concerned.

[0018] Still further it is a particular object to provide a cooling arrangement which enables an efficient and controllable cooling of e.g. food products in a food bar without negatively affecting the products, e.g. by drying them out, and through which it is enabled that the products can be kept in the food bar in a safe and unaffected manner for a longer period of time than allowed for by arrangements which for example mainly are based on the use of air fans, but also than other arrangements.

[0019] A particular object is also to provide a cooling arrangement through which high requirements on hygienic conditions can be fulfilled.

[0020] It is also a particular object to provide a cooling arrangement which facilitates maintaining a stable, equal, temperature throughout the bar, or in some instances, even a variable or adaptable temperature for different regions in a holding arrangement holding products, also when they are accessed, i.e. when a covering element, a hood or a lid, is in an open position, or opened and closed frequently.

[0021] A most particular object is to enable controlling of the temperature in a region to be cooled (e.g. in or above canteens) to be within a range of approximately 2°-4°C, which is difficult if the uneven temperature distribution in a cooling arrangement is between 1.5°-2°C or more, as is the case for most known arrangements.

[0022] Still further it is an object to provide a cooling arrangement through which the need of using fans to achieve a sufficient refrigerating capacity can be eliminated, or reduced.

[0023] Therefore a cooling arrangement as initially referred to is provided which has the characterizing features of claim 1.

[0024] A cooling assembly comprising a cooling arrangement as initially referred to and a covering arrangement is also provided which has the characterizing features of claim 17.

[0025] Another object of the invention is to provide a food bar arrangement with a cooling arrangement through which one or more of the above mentioned objects can be fulfilled.

[0026] Therefore a food bar as initially referred to is provided which has the characterizing features of claim 19.

[0027] A particular object is thereby to provide a high standard refrigerated food bar arrangement, particularly of the type intended for self-service, but also for other purposes, e.g. in canteens in schools or restaurants wherein staff are serving customers.

[0028] It is also a particular object to provide a cooling arrangement which can be operated without, and particularly does not necessitate the use of, any fan blowers, or only to a limited extent, or which optionally can be used with or without fans, or with fans as an auxiliary equipment that may be activated or not.

[0029] By means of a cooling arrangement according to the invention, it particularly becomes possible to control the cooling temperature to be between 2-4°C by enabling an even temperature distribution of the cooling arrangement only varies within an interval of about +/- 0.5°C, which is extremely advantageous.

[0030] Advantageous embodiments are given by the respective appended sub-claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] The invention will in the following be further described in a non-limiting manner, and with reference to the accompanying drawings, in which:

Fig. 1 is a view in perspective of a cooling arrangement according to a first embodiment of the invention,

Fig. 2 is a side view showing a cooling medium conduit of the cooling arrangement shown in Fig.1, comprising two first cooling plate elements arranged in parallel for a dual sided food bar, and with one first cooling plate element, here the front cooling plate element, removed,

Fig. 3 is a side view showing the rear, inner, side of a first cooling plate element of a cooling arrangement as shown in Fig. 1 comprising two first cooling plate elements arranged in parallel for a dual sided food bar, and with one first cooling plate element, here the front cooling plate element, removed,

Fig. 4 is a view in perspective of an advantageous embodiment of a cooling arrangement,

Fig. 5 is a schematic cross-sectional side view of the arrangement shown in Fig.4,

Fig. 6 shows an alternative embodiment of a cooling arrangement,

Fig. 7 is a perspective view of a cooling arrangement according to one embodiment of the invention as arranged on the rear side of a covering ele-

ment,

Fig. 8 is a very schematic view in perspective of a cooling arrangement as arranged between two covering elements of a covering arrangement for a dual sided food bar arrangement, and

Fig. 9 is a schematic view in perspective from above of a food bar arrangement with a cooling arrangement according to the invention.

DETAILED DESCRIPTION

[0032] Fig.1 shows a first embodiment of a cooling arrangement (or element) 200 comprising a cooling medium conduit 201 on two outer longitudinal sides of which two first cooling plate elements 210A, 210B are disposed, and which e.g. may be used for cooling a dual sided food bar arrangement. The cooling medium conduit 201 is provided with two inlets 202, 202 through which a cooling medium is introduced from a cooling system or a cooling apparatus that may be provided in an appropriate manner, and which may be of any known kind, e.g. comprising a compressor, an evaporator, a condenser etc. in a manner known per se. The invention is neither limited to any particular cooling system or apparatus, nor to the location thereof. The cooling medium circulates in the branch conduit 201, which also is provided with two (return) outlets 203, 203 arranged symmetrically with respect to the inlets, here at a slight distance from the inlets 202, 202, in a direction towards the center of longitudinal extension of the cooling medium conduit 201. There could also have been any other number of inlets and outlets, depending on the length of the cooling medium conduit, and of the cooling arrangement. In order to enable the provisioning of an even temperature distribution, as will be further discussed below, it is of significance that the inlets and outlets are disposed in a symmetric manner, e.g. with respect to the center of the cooling medium conduit, and with respect to one another.

[0033] The same amount of cooling medium is input to both, or each inlet 202, 202 to allow for an even distribution of cooling medium in the cooling medium conduit.

[0034] The cooling medium in some embodiments is air, in other embodiments it may be a cooling liquid, e.g. comprising water or any appropriate cooling medium. The temperature of the cooling medium depends on the surrounding outer temperature, and on the temperature that is desired for the food bar or similar to be cooled. In some implementations, in which the cooling medium is air, or an air mixture, the temperature in the medium may be about -20°C. If the cooling medium is water based, the temperature could be about -3 or -4 °C. It should be clear that the invention is not limited to the specified temperatures, nor to any specific cooling medium, these being given merely for exemplifying reasons.

[0035] The first cooling plate elements 210A, 210B comprise a plurality of internal flanges or ribs 211A, 211B extending in parallel, and a plurality of external cooling flanges 212A,212B extending in parallel in a direction substantially orthogonal to the longitudinal extension of the cooling medium conduit 201. The external flanges 212A, 212B are preferably arranged at a larger distance from each other than are the internal flanges 211A, 211B. One reason for that is that the larger distances between the external flanges facilitate cleaning, which normally is not required for the internal flanges facing the cooling medium conduit 201. In an advantageous embodiment the distance between adjacent external flanges is between 12 and 18 mm, particularly about 15 mm (peak-to-peak), whereas the distance between adjacent internal flanges (peak-to-peak) may be between ca. 5 and 8 mm. It should be clear that these figures merely are given for exemplifying reasons; the distances may be larger as well as smaller; the same distances may be used for the external and the internal flanges etc. In some embodiments the external flanges are deeper, i.e. protrude a longer distance from its baseplate than the internal flanges do (in the opposite direction). One reason therefore is to not lose any cooling capacity due to the distance between the plate and the cooling medium conduit being too large. However they are preferably much closer spaced as referred to above. The external flanges, however may be deeper in order to further increase the effective area, which is a means to increase the transfer of cooling power from the cooling medium conduit to the food bar, or the products to be cooled.

[0036] The functioning according to the invention is that a cooling medium, here air, is introduced to, and circulates in the cooling medium conduit 201. In one embodiment it holds a temperature of about -20°C. Regularly spaced from one another, at a distance, e.g. 10-15 mm from the upper edge of the branch conduit 201, and all along its upper edge in a symmetric manner, a plurality of openings, e.g. circular holes 204 with a diameter of about 4-5 mm are disposed, cf. Fig. 2. It should be clear that the figures concerning diameter and distance etc. are merely given for exemplifying reasons. The distances between holes and their diameters or dimensions may be larger as well as smaller. In the shown embodiment they are arranged symmetrically in one row. In alternative embodiments it might of course be two or more rows, and/or the openings may have other shapes than circular etc., of importance being that they are located in a symmetric manner along the upper edge of the cooling medium conduit 201. The cool air escaping through the openings 204 will flow downwards, along the outer side wall surfaces of the cooling medium conduit 201 (see Fig. 4), in the space formed between said outer surfaces and in "channels" formed by the internal flanges of the first cooling plate elements 210A, 210B which are disposed in parallel with the outer surfaces, at a small distance, or as close as possible.

[0037] Due to the provisioning of the internal flanges, i.e. the inner increased effective area, the cooling plate

elements 210A, 210B will be more efficiently cooled by means of the cooling medium conduit, in other words the cooling transfer capacity will be enhanced. Further, due to the additional provisioning of the external flanges 212A, 212B, the effective area for cooling transfer on the outside is also increased. Thus, the transfer of cooling power from the cooling medium conduit 201 to the first cooling plate elements is increased due to the internal flanges 211A, 211B, and the transfer to outer side of the cooling plate elements is likewise increased due to the enhanced effective area obtained by means of the external flanges.

[0038] In different embodiments the flanges (internal and/or external) may have the same size, shape and be arranged equidistantly throughout the entire area of a first cooling plate element, whereas in other embodiments it may be provided for an even more increased effective area e.g. along the outer side edges of the cooling plate elements where cooling losses may be larger due to a covering element being opened. This can be provided for in different manners, e.g. by means of flanges with a larger height, or deeper, and/or arranged at a smaller distance from each other etc.

[0039] It should be clear that the cooling plate elements can, in alternative embodiments be provided with a corrugated surface, or with fins, or formed so as to exhibit a large effective area towards the cooling medium conduit in many different manners.

[0040] In advantageous embodiments as described above, it has been seen that the cooling transfer capacity may be increased from about 30% for state of the art arrangements up to about 70%.

[0041] Through the arrangement of the cooling medium conduit 201 on at least one side provided with a first cooling plate element as discussed above, an excellent optimal cooling transfer capacity is enabled. If the products are covered by a covering arrangement, cooling will be efficient also due to self-convection.

[0042] Thereby the need for using fans as a cooling means is reduced or eliminated, although fans may be implemented as an auxiliary or additional cooling means, which is extremely advantageous.

[0043] In some embodiments the inner of the cooling medium conduit may be divided so as to comprise more than one flows of cooling medium, further contributing in reducing an uneven temperature distribution. By increasing the material thickness (e.g. metal) at desired locations in the cooling medium conduit, e.g. at the outer edges, or wherever needed, a buffering of cold can be achieved as an additional means.

[0044] In some embodiments, only the inner surface areas of the cooling element plates are enhanced by means of flanges, or alternatively only the outer surface areas.

[0045] The outer side of the cooling arrangement, also denoted the cooling tower, should, in some preferred embodiments, have a temperature in the range of -3°C to +2°C.

[0046] The flanges, ribs or fins preferably extend in parallel from the upper edge of the respective first cooling plate element to the lower edge, perpendicularly to the edges, forming parallel channels or in one alternative embodiment, forming a slight angle of one or a few degrees with a central line extending from the upper to the lower edge of the cooling medium conduit, symmetrically with respect to the upper edge midpoint, outwards to the outer side edges of the first cooling plate elements.

[0047] The flanges or similar may also be slightly inclined or angled such that they are not quite symmetric, one side of a flange being somewhat more inclined, or shorter, than the other side.

[0048] The flanges are preferably rounded, and the valleys between them also. The cooling plate elements may e.g. be made of aluminium, but also other materials are possible, including any metal or metal alloy or an appropriate plastic material.

[0049] The first cooling plate elements 210A, 210B (and the outer side walls of the branch conduit 201) are in the shown embodiment arranged in a somewhat downwards, outwards slanting manner to give the air flowing on the outer sides an slight additional push, which is advantageous. The outer side walls of the branch conduit and the cooling plate elements may of course, alternatively, be entirely vertical.

[0050] The air flowing downwards between the outer surface of the cooling medium conduit 201 and a respective first cooling plate element, i.e. in the channels formed by the internal flanges, for example flows back to an evaporator of a cooling system, and the air on the outside of the first cooling plate elements flows downwards, and out over the products, e.g. in canteens, such that air will flow due to self-convection if the products are located under a cover or similar.

[0051] Fig. 2 is a side view of the cooling medium conduit 201 with one first cooling plate element 210A removed. Elements already discussed with reference to Fig.1 bear the same reference numerals and will not be further discussed herein. In Fig. 2 the lower ends of the internal flanges 211B of the first cooling plate element 210B can be seen extending below the lower edge of the branch or cooling medium conduit 201. At the upper edge of the cooling medium conduit 201 a row of equidistant openings 204 as discussed above are shown. The cooled air exiting the openings 204 flows downwards along the outer sides of the cooling medium conduit 201 as indicated by the dashed arrows A1, A2, wherein the arrow A2 indicates that cooled air flows also on the other side of the cooling medium conduit, exit openings being arranged also on the other upper side of the cooling medium conduit (if the cooling arrangement is to be used for dual sided cooling). Reference numeral 219 merely refer to any appropriate fastening means, e.g. screws and nuts, for connecting the first cooling plate elements 210A, 210B to the cooling medium conduit 201. Bars 218 or any appropriate means may be used to keep a desired distance, and push, the outer surface of the cooling me-

dium conduit against the inner flanges 212A of the first cooling plate element 210A (not shown in Fig.2) .

[0052] The air exiting via outlets 203, 203 is recirculated to the cooling system. Optional air outlets 231 may be provided for directing cooled air, to provide for additional cooling, into a space under canteens or similar in a food bar, or to another part of a food bar, or to another cooling zone. These optional outlets 231 are not of significance for the functioning of the inventive concept, and may hence be disposed of.

[0053] It should be clear that the locations of outlets/inlets alternatively may be reversed; i.e. the outlets 203 can function as inlets instead. Either a parallel flow or a counter flow heat exchanger may be used.

[0054] Fig. 3 shows an inner side of an outer wall 201B of the cooling medium conduit 201, the opposite outer wall being removed for illustrative purposes. Similar elements are provided with the same reference numerals as in Figs. 1 and 2. The openings 204B in the outer wall 201B are disposed in the same manner as the openings 204A in the other outer side wall 201B of the cooling medium conduit 201. In Fig. 3 the internal flanges 211B (protruding below the lower edge of the cooling medium conduit 210B) and the external flanges 212B of the first cooling plate element 210B can be seen. The distance bars 218 are seen from the inside of the cooling medium conduit. A support and holding structure 215, 216 comprises a structure for holding the cooling arrangement 201, and comprises inlet and outlet conduits, and means for interconnecting the cooling arrangement 200 and a canteen holding arrangement or similar. It may have any appropriate form and also other dimensions than shown in the Figures. Particularly it may with advantage be made to have a smaller height; the pipes of the inlets and outlets 202, 203 then being shorter.

[0055] Through the arrangement of the cooling medium conduit and the cooling plate elements as disclosed according to the invention it becomes possible to achieve a very even temperature distribution all along the cooling arrangement.

[0056] Fig. 4 shows a cooling arrangement 200' according to another embodiment in which additional, second, cooling plate elements 220A', 220B' are disposed in parallel with, and outside, at a slight distance from, respective first cooling plate elements 210A', 210B'. The distance is substantially given by the height of the external flanges or rims or similar 212A', 212B'. In other respect the elements shown in Fig.4 correspond to the elements shown in Figs. 1-3, and the corresponding reference numerals provided with a prime symbol are used. These elements will therefore not be further discussed here.

[0057] The second cooling plate elements 220A', 220B' are in this embodiment provided with two rows, a lower and an upper row, of gills or fins 221A', 222A' opening up in an upward direction. The gills may have any appropriate shape and size, and may alternatively be arranged in more than two rows, or in any appropriate manner such that at least some gills are disposed at another distance from the upper/lower edge of the cooling medium conduit 201' than other gills. The may also be somewhat inclined to the right or to the left in Fig. 4 such that the center of the openings form an angle less than 90° with a line along the side walls, i.e. the respective second element plate, perpendicular to the upper and lower edges thereof.

[0058] In the shown embodiment the gills or fins 221A', 222A' are fixed. In an alternative embodiment they can be closable, i.e. they can be opened and closed respectively, manually or automatically. In still another embodiment their positions are controllable, hence it may be possible to regulate their opening angle β. In a particular embodiment some of the gills are closable or controllable, for example if some regions require more cooling, the gills above such regions are opened up more and vice versa.

[0059] The purpose of the second cooling plate elements 220A', 220B' is to further increase the self-convection over the canteens, under covering elements, and air will enter the gills from the space above e.g. a holding arrangement with canteens containing food products, and flow downwards, while being cooled when passing in the space, channels, between the inner sides of second cooling element plates 220A', 220B' and the external flanges 212A', 212B' of the first cooling plate elements 210A, 210B, providing an enlarged effective cooling area, which means that cooling transfer capacity will be most efficient. As will be further described with reference to Fig. 7 below, if used with a covering arrangement comprising covering elements which are moved between an open and a closed position through being vertically displaced up and down, and which furthermore have rear walls ending at a position at an appropriate distance from the lower edges of side and front walls of the covering elements, in a closed position of the covering elements, the lower rows of gills 222A' will be exposed all the time, i.e. not covered by the rear section, allowing the entry of air, which will be cooled as explained above. When a covering element is opened, it will be moved upwards in a vertical direction, and also the gills 221A' which are located in the upper row will be uncovered, allowing the entry of air which will be refrigerated as discussed above, and will flow out over the canteens or similar, hence assisting in further compensating, in addition to the larger effective area of the cooling plate being uncovered, for losses in cooling capacity when the covering elements are opened, in that the self-convection will be even more stimulated, and more air will be refrigerated.

[0060] A further advantage of using gills, is that radiation losses are reduced.

[0061] Thus, when more cooling is needed, more cooling is automatically provided without increasing cooling power capacity from any cooling system or similar. In some cases auxiliary fans may optionally be provided at the upper side of the space between the first cooling plate elements 210A', 210B' and second cooling plate ele-

ments 220A', 220B' for pushing in additional air. The provisioning of such fans may be optional. In some embodiments there are no fans.

[0062] In some embodiments fans are provided which can be activated when there is a need for additional cooling power, or for example under extreme conditions, such as a high surrounding temperature, or for products requiring a particularly low temperature.

[0063] In a particular embodiment the outer walls of the cooling medium conduit are provided with a number of booster openings 224' with a diameter of about 2,5 - 3,5 mm, e.g. 3 mm, which however merely indicates an advantageous embodiment, see Fig. 5, located below the row of openings (204', see also openings 204 Figs. 2, 3), and corresponding openings 225', 226' in the first and second cooling plate elements, at a position which is located at the entry of a number of the upper gills 221A' , 221B' to further enhance the cooling capacity. In one embodiment there are eight such booster openings 224' (225', 226') on each outer side wall. There may of course be more as well as fewer; they may be equidistantly disposed, or only in the regions of the outer side edges, or wherever an even more increased cooling capacity is needed.

[0064] Fig. 5 is a very schematic view in cross-section of a cooling arrangement 200' as shown in Fig.4. On both sides of a cooling medium conduit 201' first cooling plate elements 210A', 210B' with internal and external flanges are provided. Cool air flows through openings 204', only very schematically indicated in Fig. 5, along the outer side walls of the cooling medium conduit 201', whereas by means of the inner flanges the effective cooling area is enhanced, efficiently cooling the first cooling plate elements 210A', 210B', which via the external flanges provide a high cooling capacity in the channels formed on the outer sides. Air entering via the gill openings via self-convection, arrows C1, C2, is further cooled in the space or the channels formed by the external flanges, and flows out, arrows D, over canteens or similar, not shown, hence cooling the products therein. Arrows X indicate air flows returning to an evaporator of a cooling system. In Fig. 5 the booster openings 224' in the outer walls of the cooling medium conduit 201', and corresponding openings 225' , 226' in the first and second cooling plate elements respectively, additionally assist in cooling down the air entering the upper gills 221A', 221B' as discussed with reference to Fig. 4.

[0065] In Fig. 5 the cross-section is taken through walls of the flanges and flows F1, F2 are schematically indicated although the actual flow channels between flanges cannot be seen.

[0066] If the cooling arrangement is used with a covering arrangement as disclosed in the Swedish patent application "A covering arrangement for a refrigerated food bar arrangement, and a food bar arrangement with such a covering arrangement" filed by the same applicant, and the content of which herewith is incorporated herein by reference, the lower gills 222A', 222B' are uncovered always allowing the entry of circulating air, whereas the upper gills are covered by a covering element when it is in a closed position, and uncovered when the covering element is opened, i.e. lifted up, hence also allowing circulating air to entry, possibly boosted in embodiments comprising booster openings 224'.

[0067] Fig. 6 shows an alternative cooling arrangement 200" similar to the one described with reference to Figs. 4 and 5, but with the difference that the second cooling plate elements 220A", 220B" do not comprise any gills. In such a case preferably, although not necessarily, auxiliary fans can be provided above the "channels" provided between the first and second cooling plate elements to further increase the cooling capacity. Booster openings may optionally be provided in the outer wall of the cooling medium conduit and in the first cooling plate elements. In other aspects the functioning is similar to that described above with reference to the other embodiments.

[0068] The second cooling pate elements, with or without gills, may be made of Al, any other metal material, or of plastic.

[0069] Fig. 7 schematically illustrates a cooling arrangement 200 as shown in Fig. 4 arranged in connection with a covering arrangement 110 comprising two covering elements (only one shown) 10B which is in a closed position. The covering arrangement is disclosed in the above mentioned Swedish patent application. When a covering element is brought to an open position, it is moved vertically upwards such that its lower edge will be located substantially as indicated through the dashed line U in Fig. 7, hence, both rows of gills 221A', 222A' are uncovered, whereas in a closed position its lower edge will be located approximately as indicated by dashed line L in Fig.7, hence covering the upper row of gills 221A'.

[0070] The air flow due to self-convection under the covering element 10B over the canteens (not shown) is illustrated by means of a dashed arrow.

[0071] Fig. 8 very schematically shows a cooling arrangement 200" as in Fig. 6, i.e. which do not comprise any gills. It should however be clear, that in most advantageous embodiments, the second cooling plate elements do comprise gills.

[0072] It should be clear that a cooling arrangement 110" according to the invention does not have to be used in connection with a food bar as the one shown in the Fig.8, but it can be used with any other food bar or also in other contexts when products, or anything else, need cooling. It should also be clear that a food bar does not have to be a dual food bar; it might just as well be a single sided food bar, in which case the cooling arrangement only comprises first (and second) cooling plate elements on one side.

[0073] However, in the particular illustrated embodiment, the cooling arrangement 200" is used in connection with a food bar arrangement 100 which comprises canteen holding arrangements 103A, 103B adapted to receive and hold a plurality of canteens 104 in which fresh

food products are to be kept.

[0074] The holding arrangements 103A, 103B are here provided in connection with a cupboard arrangement 300 comprising cold wells and being adapted to receive the canteens in such a manner that openings of the canteens make the food accessible for a customer from a first and a second outer side section of the holding arrangements 103A, 103B, hence allowing a customer to choose and pick from the canteens from two sides. The canteens are arranged in an outwards inclined manner, hence further contributing to the cooled air flowing outwards, downwards over the products in the canteens, and flowing upwards when it encounters the inner side of the covering element, and back towards the upper edge of the cooling arrangement.

[0075] It should be clear that the cooling arrangement according to the present invention with advantage also can be used irrespective of any particular covering arrangement, and for cooling different types of food bar arrangements or any other arrangement needing to be cooled.

[0076] The cooling element arrangement 200" is arranged with respect to, or in, the holding arrangement 103 such that, when the canteens 104 are taken up therein, the canteen back walls will be located close to, facing it.

[0077] In the advantageous embodiment shown in Fig. 8 the holding arrangement 103 is adapted to receive one or more rows of canteens 104, the cooling or refrigerating arrangement 200" protruding in a central portion of the bar arrangement to a height substantially in line with the upper edges of rear sections, or rear walls, of the covering elements 10A, 10B when they are in a closed position.

[0078] The height of a rear section, in a mounted state of a covering element, is smaller than that of its side sections since the refrigerating arrangement extends adjacent to the rear section, the purpose of the shorter dimension of the height of the rear section being to allow cooling by means of the cooling, refrigerating, arrangement as discussed above. When a covering element is lifted or elevated to the open position, a larger area of the cooling element will be exposed or uncovered, thus at least to a considerable extent compensating for the warmer air entering the space above the canteens when the covering element 10B is in an open position.

[0079] The covering arrangement is arranged so as to leave a space above the canteens allowing air to circulate due to the cooled air flowing outwards (see arrows C in Fig. 8), (particularly somewhat downwards due to the inclination of the canteens in some embodiments) over the food, since cool air has a lower density.

[0080] Fig. 9 very schematically illustrates a food bar arrangement 100' with a cooling arrangement 200' as described with reference to Fig. 4, and with a covering arrangement 110 as disclosed in the earlier mentioned Swedish patent application. In Fig. 9 the gills 221A', 222A' are shown through the transparent front section of the covering element, and the front covering element is supposed to be in an open position such that the gills in both the upper and the lower rows are uncovered.

[0081] The food bar arrangement also here comprises cupboards 300, and a machine room 400 is schematically illustrated in which e.g. an evaporator and a compressor of a cooling system may be provided which is in communication with the cooling arrangement 200', which however merely relates to an advantageous embodiment of a food bar arrangement in association with which a cooling arrangement of the present invention may be used.

[0082] It should be clear that the invention is not limited to the specifically illustrated embodiments, but that it can be varied in a number of ways within the scope of the appended claims.

Claims

1. A cooling arrangement (200;200';200") for a food bar arrangement or similar holding products needing to be cooled, wherein the cooling arrangement (200;200';200") comprises a cooling medium conduit (201;201';201") with a number of cooling medium inlets (202,202), the cooling arrangement further comprising a number of cooling medium Outlets (203, 203), **characterized in that** the cooling medium inlets (202,202) and the cooling medium outlets (203,203) are disposed symmetrically along the cooling medium conduit (201;201';201") which comprises at least one side wall (201A,201B;201A', 201B';201A",201B"), said at least one side wall comprising a plurality of openings, e.g. circular holes, (204,204A,204B) disposed along an upper edge of said at least one side wall allowing cool air to exit through said openings (204,204A,204B),
that adjacent, and in parallel, with said outer wall at least a first cooling plate element (210A, 210B;210A' , 210B' ; 210A",210B") is disposed,
that said first cooling plate element (210A,210B; 210A',210B';210A",210B") comprises internal flanges, ribs or similar (211A,211B; 211A',211B';211A", 211B") provided on an inner side of said first cooling plate element (210A,210B;210A',210B';210A", 210B") facing the cooling medium conduit (201), and/or external flanges (212A,212B;212A',212B'; 212A",212B") provided on the outer side of said first cooling plate element (210A, 210B;210A', 210B' ;210A", 210B") to enhance the effective area of said first cooling plate element (210A,210B;210A',210B' ;210A",210B"), to increase the cooling power transfer capacity from the cooling medium conduit, and to allow air escaping through said openings (204) to flow in the space between the cooling medium conduit (201;201';201") and the first cooling plate element (210A,210B; 210A', 210B'; 210A", 210B").

2. A cooling arrangement according to claim 1, **characterized in that**

said at least one first cooling plate element (210A, 210B;210A', 210B';210A", 210B") comprises a plurality of internal flanges (211A,211B;211A',211B' ;211A",211B") extending in parallel from an upper edge towards a lower edge of said first cooling plate element (210A,210B;210A',210B';210A",210B"), said internal flanges (211A,211B;211A',211B' ;211A",211B") being arranged on a side of the first cooling plate element facing the cooling medium conduit (201;201';201"), wherein the distance between the first cooling plate element (210A, 210B;210A', 210B';210A", 210B") and the cooling medium conduit (201;201201") substantially is given by a height of said internal flanges (211A, 211B;211A',211B';211A",211B"), i.e. the distance they protrude, allowing air exiting the openings or through holes (204, 204A,204B), to flow downwards in channels formed by said internal flanges (211A, 211B;211A',211B';211A",211B").

3. A cooling arrangement according to claim 1 or 2, **characterized in that** said first cooling plate element (210A,210B;210A', 210B';210A", 210B") comprises external flanges, ribs or similar (212A,212B; 212A',212B';212A", 212B") arranged on a side of the first cooling plate element (210A,210B;210A',210B';210A", 210B") facing away from the cooling medium conduit (201;201';201"), hence being adapted to increase the effective cooling area on the outside of said first cooling plate element (210A,210B;210A',210B' ;210A", 210B") .

4. A cooling arrangement at least according to claim 2, **characterized in that** the distance between adjacent internal flanges (211A,211B;211A',211B';211A",211B") is about 5-8 mm, and/or that the distance between adjacent external flanges (212A,212B; 212A',212B';212A", 212B") is about 12-18 mm.

5. A cooling arrangement at least according to claim 2 and 3, **characterized in that** the external flanges (212A,212B; 212A',212B' ;212A",212B") protrude a distance which is longer than the distance that the internal flanges (211A, 211B;211A',211B';211A",211B") protrude.

6. A cooling arrangement according to any one of the preceding claims, **characterized in that** the internal flanges (211A,211B;211A',211B';211A", 211B") are equidistantly disposed and/or that the external flanges (212A,212B; 212A',212B';212A", 212B") are equidistantly disposed.

7. A cooling arrangement according to any one of the preceding claims, **characterized in that** it further comprises at least one second cooling plate element (220A',220B';220A",220B") disposed in parallel with said first cooling plate element (210A', 210B';210A",210B") on its side facing away from the cooling medium conduit (201';201").

8. A cooling arrangement according to claim 7, **characterized in that** the second cooling plate element (220A',220B' ;220A",220B") comprises a plurality of gills or fins (221A',221B',222A',222B') having openings which are substantially directed upwards in a mounted state of the cooling arrangement and adapted to allow air to entry through said gills (221A',221B',222A' ,222B'), and to flow downwards in channels formed by the external flanges of the first cooling plate element (210A',210B';210A",210B"), in a space between the first cooling plate element and said second cooling plate element (220A',220B';220A",220B") while being cooled, and to flow out at lower edges of said second cooling plate element (220A',220B' ;220A",220B") over products or similar to be cooled, for example canteens or similar arranged in holding means, and being located in connection with said lower edge, such that said products are cooled.

9. A cooling arrangement according to claim 8, **characterized in that** the gills (221A',221B',222A',222B') are disposed at an upper section of said second cooling plate element (220A',220B';220A",220B"), and that the gills (221A',221B',222A',222B') are disposed so as to be located at least two different distances from the upper edge of said second cooling plate element (220A' ,220B';220A",220B"), preferably disposed in two parallel rows.

10. A cooling arrangement according to claim 8 or 9, **characterized in that** at least some of the gills (221A',221B',222A',222B') are adapted to be openable /closable and that they automatically or manually can be closed or opened, and/or that at least some of the gills (221A',221B', 222A',222B') are adapted to be openable to a controllable extent, by means of a controllable opening angle (β).

11. A cooling arrangement according to any one of the preceding claims, **characterized in that** the outer wall (s) of the cooling medium conduit (201;201';201") comprises booster openings (224A' ,224B') disposed below said openings (204; 204A, 204B;204") which are constantly open or adapted to be openable/closable in a controlled manner, and **in that** also said first cooling plate element, or said first

cooling plate element and second cooling plate element, if provided, is/are provided with corresponding through booster openings (225B', 226B') to further enhance cooling capacity by allowing cooled air to flow directly from the cooling medium conduit through said booster openings out to the outer side of the cooling arrangement.

12. A cooling arrangement at least according to claim 9, **characterized in that**
one or more fans are provided above the upper edges of the first and/or the second cooling plate elements to further increase the cooling capacity, said fans being adapted to be able to optionally be switched on/switched off.

13. A cooling arrangement according to any one of the preceding claims,
characterized in that
it comprises two first cooling plate elements arranged on opposite sides of said cooling medium conduit (201,201',201"), or first and second cooling plate elements disposed on two sides of said cooling medium conduit hence being adapted for cooling on two opposite sides.

14. A cooling assembly,
characterized in that
it comprises a cooling arrangement (200;200';200") according to any one of claims 1-13 and at least one covering arrangement (110) comprising at least one covering element (10A,10B) comprising a rear section and a front section, wherein said rear section has a lower edge which ends, in a mounted state of the assembly, at a shorter distance from an upper edge than said front section, said upper edges being joined, and **in that** said covering arrangement (110) and said cooling arrangement (200;200';200") are so arranged with respect to one another that said rear section faces the outermost first or second cooling plate element, and **in that** said covering element (10A,10B) is adapted to be opened and closed respectively by means of a vertical movement, such that a larger area, providing an enhanced cooling capacity, of said outermost cooling plate element is uncovered when the covering element (10A,10B) is in an opened position hence compensating for cooling losses due to opening of the covering element (10A,10B), and **in that** in a closed position, a smaller area of the outermost of said cooling plate elements is uncovered.

15. A cooling assembly according to claim 14,
characterized in that
the cooling arrangement (200;200';200") comprises at least one second cooling plate element (220A', 220B';220A",220B") which is provided with gills (221A', 221B', 222A', 222B') arranged in at least an upper and a lower row, and **in that** when the covering element (10B) is in an open position, both rows of gills are uncovered, whereas when it is in a closed position, only one row is uncovered.

16. A food bar arrangement (100),
characterized in that
it is provided with a cooling arrangement as in any one of claims 1-13.

17. A food bar arrangement according to claim 16,
characterized in that
it is provided with a cooling assembly according to claim 14 or 15, and **in that** it comprises a single sided or a dual-sided food bar.

Patentansprüche

1. Eine Kühlanordnung (200; 200'; 200") für eine Nahrungsmittelriegelanordnung oder ähnliches, die Produkte, die gekühlt werden müssen, hält, wobei die Kühlanordnung (200; 200'; 200") eine Kühlmittelleitung (201; 201'; 201") mit einer Anzahl von Kühlmitteleinlässen (202, 202) umfasst, die Kühlanordnung ferner eine Anzahl von Kühlmittelauslässen (203, 203) umfasst,
dadurch gekennzeichnet, dass
die Kühlmitteleinlässe (202, 202) und die Kühlmittelauslässe (203, 203) symmetrisch entlang der Kühlmittelleitung (201; 201'; 201"), die wenigstens eine Seitenwand (201A; 201B; 201A', 201B'; 201A", 201B") umfasst, angeordnet sind, die wenigstens eine Seitenwand eine Vielzahl von Öffnungen (204, 204A, 204B), beispielsweise kreisförmige Löcher, umfasst, die entlang einer oberen Kante der wenigstens einen Seitenwand, die kalter Luft ermöglicht durch die Öffnungen (204, 204A, 204B) auszutreten, angeordnet sind,
dass angrenzend, und parallel mit der äußeren Wand wenigstens ein erstes Kühlplattenelement (210A, 210B,; 210A', 210B'; 210A", 210B") angeordnet ist,
dass das erste Kühlplattenelement (210A, 210B; 210A', 210B'; 210A"; 210B") Innenflansche, Rippen oder ähnliches (211A, 211B; 211A', 211B'; 211A", 211B"), die auf einer Innenseite des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B"), das der Kühlmittelleitung (201) zugewandt ist, angeordnet sind, und/oder Außenflansche (212A, 212B; 212A', 212B'; 212A", 212B"), die auf einer Außenseite des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B") angeordnet sind, um die Wirkfläche des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B") zu verbessern, um die Kühlleistungübertragungskapazität von der Kühlmittelleitung zu erhöhen, und um Luft zu ermöglichen durch die Öffnungen (204) aus-

zutreten, um in dem Raum zwischen der Kühlmittelleitung (201; 201'; 201") und dem ersten Kühlplattenelement (210A, 210B; 210A', 210B'; 210A"; 210B") zu strömen.

2. Eine Kühlanordnung gemäß Anspruch 1,
dadurch gekennzeichnet, dass
das wenigstens eine erste Kühlplattenelement (210A, 210B; 210A', 210B'; 210A"; 210B") eine Vielzahl von Innenflanschen (211A, 211B; 211A', 211B' ; 211A", 211B"), die sich parallel von einer oberen Kante in Richtung einer unteren Kante des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B") erstrecken, umfasst, die Innenflansche (211A, 211B; 211A', 211B'; 211A", 211B") auf einer Seite des ersten Kühlplattenelements, die der Kühlmittelleitung (201; 201'; 201") zugewandt ist, angeordnet sind, wobei der Abstand zwischen dem ersten Kühlplattenelement (210A, 210B; 210A', 210B'; 210A"; 210B") und der Kühlmittelleitung (102; 201'; 201") im Wesentlichen durch eine Höhe der Innenflansche (211A, 211B; 211A', 211B'; 211A", 211B") bestimmt ist, beispielsweise die Strecke, die sie hervorstehen, und der Luft ermöglicht die Öffnungen oder Durchgangslöcher (204, 204A, 204B) zu verlassen, um nach unten in Kanälen, die mittels der Innenflansche (211A, 211B; 211A', 211B'; 211A", 211B") ausgebildet sind, zu strömen.

3. Eine Kühlanordnung gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
das erste Kühlplattenelement (210A, 210B; 210A', 210B'; 210A"; 210B") Außenflansche, Rippen oder ähnliches umfasst, die auf einer Seite des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B"), die von der Kühlmittelleitung (201; 201'; 201") abgewandt ist, angeordnet sind, demzufolge zum Steigern der effektiven Kühlfläche auf der Außenseite des ersten Kühlplattenelements (210A, 210B; 210A', 210B'; 210A"; 210B") ausgebildet sind.

4. Eine Kühlanordnung wenigstens gemäß Anspruch 2,
dadurch gekennzeichnet, dass
der Abstand zwischen angrenzenden Innenflanschen (211A, 211B; 211A', 211B'; 211A", 211B") ungefähr 5 - 8 mm beträgt, und/oder dass der Abstand zwischen angrenzenden Außenflanschen (212A, 212B; 212A', 212B'; 212A", 212B") ungefähr 12 - 18 mm beträgt.

5. Eine Kühlanordnung wenigstens gemäß Anspruch 2 und 3,
dadurch gekennzeichnet, dass
die Außenflansche (212A, 212B; 212A', 212B'; 212A", 212B") ein Strecke hervorstehen, die länger ist als die Stecke, die die Innenflansche (211A, 211B; 211A', 211B'; 211A", 211B") hervorstehen.

6. Eine Kühlanordnung gemäß einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
die Innenflansche (211A, 211B; 211A', 211B'; 211A", 211B") äquidistant angeordnet sind und/oder dass die Außenflansche (212A, 212B; 212A', 212B' ; 212A", 212B") äquidistant angeordnet sind.

7. Eine Kühlanordnung gemäß einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
sie ferner wenigsten ein zweites Kühlplattenelement (220A', 220B'; 220A", 220B"), das parallel mit dem ersten Kühlplattenelement (210A', 210B'; 210A"; 210B") auf seiner Seite, die von der Kühlmittelleitung (201'; 201") abgewandt ist, angeordnet ist.

8. Eine Kühlanordnung gemäß Anspruch 7,
dadurch gekennzeichnet, dass
das zweite Kühlplattenelement (220A', 220B'; 220A", 220B") eine Vielzahl von Rippen oder Finnen (221A', 221B', 222A', 222B') mit Öffnungen, die in einem montierten Zustand der Kühlanordnung im Wesentlichen nach oben ausgerichtet sind und ausgebildet sind, um Luft zu ermöglichen durch die Rippen (221A', 221B', 222A', 222B') einzutreten und in Kanälen, die durch die Außenflansche des ersten Kühlplattenelements (210A, 210B', 222A', 222B') ausgebildet sind, nach unten zu strömen, in einem Raum zwischen dem ersten Kühlplattenelement und dem zweiten Kühlplattenelement (220A', 220B'; 220A", 220B"), während sie gekühlt wird, und an unteren Kanten des zweiten Kühlplattenelements (220A', 220B'; 220A", 220B") über zu kühlende Produkte oder ähnliches nach außen zu strömen, beispielsweise Kantinen oder ähnliches, die in Haltemitteln angeordnet sind, und in Verbindung mit der unteren Kante angeordnet ist, sodass die Produkte gekühlt werden.

9. Eine Kühlanordnung gemäß Anspruch 8,
dadurch gekennzeichnet, dass
die Rippen (221A', 221B', 222A', 222B') an einem oberen Abschnitt des zweiten Kühlplattenelements (220A', 220B'; 220A", 220B") angeordnet sind und dass die Rippen (221A', 221B', 222A', 222B') angeordnet sind, um an wenigstens zwei verschiedenen Abständen von der oberen Kante des zweiten Kühlplattenelements (220A', 220B'; 220A", 220B") angeordnet zu sein, vorzugsweise in zwei parallelen Reihen angeordnet.

10. Eine Kühlanordnung gemäß Anspruch 8 oder 9,
dadurch gekennzeichnet, dass
wenigstens einige der Rippen (221A', 221B', 222A' , 222B') angepasst sind, um öffenbar/schließbar zu sein und dass sie automatisch oder manuell geschlossen oder geöffnet werden können, und/oder

dass wenigstens einige der Rippen (221A', 221B', 222A', 222B') angepasst sind, um in einem regelbarem Ausmaß öffenbar zu sein, mit Hilfe eines regelbarem Öffnungswinkels (β).

11. Eine Kühlanordnung gemäß einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
die Außenwand(wände) der Kühlmittelleitung (201; 201'; 201") Boosteröffnungen (224A', 224B') umfassen, die unter den Öffnungen (203; 204A, 204B; 204"), die konstant offen oder angepasst sind, um in regelbarer Weise öffenbar/schließbar zu sein, angeordnet sind, und dass auch das erste Kühlplattenelement oder das erste Kühlplattenelement und das zweite Kühlplattenelement, falls vorhanden, über korrespondierende Durchtrittsboosteröffnungen (225B'; 226B') verfügt/verfügen, um die Kühlkapazität, durch Ermöglichen gekühlter Luft direkt von der Kühlmittelleitung durch die Bossteröffnungen nach außen zu der Außenseite der Kühlanordnung zu fließen, weiter zu verbessern.

12. Eine Kühlanordnung wenigstens gemäß Anspruch 9,
dadurch gekennzeichnet, dass
eine oder mehrere Ventilatoren über den oberen Kanten des ersten und/oder des zweiten Kühlplattenelements vorgesehen sind, um die Kühlkapazität weiter zu erhöhen, die Ventilatoren ausgebildet sind, um wahlweise an/aus geschaltet zu werden.

13. Eine Kühlanordnung gemäß einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
sie zwei erste Kühlplattenelemente, die auf gegenüberliegenden Seiten der Kühlmittelleitung (201, 201', 201") angeordnet sind, oder erste und zweite Kühlplattenelemente, die die auf zwei Seiten der Kühlmittelleitung angeordnet sind, umfasst, demzufolge zur Kühlung auf zwei gegenüberliegenden Seiten ausgebildet sind.

14. Eine Kühlbaugruppe,
dadurch gekennzeichnet, dass
sie eine Kühlanordnung (200; 200'; 200") gemäß einem der Ansprüche 1 - 13 und wenigstens eine Abdeckanordnung (110), die wenigstens ein Abdeckelement (10A, 10B), das einem hinteren Abschnitt und einen vorderen Abschnitt umfasst, umfasst, wobei der hintere Abschnitt eine untere Kante aufweist, die, in einem montierten Zustand der Baugruppe, an einem kürzeren Abstand von der oberen Kante als der vordere Abschnitt endet, die oberen Kanten verbunden sind, und dass das Abdeckelement (110) und die Kühlanordnung (200; 200'; 200") bezüglich einander so angeordnet sind, dass der hintere Abschnitt dem äußersten ersten oder zweiten Kühlplattenelement zugewandt ist, und dass das Abdeckelement (10A, 10B) ausgebildet ist, um entsprechend durch Hilfe einer vertikalen Bewegung geöffnet und geschlossen zu werden, sodass eine größere Fläche, die eine verbesserte Kühlkapazität bereitstellt, des äußersten Kühlplattenelements unbedeckt ist, wenn sich das Abdeckelement (10A, 10B) in einer geöffneten Position befindet, demzufolge kompensierend für Kühlverluste aufgrund der Öffnung des Abdeckelements (10A, 10B), und dass in einer geschlossenen Position eine kleinere Fläche der äußersten der Kühlplattenelemente unbedeckt ist.

15. Eine Kühlbaugruppe gemäß Anspruch 14,
dadurch gekennzeichnet, dass
die Kühlanordnung (200; 200'; 200") wenigstens ein zweites Kühlplattenelement (220A', 220B'; 220A", 220B") umfasst, das über Rippen (221A', 221B', 222A', 222B') verfügt, die wenigstens in einer oberen und einer unteren Reihe angeordnet sind, und dass wenn das Abdeckelement (10B) sich in einer geöffneten Position befindet, beide Reihen der Rippen unbedeckt sind, wohingegen, wenn es sich in einer geschlossenen Position befindet, nur eine Reihe unbedeckt ist.

16. Eine Nahrungsmittelriegelanordnung (100),
dadurch gekennzeichnet, dass
sie über eine Kühlanordnung wie in einem der Ansprüche 1 - 13 verfügt.

17. Eine Nahrungsmittelriegelanordnung gemäß Anspruch 16,
dadurch gekennzeichnet, dass
sie über eine Kühlbaugruppe gemäß Anspruch 14 oder 15 verfügt, und dass sie einen einseitigen oder zweiseitigen Nahrungsmittelriegel umfasst.

Revendications

1. Système de refroidissement (200 ; 200' ; 200") pour un système de buffet alimentaire ou des articles de support similaires devant être refroidis, le système de refroidissement (200 ; 200' ; 200") comprenant un conduit d'agent de refroidissement (201 ; 201' ; 201") avec un certain nombre d'entrées d'agent de refroidissement (202, 202), le système de refroidissement comprenant en outre un certain nombre de sorties d'agent de refroidissement (203, 203), **caractérisé en ce que**
les entrées d'agent de refroidissement (202, 202) et les sorties d'agent de refroidissement (203, 203) sont disposées symétriquement le long du conduit d'agent de refroidissement (201 ; 201' ; 201") qui comprend au moins une paroi latérale (201A, 201B ; 201A', 201B'; 201A", 201B"), ladite au moins une paroi latérale comprenant une pluralité d'ouvertures,

par exemple des trous circulaires, (204, 204A, 204B) disposé(e)s le long d'un bord supérieur de ladite au moins une paroi latérale, permettant à l'air froid de sortir par lesdites ouvertures (204, 204A, 204B),
en ce qu'au moins un premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") est positionné de manière adjacente à et en parallèle de ladite paroi extérieure,
en ce que ledit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") comprend des brides ou des nervures internes ou des éléments similaires (211A, 211B ; 211A' , 211B' ; 211A", 211B") prévu(e)s sur un côté intérieur dudit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") faisant face au conduit d'agent de refroidissement (201) et/ou des brides externes (212A, 212B ; 212A' , 212B' ; 212A", 212B") prévues sur le côté extérieur dudit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") pour améliorer la surface effective dudit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B"), pour augmenter la capacité de transfert de puissance de refroidissement en provenance du conduit d'agent de refroidissement, et pour permettre à l'air s'échappant par lesdites ouvertures (204) de circuler dans l'espace entre le conduit d'agent de refroidissement (201 ; 201' ; 201") et le premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B").

2. Système de refroidissement selon la revendication 1, **caractérisé en ce que** ledit au moins un premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") comprend une pluralité de brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B") s'étendant en parallèle d'un bord supérieur vers un bord inférieur dudit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B"), lesdites brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B") étant positionnées sur un côté du premier élément de plaque de refroidissement faisant face au conduit d'agent de refroidissement (201 ; 201' ; 201"), où la distance entre le premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") et le conduit d'agent de refroidissement (201 ; 201' ; 201") est sensiblement donné par une hauteur desdites brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B"), c'est-à-dire la distance à laquelle elles font saillie, permettant à l'air sortant des ouvertures ou trous traversants (204, 204A, 204B) de s' écouler vers le bas dans des canaux formés par lesdites brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B").

3. Système de refroidissement selon la revendication 1 ou 2, **caractérisé en ce que** ledit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") comprend des brides ou des nervures externes ou similaires (212A, 212B ; 212A' , 212B' ; 212A" , 212B") agencés sur un côté du premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B") orienté à l'opposé du conduit d'agent de refroidissement (201 ; 201' ; 201"), étant conçues de ce fait pour augmenter la surface de refroidissement effective sur l'extérieur dudit premier élément de plaque de refroidissement (210A, 210B ; 210A', 210B' ; 210A", 210B").

4. Système de refroidissement au moins selon la revendication 2, **caractérisé en ce que** la distance entre des brides internes adjacentes (211A, 211B ; 211A', 211B' ; 211A", 211B") est d'environ 5 à 8 mm et/ou que la distance entre des brides externes adjacentes (212A, 212B ; 212A', 212B' ; 212A", 212B") est d'environ 12 à 18 mm.

5. Système de refroidissement selon au moins les revendications 2 et 3, **caractérisé en ce que** les brides extérieures (212A, 212B ; 212A', 212B' ; 212A", 212B") font saillie à une distance qui est plus grande que la distance à laquelle les brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B") font saillie.

6. Système de refroidissement selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les brides internes (211A, 211B ; 211A', 211B' ; 211A", 211B") sont positionnées de manière équidistante et/ou **en ce que** les brides externes (212A, 212B ; 212A', 212B' ; 212A", 212B") sont positionnées de manière équidistante.

7. Système de refroidissement conforme à l'une des précédentes revendications, **caractérisé en ce qu'** il comprend en outre au moins un second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B") positionné en parallèle dudit premier élément de plaque de refroidissement (210A', 210B' ; 210A", 210B") de son côté orienté à l'opposé du conduit d' agent de refroidissement (201' ; 201").

8. Système de refroidissement selon la revendication 7, **caractérisé en ce que** le second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B") comprend une pluralité d'ouïes ou d'ailettes (221A', 221B', 222A', 222B') présentant des ouvertures qui sont sensiblement dirigées vers le haut dans un état monté du système de refroidissement et conçues pour permettre à l'air d'entrer à travers lesdites ouïes (221A', 221B', 222A', 222B'), et de s' écouler vers le bas dans des canaux formés par les brides extérieures du premier élément de plaque de refroidissement (210A', 210B' ; 210A", 210B"), dans un espace entre le premier élément de plaque de refroidissement et ledit second élément de plaque

de refroidissement (220A', 220B' ; 220A", 220B") tout en étant refroidi, et de s'écouler au niveau de bords inférieurs dudit second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B") sur des articles ou éléments similaires devant être refroidis, par exemple des gamelles ou des éléments similaires agencé(e)s dans des moyens de support, et se trouvant en connexion avec ledit bord inférieur, de manière à refroidir lesdits articles .

9. Système de refroidissement selon la revendication 8, **caractérisé en ce que** les ouïes (221A', 221B', 222A', 222B') sont positionnées au niveau d'une section supérieure dudit second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B"), et **en ce que** les ouïes (221A', 221B', 222A', 222B') sont positionnées de manière à être situées à au moins deux distances différentes du bord supérieur dudit second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B"), de préférence positionnées en deux rangées parallèles.

10. Système de refroidissement selon la revendication 8 ou 9, **caractérisé en ce qu'**au moins certaines des ouïes (221A', 221B', 222A', 222B') sont conçues pour pouvoir être ouvertes/fermées et **en ce qu'**elles peuvent être automatiquement ou manuellement fermées ou ouvertes, et/ou **en ce qu'**au moins certaines des ouïes (221A', 221B', 222A', 222B') sont conçues pour pouvoir être ouvertes dans une mesure contrôlable, au moyen d'un angle d'ouverture contrôlable (β).

11. Système de refroidissement selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la ou les parois extérieures du conduit d'agent de refroidissement (201 ; 201' ; 201") comprennent des ouvertures d'amplification (224A', 224B') disposées sous lesdites ouvertures (204 ; 204A, 204B ; 204") qui sont constamment ouvertes ou adaptées pour pouvoir être ouvertes/fermées de manière contrôlée, et **en ce qu'**aussi ledit premier élément de plaque de refroidissement, ou ledit premier élément de plaque de refroidissement et le second élément de plaque de refroidissement, le cas échéant, est/sont muni(s) d'ouvertures d'amplification traversantes correspondantes (225B', 226B') pour améliorer encore la capacité de refroidissement en permettant à l'air refroidi de s'écouler directement du conduit d'agent de refroidissement à travers lesdites ouvertures de surpression vers le côté extérieur du système de refroidissement.

12. Système de refroidissement au moins selon la revendication 9, **caractérisé en ce qu'**un ou plusieurs ventilateurs sont prévus au-dessus des bords supérieurs du premier et/ou du second élément de plaque de refroidissement pour augmenter encore la capacité de refroidissement, lesdits ventilateurs étant conçus pour être optionnellement activés/désactivés.

13. Système de refroidissement selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**il comprend deux premiers éléments de plaque de refroidissement agencés sur des côtés opposés dudit conduit d'agent de refroidissement (201, 201' , 201"), ou des premier et second éléments de plaque de refroidissement positionnés sur deux côtés dudit conduit d'agent de refroidissement de ce fait adapté pour refroidir sur deux côtés opposés.

14. Ensemble de refroidissement, **caractérisé en ce qu'**il comprend un système de refroidissement (200 ; 200' ; 200") selon l'une quelconque des revendications 1 à 13 et au moins un dispositif de couverture (110) comprenant au moins un élément de couverture (10A, 10B) comprenant une section arrière et une section avant, où ladite section arrière présente un bord inférieur qui se termine, dans un état monté de l'ensemble, au niveau d'une distance plus courte d'un bord supérieur que ladite section avant, lesdits bords supérieurs étant joints, et **en ce que** ledit dispositif de couverture (110) et ledit système de refroidissement (200 ; 200' ; 200") sont agencés l'un par rapport à l'autre de telle sorte que ladite section arrière fait face au premier ou au second élément de plaque de refroidissement le plus à l'extérieur, et **en ce que** ledit élément de couverture (10A, 10B) est conçu pour être ouvert et fermé respectivement au moyen d'un mouvement vertical, de sorte qu'une plus grande surface, offrant une capacité de refroidissement améliorée, dudit élément de plaque de refroidissement le plus à l'extérieur soit découverte lorsque l'élément de couverture (10A, 10B) est dans une position ouverte, compensant ainsi des pertes de refroidissement due à l'ouverture de l'élément de couverture (10A, 10B), et **en ce qu'** en position fermée, une surface plus petite du plus à l'extérieur desdits éléments de la plaque de refroidissement est découverte.

15. Ensemble de refroidissement selon la revendication 14, **caractérisé en ce que** le système de refroidissement (200 ; 200' ; 200") comprend au moins un second élément de plaque de refroidissement (220A', 220B' ; 220A", 220B") qui est muni d'ouïes (221A', 221B', 222A', 222B') positionnées selon au moins une rangée supérieure et une rangée inférieure, et **en ce que** lorsque l'élément de couverture (10B) est en position ouverte, les deux rangées d' ouïes sont découvertes, tandis que lorsqu'il est en position fermée, une seule rangée est découverte.

16. Système de buffet alimentaire (100), **caractérisé en ce qu'**il est pourvu d'un système de refroidissement

selon l'une quelconque des revendications 1 à 13.

17. Système de buffet alimentaire selon la revendication 16, **caractérisé en ce qu'**il est pourvu d'un ensemble de refroidissement selon la revendication 14 ou 15, et **en ce qu'**il comprend un buffet alimentaire à un seul côté ou à deux côtés.

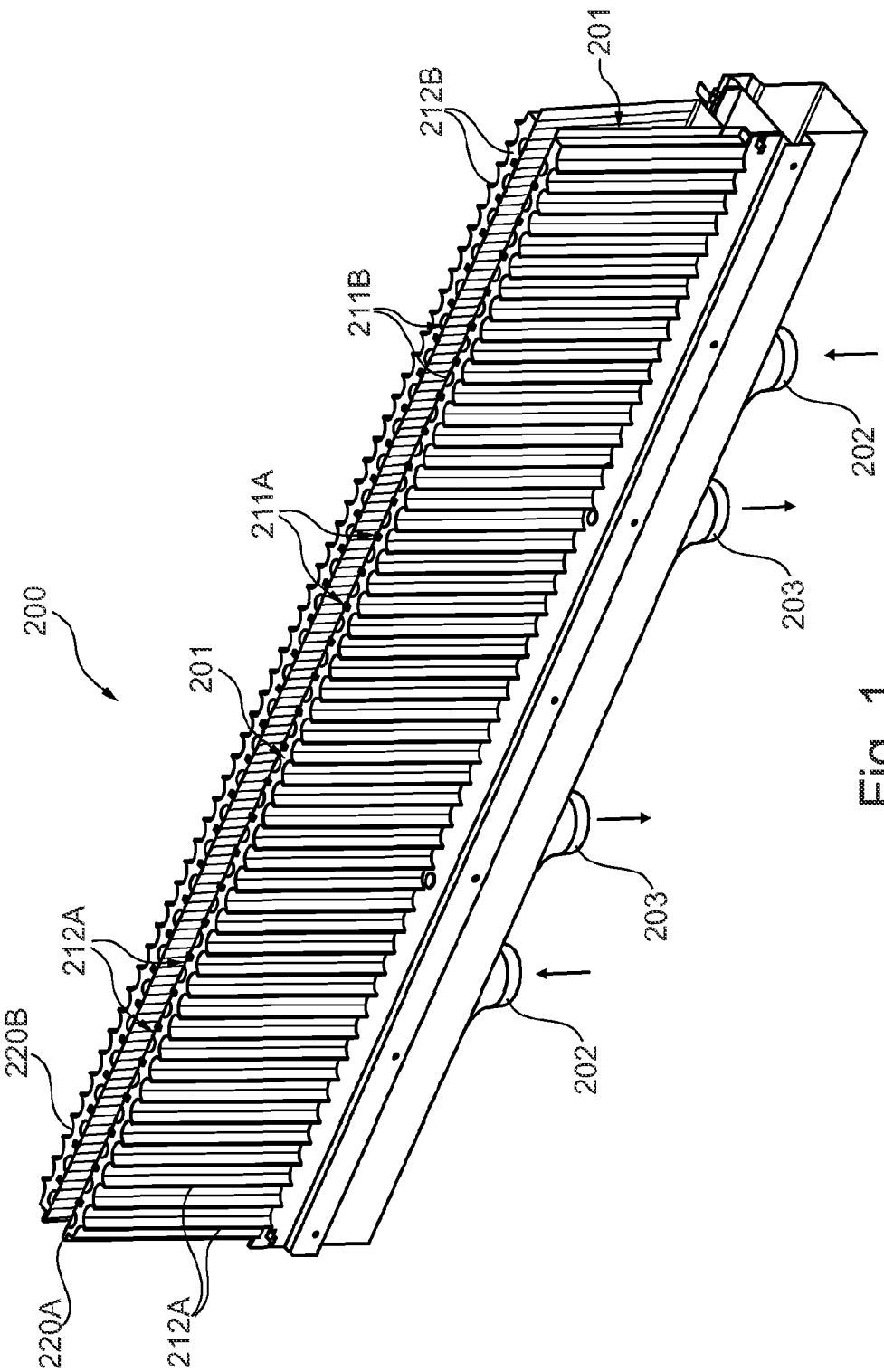
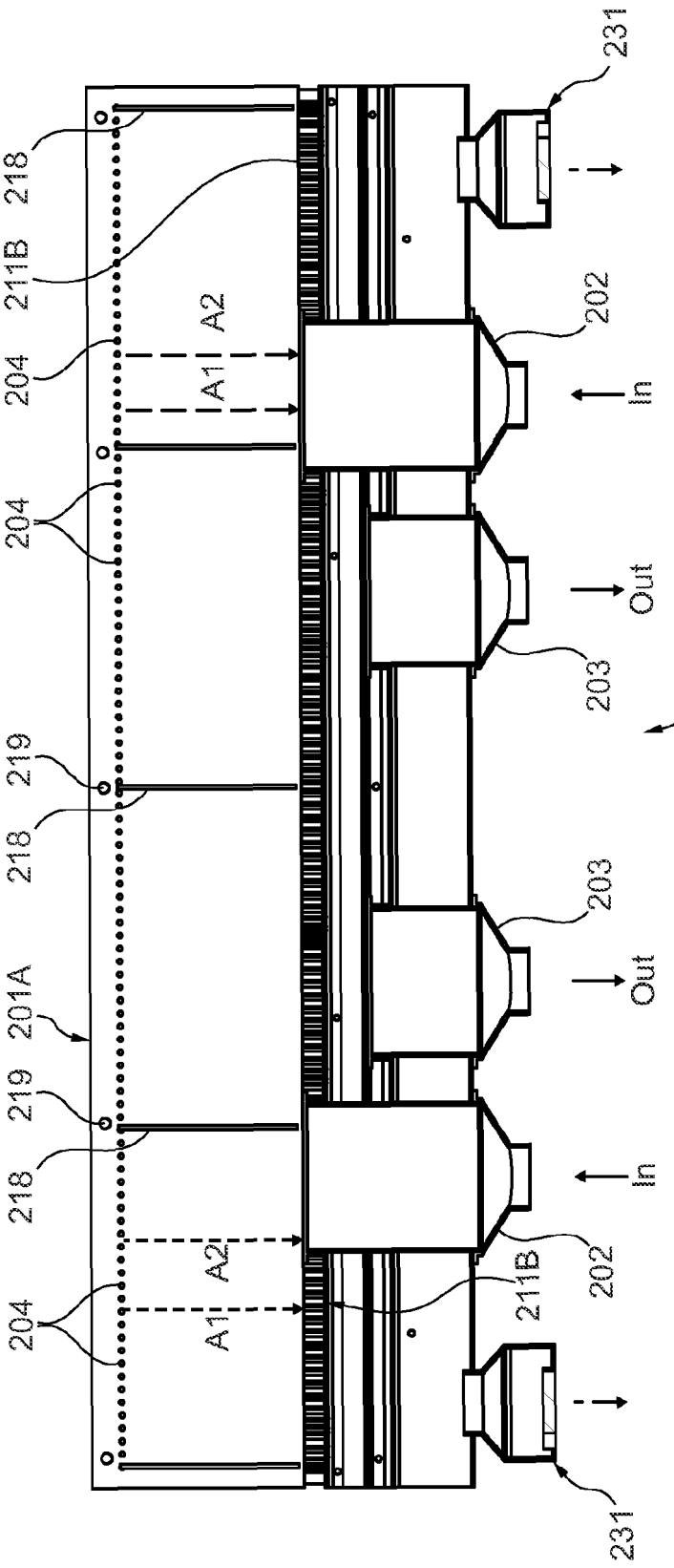


Fig. 1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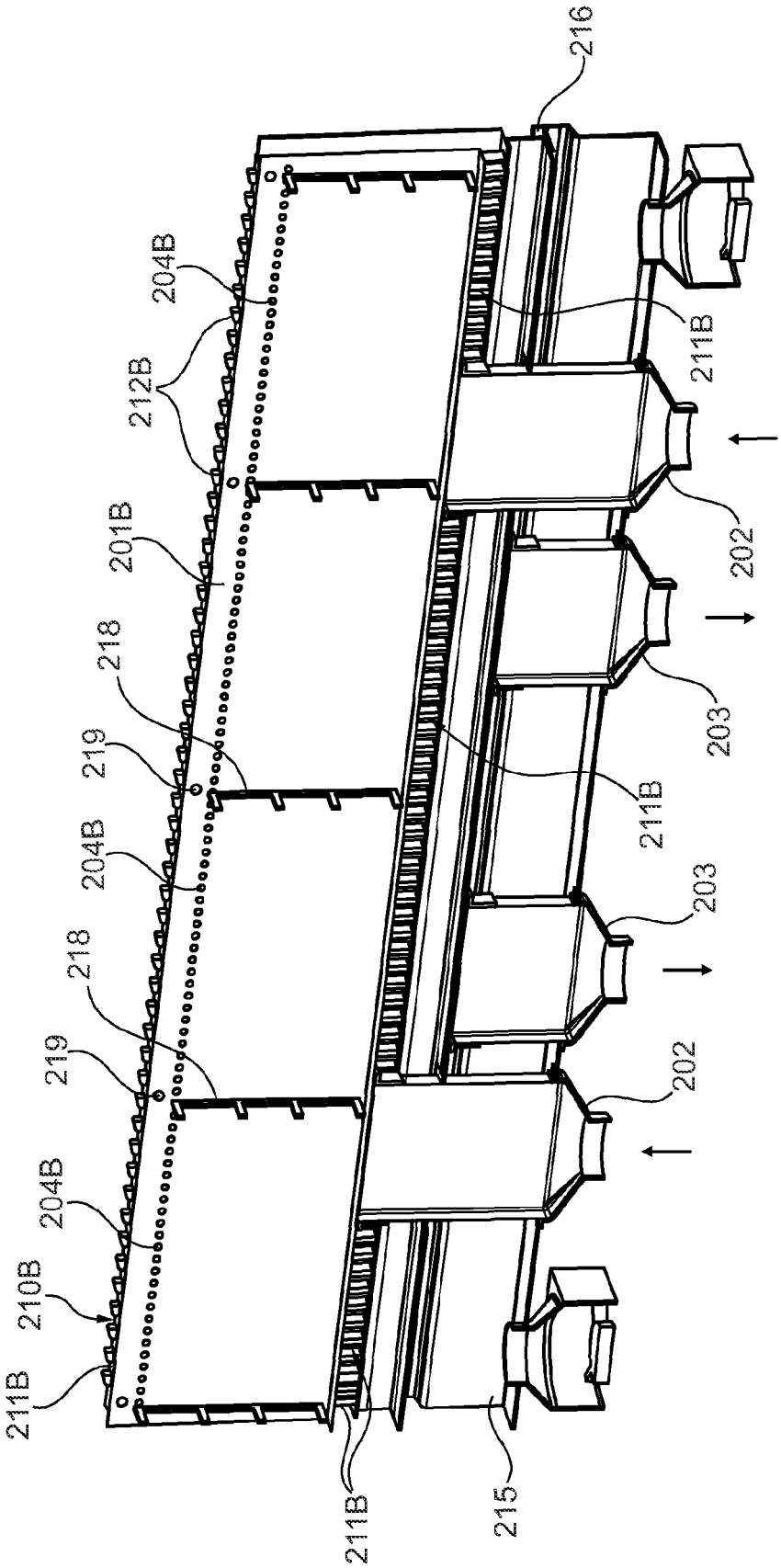
218
211B
A2
A1
202
204
In
204
Out
203
200
219
218
203
201A
Out
219
218
In
A2
211B
202
204
A1
231

Fig. 2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204B
212B
211B
202
201B
218
219
203
211B
204B
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218
219
202
204B
210B
211B
211B
215

Fig. 3

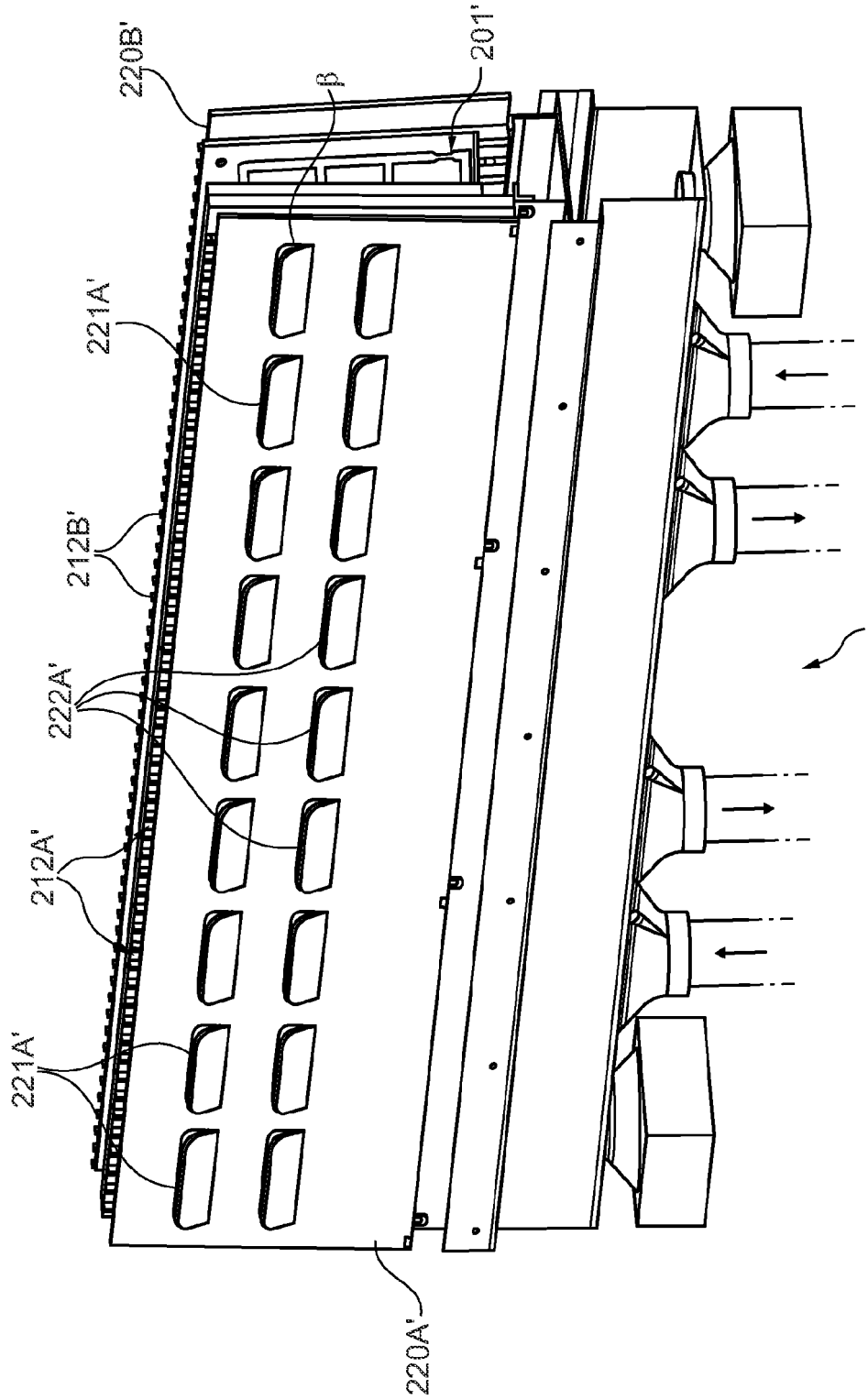

Fig. 4

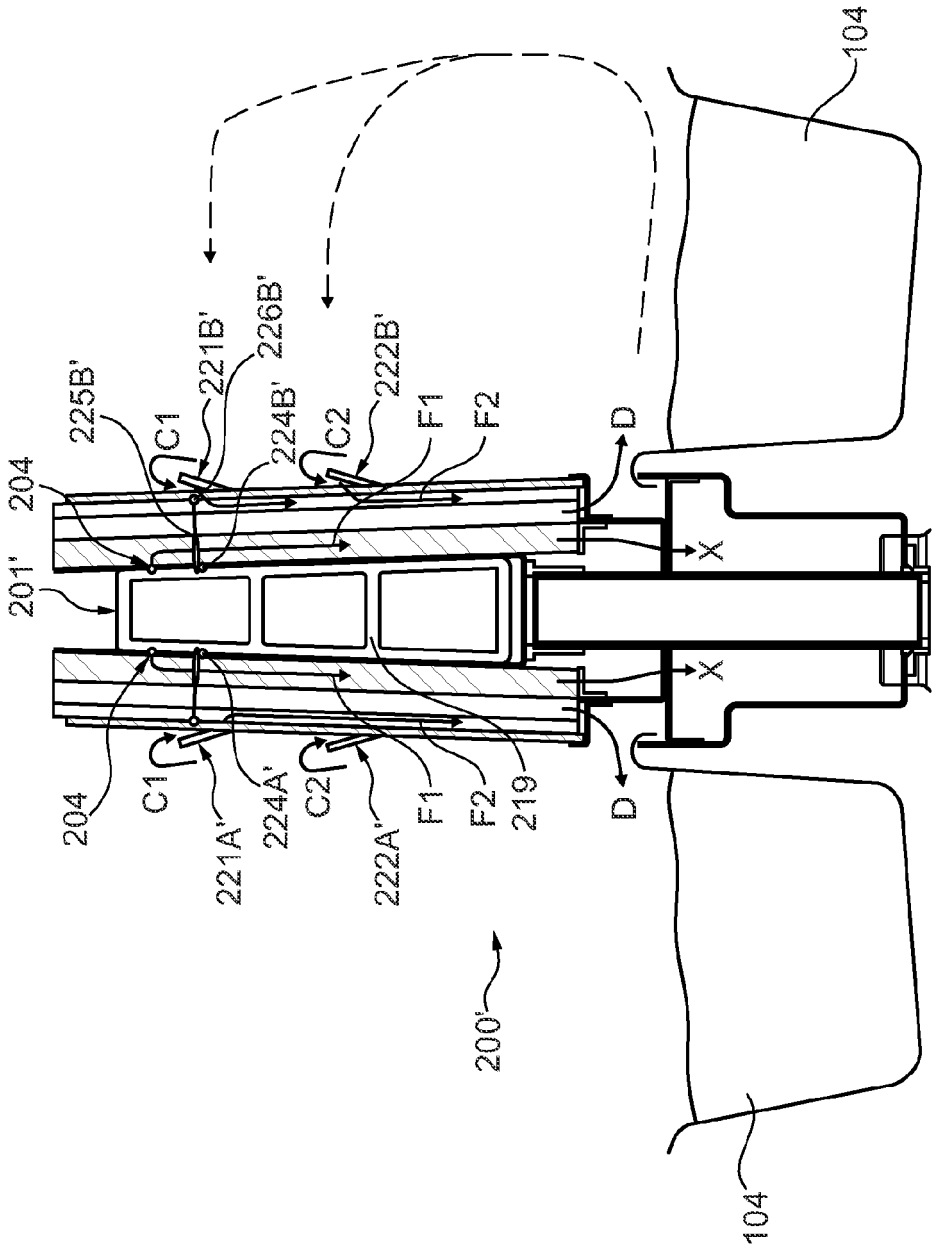
104
225B'
221B'
226B'
224B'
222B'
C1
C2
F1
F2
D
204
201'
X
204
C1
221A'
224A'
C2
222A'
F1
F2
219
D
200'
104

Fig. 5

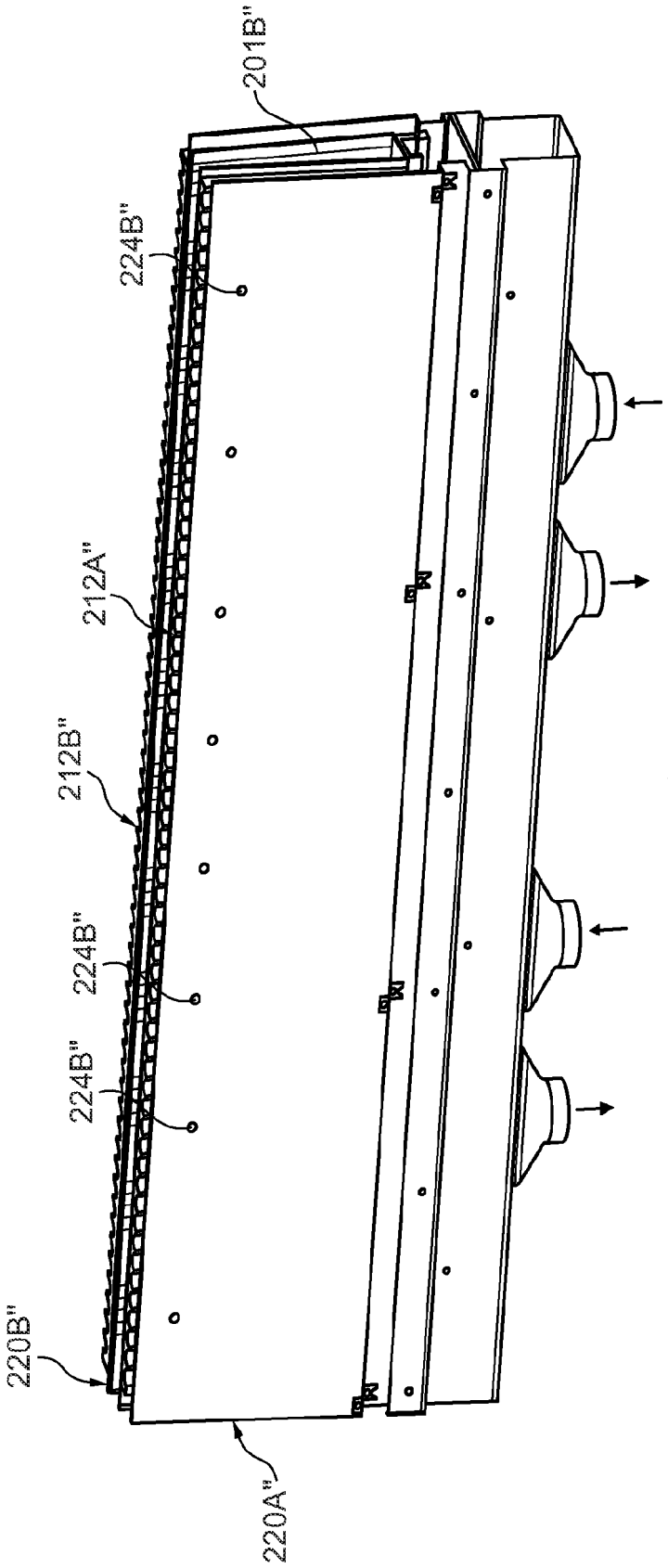

Fig. 6

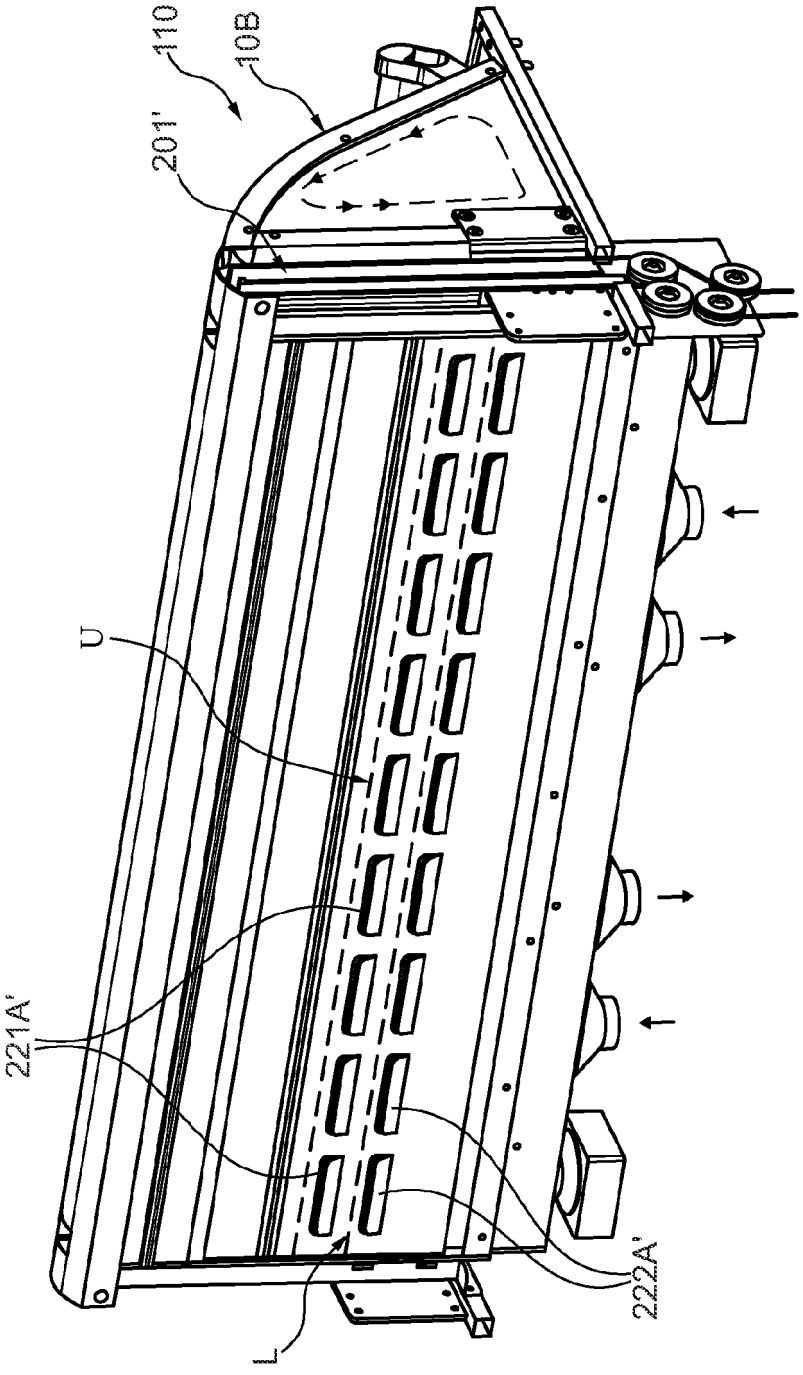

Fig. 7

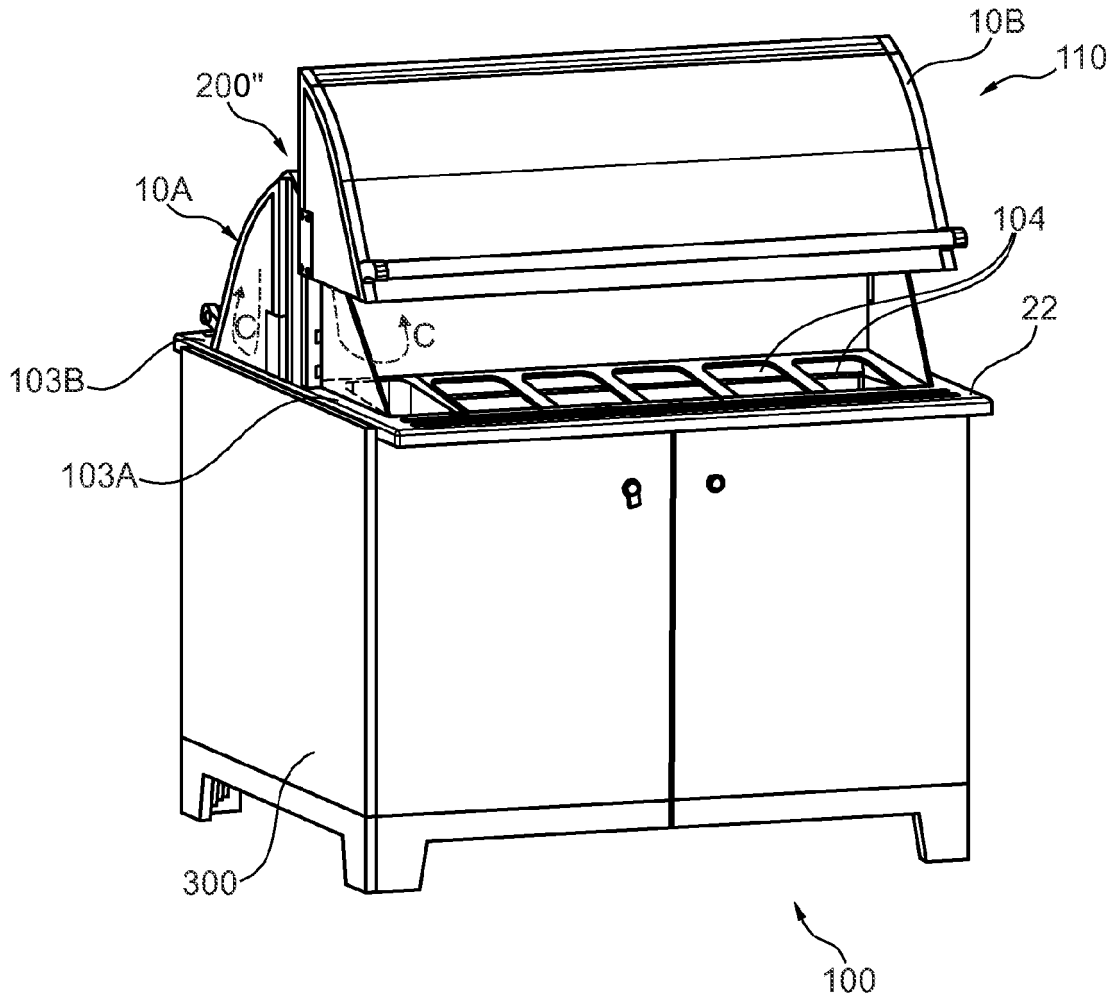

Fig. 8

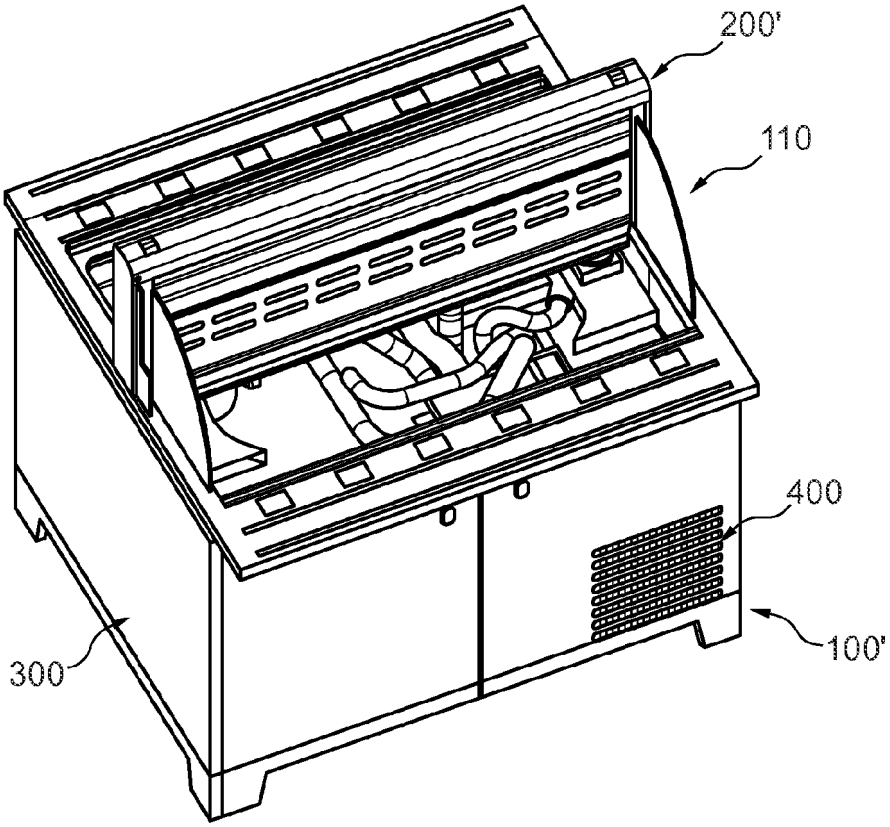

Fig. 9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 1909875 A1 **[0006]**
- EP 1629750 A1 **[0006]**