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(54) **REFRIGERATED SALES FURNITURE**

GEKÜHLTES VERKAUFSMÖBELSTÜCK

MEUBLE POUR VENTE DE PRODUITS RÉFRIGÉRÉS

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Description

[0001] The invention relates to a refrigerated sales furniture, in particular to a refrigerated sales furniture comprising at least one door and at least one warm air channel, which is configured for reducing the risk of condensation at the at least one door.

[0002] For being operated more efficiently, refrigerated sales furnitures are often equipped with doors, in particular glass doors, establishing a separation between a refrigerated space inside the furniture and the warm environment outside the furniture. A common problem is that condensate forms on the lower portion of the doors, which is undesirable and should be avoided.

[0003] US 5 214 877 A discloses a refrigerator door assembly with venting system comprising a vent plate attached to the bottom frame member of a door mounting frame of an insulated door assembly of a refrigerator unit. The vent plate includes passages which enable ambient air to be drawn into the cabinet of the refrigerator unit at a controlled location in order to avoid frost build up.

[0004] It would be beneficial to provide an improved refrigerated sales furniture which avoids condensation on the lower portion of its doors more efficiently without introducing active components.

[0005] The invention is defined by independent claims 1 and 13. According to an exemplary embodiment of the invention, a refrigerated sales furniture comprises: a furniture body providing a refrigerated sales space for storing products to be presented therein; at least one access area providing access to the refrigerated sales space; and at least one door, which is provided at the at least one access area and which is movable between a closed position closing the at least one access area and at least one open position allowing access to the refrigerated sales space via the at least one access area. The refrigerated sales furniture further comprises a return air opening which is provided at the bottom of the refrigerated sales space next to the at least one door for receiving a flow of cold air flowing substantially vertically in a downward direction in at least a lower front portion of the refrigerated sales space. The refrigerated sales furniture also comprises a door support frame; a stopper bar provided at a lower portion of the door support frame; and a sealing element provided at the stopper bar and extending forwardly in a substantially horizontal direction, wherein the sealing element is configured for abutting against a rear side of a lower portion of the inner glass pane of the at least one door for providing a sealing between the stopper bar and the at least one door. At least one warm air channel extends below the at least one door from a front side of the refrigerated sales furniture into the refrigerated sales furniture, in particular into the refrigerated sales space. The warm air channel comprises a first portion provided between the underside of the at least one door in its closed position and an upper side of the lower portion of the door support frame, an adjacent second portion extending between the stopper bar and

a virtual plane defined by the inner glass pane, and a third portion provided by at least one warm air channel opening formed in the stopper bar and is configured for flowing warm air from an area in front of the refrigerated sales furniture into the refrigerated sales furniture, when the door is in its closed position for keeping the temperature at a lower portion of the at least one door above the dew point. The refrigerated sales furniture is further configured such that the flow of warm air is sucked through the at least one warm air channel by the flow of cold air, e.g. a cold air curtain, and merges with said flow of cold air.

[0006] Exemplary embodiments of the invention further include a method of reducing the risk of condensation on the surface of a door of a refrigerated sales furniture, the refrigerated sales furniture comprising: a furniture body providing a refrigerated sales space for storing products to be presented therein; at least one access area providing access to the refrigerated sales space; and at least one door, which is provided at the at least one access area and which is movable between a closed position closing the at least one access area and at least one open position allowing access to the refrigerated sales space via the at least one access area; a door support frame; a stopper bar provided at a lower portion of the door support frame; and a sealing element provided at the stopper bar and extending forwardly in a substantially horizontal direction, wherein the sealing element is configured for abutting against a rear side of a lower portion of the inner glass pane of the at least one door for providing a sealing between the stopper bar and the at least one door. The refrigerated sales furniture further comprises at least one warm air channel extending, below the at least one door, from a front side of the refrigerated sales furniture into the refrigerated sales furniture, wherein the method comprises the steps of: providing a flow of cold air flowing substantially vertically in a downward direction in at least a lower front portion of the refrigerated sales space next to the inside of a lower portion of the at least one door into a return air opening, which is provided at the bottom of the refrigerated sales space; flowing warm air from an area in front of the refrigerated sales furniture into the refrigerated sales furniture through the warm air channel when the door is in its closed position in order to keep the temperature at a lower portion of the at least one door above the dew point temperature; and sucking the flow of warm air through the at least one warm air channel by the flow of cold air and merging the same with the flow of cold air.

[0007] According to exemplary embodiments of the invention the convection heat transfer coefficient on the lower portion of the outer surface of the door is increased by generating a flow of warm air along the lower portion of the door. Said flow of warm air causes an increase of the temperature at a lower portion of the outer surface of the door. This helps to keep the temperature of said lower portion over the dew point temperature and thus the door free from condensation.

[0008] A warm air channel according to exemplary embodiments of the invention is very efficient for warming up the lower part of the door by delivering warm air into the refrigerated sales space and prevents an undesirable flow of cold air out of the refrigerated sales space.

[0009] The flow of warm air in particular is generated without employing additional fans, but simply by creating a warm air channel below the door, in particular within the door abutment profile, and using Bernoulli's principle and the fan(s) already present in the furniture.

[0010] A benefit of the exemplary embodiments of the invention is the simplicity with which the problem of condensation at a lower portion of the door can be solved without the need for modifying the design of the door or adding new active components, such as additional electrical heaters or fans.

[0011] The exemplary embodiments of the invention reliably avoid the problem of condensation, in particular in refrigerated sales furnitures in which a cold air curtain is flowing next to the door(s).

[0012] The exemplary embodiments of the invention reliably avoid the problem of condensation even if thermal bridges introduced by spacers, the door frame, hinges and other solid elements of the door assuring the mechanical structure of the door are present and despite the fact that the edges of the doors, particularly the lower portion of the doors, constitute an intrinsic weakness of the thermal insulation, and although an enhanced heat transfer due to the local air curtain acceleration takes place at the return air grille, which is provided inside the refrigerated furniture.

[0013] The exemplary embodiments of the invention can replace other conceivable ways for maintaining the temperature in the lower portion of the door above the dew point temperature that include improving the thermal resistance of the door edge design and/or using an air baffle for avoiding the cold air from contacting the door directly. Alternatively, exemplary embodiments of the invention can also be provided in addition thereto.

[0014] In the following, exemplary embodiments will be described with reference to the enclosed figures:

Figure 1 shows a schematic sectional view of a refrigerated sales furniture according to an exemplary embodiment of the invention.

Figure 2 shows an enlarged view of an area at the lower end of a glass door of the refrigerated sales furniture shown in Figure 1.

Figure 3 shows an enlarged view of a lower portion of a door support frame, as it is employed in a refrigerated sales furniture, which is shown in Figures 1 and 2.

Figure 4 shows an enlarged view of an area at the lower end of the glass door of a refrigerated sales furniture according to an alternative embodiment,

which is not part of the claimed invention.

[0015] Figure 1 depicts a schematic sectional view of a refrigerated sales furniture, which is an example for a refrigerated sales furniture 10. The refrigerated sales furniture 10 comprises a furniture body 1 defining a refrigerated sales space 28 which is configured for storing products (not shown) to be presented therein. A plurality of shelves or racks 22, which are configured for accommodating and supporting said products, are provided on top of each other within the refrigerated sales space 28.

[0016] An evaporator 2, which is part of a refrigeration circuit, is provided at the bottom of the refrigerated sales furniture 10 below the refrigerated sales space 28. Additional components of the refrigeration circuit, such as a compressor, a condenser and an expansion device, which are not shown in Figure 1, may be provided within the refrigerated sales furniture 10 as well. Alternatively, one or more of these components may be located outside the refrigerated sales furniture 10, for example in a machine room or on the outside/on the roof of the building (not shown), which houses the refrigerated sales furniture 10.

[0017] An access area 11 provided at the front side of the refrigerated sales space 28 is closed by means of a door 8, in particular a glass door, which is pivotably supported by upper and lower portions 6a, 6b of a door support frame and upper and lower hinges 7. In alternative embodiments, which are not shown in the Figures, refrigerated sales furnitures may be equipped with two or more doors including sliding doors mounted on ball bearings rolling on rails. Sealing lips 9 are provided between stopper bars 12 formed at the portions 6a, 6b of door support frame and the door 8 in order to prevent cold air from flowing out of the refrigerated sales space 28. Additionally, elastic buffers 13 are provided between the stopper bars 12 and the door 8 for damping the impact of the door 8 onto the stopper bars 12 when the door 8 is closed and for maintaining a defined gap between the door 8 and the stopper bars 12.

[0018] A basically horizontally extending return air duct 26 is formed on an inlet side of the evaporator 2, which is the right side of the evaporator 2 in the exemplary configuration shown in Figure 1. The return air duct 26 houses a fan 3, which is configured for sucking air from the refrigerated sales space 28 through a return air opening 34 provided at the bottom of the refrigerated sales space 28 into the return air duct 26 and delivering said air to the evaporator 2, where it is cooled. The return air opening 34 is covered by a return air grille 4 for preventing goods and other items from falling into the return air duct 26.

[0019] Cooled air leaving the evaporator 2 (on its left side in the exemplary configuration shown in Figure 1) is delivered into a vertical cold air duct 24 extending vertically along the back side 29 of the refrigerated sales space 28.

[0020] The vertical cold air duct 24 may be provided

with some cold air openings 30 for delivering cold air from the vertical cold air duct 24 into the refrigerated sales space 28.

[0021] A horizontal cold air duct 25 is fluidly connected with the upper end of the vertical cold air duct 24 for delivering cold air from the vertical cold air duct 24 to the front side of the refrigerated sales space 28. A front side end of the horizontal cold air duct 25 is provided with an air discharge opening 5 for discharging cold air from the horizontal cold air duct 25 into an upper front area of the refrigerated sales space 28.

[0022] Cold air, which is discharged through the air discharge opening 5 into the upper front area of the refrigerated sales space 28, provides a flow of cold air, ("cold air curtain") C flowing basically vertically from the top to the bottom of the refrigerated sales space 28 along the inside of the door 8 facing the refrigerated sales space 28.

[0023] Said flow of cold air C reduces the temperature of the door 8. When the temperature of the outer surface of the door 8 facing the outside of the refrigerated sales furniture 10 drops below the dew point temperature, undesirable condensation of humidity from ambient air A will appear on the outside of the door 8. Due to the structural components supporting the door 8 in particular including the door support frame portion 6b and the hinge 7 and due to the enhanced heat transfer in said region, the risk of condensation is in particular high at the lower portion of the door 8.

[0024] For reducing the risk of condensation in said lower portion of the door 8, a warm air channel 17 extending from the exterior into the refrigerated sales space 28 is provided. A flow of relatively warm ambient air W flowing through said warm air channel 17 increases the temperature at the lower portion of the door 8. This reduces the risk that the temperature of said lower portion of the door 8 falls below the dew point temperature and condensation occurs.

[0025] In the following, the structure of the warm air channel 17 will be described in more detail with reference to Figure 2.

[0026] Figure 2 shows an enlarged view of the lower portion of the front side of the refrigerated sales furniture 10, in particular of the area around the lower end of the door 8.

[0027] The door 8 in particular is an insulating glass door 8 comprising an inner glass pane 8a facing the refrigerated sales space 28 and an outer glass pane 8c facing the outside of the refrigerated sales furniture 10. The outer glass pane 8c is spaced apart from the inner glass pane 8a by means of a glass spacer element 8d. As a result, an insulating cavity 8b, which in particular may be filled with a thermally insulating gas, such as argon, or which may be evacuated to a vacuum, is formed between the inner and the outer glass panes 8a, 8c for providing thermal insulation.

[0028] A lower door hinge 7 comprising a frame side hinge element 7a and a door side hinge element 7b, which are pivotably connected by means of a connecting

element 7c, pivotably supports the door 8 at a lower portion 6b of the door support frame.

[0029] The stopper bar 12 extends vertically from the lower portion 6b of the support frame at a position inside the door 8. The warm air channel 17 extending between the outer front side of the refrigerated sales furniture 10 and the refrigerated sales space 28 comprises a first portion 17a extending horizontally below a lower edge of the door 8 and above an upper edge of the lower portion 6b of the support frame, a second portion 17b extending between the inner glass pane 8a and the stopper bar 12, and a third portion 17c provided by at least one warm air channel opening 14 passing through the stopper bar 12.

[0030] The height H of the first portion 17a of the warm air channel 17 may be between 5 mm and 10 mm, in particular between 6 mm and 8 mm. The width D of the second portion 17b of the warm air channel 17 may be between 2 mm and 10 mm, in particular between 4 mm and 8 mm.

[0031] The at least one warm air channel opening 14 usually comprises a plurality of warm air channel openings 14 which, in combination, may extend over the whole width of the glass door 8 in the horizontal direction and over a vertical area of the stopper bar 12 having a height h from 3 mm to 12 mm, in particular a height h from 8 mm to 10 mm.

[0032] Alternatively, the at least one warm air channel opening 14 may extend only in front of weak points of the at least one door 8, for instance in front of massive structure elements with high thermal conductivity, e.g. door hinge elements 7. In such a configuration, warm air flows / is sucked into the refrigerated sales space 28 only at positions at which additional heat is needed to keep the surface temperature of the glass door 8 above the dew point.

[0033] A sealing element 9, which in particular may be provided in the form of a sealing lip, is arranged between the stopper bar 12 and the inner glass pane 8a in order to avoid cold air, in particular cold air from the flow of cold air C flowing along the inner glass pane 8a, from leaving the refrigerated storage space 28 through the warm air channel 17.

[0034] In a cold air flow guiding section 32, which is located within the refrigerated sales space 28 next to a lower region of the door 8, the vertically flowing cold air of the flow of cold air C, which flows along the inner glass pane 8a of the door 8, is deflected by the sealing element 9 and the stopper bar 12. This deflection results in a reduction of the width of the space, which is available for the flow of cold air C. Said reduction acts as a nozzle and therefore causes the speed of the cold air flow to increase. Said increase of the air flow speed causes a decrease of the static pressure in a low pressure area 36 located on the side of the stopper bar 12 facing the refrigerated sales space 28. Said decrease of static pressure results in a pressure difference between said low pressure area 36 and the warm air channel 17. As a result of this pressure difference, warm air W is sucked from

the warm air channel 17 through the at least one warm air channel opening 14 into the refrigerated sales space 28.

[0035] As a result of this flow of relatively warm ambient air W, the temperature of the lower part of the glass door 8 including the door side hinge element 7b and glass spacer element 8d and in particular the lower portion 8e of the outer glass pane 8c is increased. This makes it easier to maintain the temperature of this area above the dew point temperature of ambient air A considerably reducing the risk of undesirable condensation in this area.

[0036] The flow of relatively warm ambient air W entering the refrigerated sales space 28 via the warm air channel 17 and the at least one warm air channel opening 14 is delivered together with the cold air from the vertically flowing flow of cold air C through the return air opening 34 provided at the bottom of the refrigerated sales space 28 into the return air duct 26 and to the evaporator 2 (not shown in Figure 2), where it is cooled and then delivered back to the refrigerated sales space 28, as it has been described before with reference to Figure 1.

[0037] Figure 3 shows a schematic perspective view of a lower portion 6b of a door support frame, as it extends below the lower edge of the glass door 8 (cf. Figures 1 and 2).

[0038] Said lower portion 6b of the door support frame comprises a horizontal portion 15 provided with a hinge opening 16 for accommodating a frame side hinge element 7a (cf. Fig. 2). A vertical portion, which is provided with a plurality of warm air channel openings 14a, 14b, 14c, constitutes the stopper bar 12.

[0039] For exemplary illustration three different types of warm air channel openings 14a, 14b, 14c are shown in Figure 3. Usually, only a single type of warm air channel openings 14a, 14b, 14c is employed in a specific embodiment.

[0040] A first group of openings includes two horizontal rows of circular warm air channel openings 14a, the two rows being arranged above each other. Pairs of warm air channel openings 14a may be arranged vertically above each other, or the warm air channel openings 14a may be offset with respect to each other in the horizontal direction. Of course, only one or more than two rows of circular warm air channel openings 14a may be provided as well.

[0041] A second group of openings comprises four rectangular warm air channel openings 14b, which are arranged side by side next to each other. Of course, rectangular warm air channel openings 14b may be provided in a plurality of rows, which are arranged vertically above each other, as well.

[0042] A third group of warm air channel openings 14c comprises two rows of longitudinal warm air channel openings 14c, which are arranged above each other. Pairs of longitudinal warm air channel openings 14c may be arranged vertically above each other, or the longitudinal warm air channel openings 14c may be offset with respect to each other in the horizontal direction, as it is

shown in Figure 3. Of course, only one or more than two rows of longitudinal warm air channel openings 14c may be provided as well.

[0043] The skilled person will easily understand that other shapes of warm air channel openings 14 than the examples shown in Figure 3 may be used as well.

[0044] The warm air channel openings 14, 14a, 14b, 14c, in combination, usually are provided over an area having a height h of 3 mm to 12 mm (see Fig. 2) and constitute an open area of 25 to 55 %, in particular of 30% to 50%, and more particular of 35% to 45% of the vertical area of the stopper bar 12 which is situated between the lower edge of the warm air channel 17 and the sealing element 9.

[0045] Such a configuration has proved as being very efficient for avoiding condensation at the lower portion 8e of the outer glass pane 8c.

[0046] Figure 4 depicts a schematic sectional illustration of an alternative embodiment, which is not part of the claimed invention. The features which correspond with the features of the embodiment illustrated in Figures 1 to 3, are denoted with the same reference signs and will not be discussed in detail again.

[0047] Contrary to the embodiment illustrated in Figures 1 to 3, no warm air channel openings 14 are provided within the stopper bar 12 and no sealing element 9 is arranged between the stopper bar 12 and the inner glass pane 8a of the glass door 8.

[0048] In the exemplary embodiment shown in Figure 4, a deflecting element 20 is attached to the inner glass pane 8a of the glass door 8 at a height slightly above the upper end of the stopper bar 12. In this embodiment, the warm air channel 18 comprises a first portion 18a provided between the underside of the at least one door 8 in its closed position and an upper side of the lower portion 6b of the door support frame, an adjacent second portion 18b extending substantially vertically between the inner glass pane 8a and the stopper bar 12, and a basically horizontally extending third portion 18c which is formed between an upper edge of the stopper bar 12 and a lower first plane surface 20a of the deflecting element 20.

[0049] The height H_1 of the first portion 18a of the warm air channel 18 may be between 5 mm and 10 mm, in particular between 6 mm and 8 mm.

[0050] The height H_2 of the third portion 18c of the warm air channel 18 may be between 2.5 mm and 5.5 mm, in particular between 3.5 mm and 4.5 mm.

[0051] The width D of the vertical portion 18b of the warm air channel 18 may be between 2 mm and 10 mm, in particular between 4 mm and 8 mm.

[0052] The deflecting element 20, which in particular extends over the whole width of the at least one door 8, is provided with a lower first plane surface 20a facing the upper end of the stopper bar 12 thereby defining the third portion 18c of the warm air channel 18, a second plane surface 20b, which is attached to the inner glass pane 8a, and a third surface 20c facing the refrigerated sales

space 28. Said third surface 20c may be an inclined plane surface. Alternatively, said third surface 20c may be an arcuate surface, as it is shown exemplarily in Figure 4.

[0053] In a cold air flow guiding section 32 next to a lower portion of the door 8, the deflecting element 20 deflects the basically vertically flowing cold air flow C, which flows basically parallel to the surface of the inner glass pane 8a. This deflection prevents cold air from the cold air flow C from flowing out of the refrigerated sales space 28 via the warm air channel 18.

[0054] Instead, similar to the deflection caused by the sealing element 9, which has been described before with reference to Figure 2, the deflection of the flow of cold air C caused by the deflecting element 20 causes a reduction of the static pressure in a low pressure area 36 located next to the bottom edge of the deflecting element 20.

[0055] As a result of this pressure difference, a flow of relatively warm ambient air W is drawn from outside the refrigerated sales furniture 10 through the warm air channel 18 into the refrigerated sales space 28.

[0056] As in the embodiment depicted in Figures 1 to 3, the flow of relatively warm ambient air W flows along the lower portion of the glass door 8 thereby warming said portion. In consequence, the temperature of the lower portion 8e of the outer glass pane 8c is increased, making it easier to maintain the temperature of this area above the dew point temperature and reducing the risk that condensation occurs in said area considerably.

[0057] Similar to the situation shown in Figure 1, the warm air, which has been drawn into the refrigerated sales space 28, merges with the flow of cold air C and is sucked through a return air opening 34 into a return air duct 26 provided below the refrigerated sales space 28 and delivered to the evaporator 2, which is not shown in Figure 4, where it is refrigerated before it is delivered back into the refrigerated sales space 28.

[0058] A number of optional features are set out in the following. These features may be realized in particular embodiments, alone or in combination with any of the other features.

[0059] In an embodiment the refrigerated sales furniture comprises a cold air flow guiding section having a reduced width for increasing the cold air flow speed. This will generate a suction effect sucking warm air through the at least one warm air channel into the refrigerated sales space. The cold air flow guiding section in particular is situated between the front of the bottom portion of the refrigerated sales space and the rear side of the lowermost portion of the at least one door and/or the rear side of the lower door frame portion for creating the suction effect at a lower portion of the at least one door, basically at the height of the warm air channel.

[0060] In an embodiment the cold air flow guiding section is confined at its lower end by at least one return air opening of a return air duct, which is configured for delivering air from the refrigerated sales space to an evaporator of a refrigeration circuit. The at least one return air

opening may be covered by a return air grille in order to prevent goods and other items from falling into the return air duct.

[0061] According to the invention the warm air channel extends in a substantially horizontal direction. A substantially horizontally extending warm air channel is easy to implement and allows for efficiently delivering air from outside the refrigerated sales furniture into the refrigerated sales space.

[0062] In an embodiment, the refrigerated sales furniture is configured for providing a flow of cold air, i.e. a "cold air curtain", flowing substantially vertically in a downward direction in front of the refrigerated sales space along the inner surface of the at least one door when it is in its closed position for providing additional thermal insulation at the front of the refrigerated sales space and for protecting the goods stored in the refrigerated sales space from the ambient air when the at least one door is open.

[0063] In an embodiment at least one elastic buffer is provided between the stopper bar and the door for damping the impact of the door onto the stopper bar when the door is closed and for maintaining a defined gap between the door and the stopper bar in order to realize the vertical warm air channel.

[0064] In an embodiment the sealing element and the stopper bar at the lower door frame portion are configured for deflecting the flow of cold air. This allows to generate a cold air flow guiding section for increasing the cold air flow speed and causing a suction effect at the inner end of the warm air channel without the need for an additional deflecting element. Thus, the sealing element and the stopper bar provide an efficient structure allowing to simultaneously realize the effects of deflecting the flow of cold air and of preventing cold air from leaving the refrigerated sales space.

[0065] In an embodiment a plurality of openings is provided in the stopper bar in order to allow warm air to flow into the refrigerated sales space over its whole width. By selecting the number and size(s) of the openings, the amount of warm air flowing into the refrigerated sales space may be adjusted to the actual needs.

[0066] In an embodiment the openings are distributed over the whole width of the at least one door and/or the deflecting element and/or the sealing element extend(s) over the whole width of the at least one door. In such a configuration, warm air flows / is sucked into the refrigerated sales space over the whole width of the door.

[0067] In an embodiment the openings are provided locally only in front of weak points of the at least one door, for instance in front of massive structure elements with high thermal conductivity, e.g. door hinge elements. In such a configuration, warm air flows / is sucked into the refrigerated sales space only at positions where additional heat is needed to keep the surface temperature of the door above the dew point.

[0068] In an embodiment the openings are distributed over an area having a height of 3 to 12 mm, in particular

a height h between 8 mm and 10 mm. Such a configuration has been found as being very efficient for sucking the desired amount of warm air into the refrigerated sales space.

[0069] In an embodiment the openings comprise at least one of circular openings, rectangular openings, square openings, longitudinal openings, elliptical openings, or any combination thereof. By selecting the shape and the size of the openings, the amount of warm air flowing into the refrigerated sales space may be adjusted to the actual needs. The shape and the size of the openings may be chosen in agreement with manufacturing demands, i.e. the openings preferably may have a shape which is easy to produce, i.e. by drilling.

[0070] In an embodiment the openings in combination provide an opening area of 25% to 55%, in particular of 30% to 50%, and more particular of 35% to 45% of the perforated vertical surface of the stopper bar situated below the sealing element and having a height of 3 mm to 12 mm, in particular a height h of 8 mm to 10 mm. Such a configuration has been found as being very efficient for sucking the desired amount of warm air into the refrigerated sales space.

[0071] In an embodiment the first portion of the warm air channel has a height of 5 mm to 10 mm, in particular a height of 6 mm to 8 mm. In an embodiment the third portion of the warm air channel has a height of 2.5 mm to 5.5 mm, in particular a height of 3.0 mm to 5.0 mm.

[0072] In an embodiment the refrigerated sales furniture further comprises at least one return air opening within the refrigerated sales space, the at least one return air opening being arranged at the bottom of the refrigerated sales space next to the at least one warm air channel and being configured for receiving the warm air which is sucked through the at least one warm air channel and the cold air from the refrigerated sales area. This allows to efficiently remove warm air, which has been sucked through the at least one warm air channel from the refrigerated sales space.

[0073] In an embodiment the at least one return air opening is fluidly connected to a return air duct housing at least one fan which is configured for delivering air, which has been received by at least one return air opening, to an evaporator of a refrigeration circuit in order to cool the mixture of warm air and cold return air, which has been sucked through the at least one warm air channel into the refrigerated sales space. This avoids an undesirable increase of the temperature within the refrigerated sales space caused by the warm air, which has been sucked in from outside the refrigerated sales furniture.

[0074] The air duct and/or the evaporator in particular are arranged below the refrigerated sales space.

[0075] While the invention has been described with reference to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition many modifications may be made to adopt a

particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed, but that the invention include all embodiments falling within the scope of the claims.

References

10 [0076]

- | | |
|-----|---|
| 1 | furniture body |
| 2 | evaporator |
| 3 | fan |
| 4 | return air grille |
| 5 | air discharge opening |
| 6a | upper portion of the door support frame |
| 6b | lower portion of the door support frame |
| 7 | door hinge |
| 7a | frame side hinge element |
| 7b | door side hinge element |
| 7c | connecting hinge element |
| 8 | door |
| 8a | inner glass pane |
| 8b | insulating cavity |
| 8c | outer glass pane |
| 8d | glass spacer element |
| 8e | lower portion of the outer glass pane |
| 9 | sealing element |
| 10 | refrigerated sales furniture |
| 11 | access area |
| 12 | stopper bar |
| 13 | elastic buffer |
| 14 | warm air channel opening |
| 14a | circular warm air channel openings |
| 14b | square warm air channel openings |
| 14c | longitudinal warm air channel openings |
| 15 | horizontal portion of the lower portion of the door support frame |
| 16 | hinge opening |
| 17 | warm air channel (first embodiment) |
| 17a | first portion of the warm air channel (first embodiment) |
| 17b | second portion of the warm air channel (first embodiment) |
| 17c | third portion of the warm air channel (first embodiment) |
| 18 | warm air channel (second embodiment) |
| 18a | first portion of the warm air channel (second embodiment) |
| 18b | second portion of the warm air channel (second embodiment) |
| 18c | third portion of the warm air channel (second embodiment) |
| 20 | deflecting element |
| 20a | first plane surface of the deflecting element |
| 20b | second plane surface of the deflecting element |
| 20c | third surface of the deflecting element |

22	shelve	
24	vertical cold air duct	
25	horizontal cold air duct	
26	return air duct	
28	refrigerated sales space	5
29	back side of the refrigerates sales space	
30	cold air openings	
32	cold air flow guiding section	
34	return air opening	
36	low pressure areas	10
A	ambient air	
C	flow of cold air	
D	width of the vertical portion of the warm air channel	15
H, H ₁ , H ₂	height of the horizontal portion(s) of the warm air channel	
h	height of the vertical area of the stopper bar having openings	
W	flow of ambient air	20

Claims

1. Refrigerated sales furniture (10) comprising: 25
 - a furniture body (1) providing a refrigerated sales space (28) for storing products to be presented therein;
 - at least one access area (11) providing access to the refrigerated sales space (28); and
 - at least one door (8), which is provided at the at least one access area (11) and which is movable between a closed position closing the at least one access area (11) and at least one open position allowing access to the refrigerated sales space (28) via the at least one access area (11);
 - a return air opening (34) which is provided at the bottom of the refrigerated sales space (28) next to the at least one door (8) for receiving a flow of cold air (C) flowing substantially vertically in a downward direction in at least a lower front portion of the refrigerated sales space (28);
 - a door support frame;
 - a stopper bar (12) provided at a lower portion (6b) of the door support frame; and
 - a sealing element (9) provided at the stopper bar (12) and extending forwardly in a substantially horizontal direction, wherein the sealing element (9) is configured for abutting against a rear side of a lower portion of the inner glass pane (8a) of the at least one door (8) for providing a sealing between the stopper bar (12) and the at least one door (8);
 - the refrigerated sales furniture (10) further comprising at least one warm air channel (17) extending below the at least one door (8) from a front side of the refrigerated sales furniture (10)

into the refrigerated sales furniture (10), the warm air channel (17) being configured for flowing warm air from an area in front of the refrigerated sales furniture (10) into the refrigerated sales furniture (10) keeping the temperature at a lower portion of the at least one door (8) above the dew point temperature; wherein the refrigerated sales furniture (10) is configured such that the flow of warm air (W) is sucked through the at least one warm air channel (17) by the flow of cold air (C) and merges with said flow of cold air (C); wherein the warm air channel (17) comprises a first portion (17a) extending horizontally between the underside of the at least one door (8) in its closed position and an upper side of the lower portion (6b) of the door support frame, an adjacent second portion (17b) extending in a substantially horizontal direction between the stopper bar (12) and a virtual plane defined by the inner glass pane (8a), and a third portion (17c) provided by at least one warm air channel opening (14) formed in the stopper bar (12), **characterized in that** the third portion (17c) extends in a substantially horizontal direction.

2. Refrigerated sales furniture (10) of claim 1, comprising a cold air flow guiding section (32) having a reduced width for increasing the speed of the cold air flow (C), the cold air flow guiding section (32) in particular being situated between the front of a bottom portion of the refrigerated sales space (28) and the rear side of the lowermost portion of the at least one door (8) and/or the rear side of the lower portion (6b) of a door support frame.
3. Refrigerated sales furniture (10) of claim 1 or 2, wherein the refrigerated sales furniture (10) is configured for providing a flow of cold air (C) flowing substantially vertically in a downward direction in front of the refrigerated sales space (28) along the inside of the at least one door (8), when it is in its closed position.
4. Refrigerated sales furniture (10) of any of the preceding claims, wherein the sealing element (9) is a sealing lip, and/or wherein the sealing element (9) and/or the stopper bar (12) are configured for deflecting the flow of cold air (C).
5. Refrigerated sales furniture (10) of any of the preceding claims, wherein the sealing element (9) extends over the whole width of the at least one door (8).
6. Refrigerated sales furniture (10) of any of the preceding claims, wherein a plurality of warm air chan-

nel openings (14a, 14b, 14c) is provided in the stopper bar (12).

7. Refrigerated sales furniture (10) of claim 6, wherein the warm air channel openings (14, 14a, 14b, 14c) are distributed over the whole width of the door (8) and/or wherein the warm air channel openings (14, 14a, 14b, 14c) are distributed over an area having a height of 3 to 12 mm, in particular a height h from 8 mm to 10 mm. 5 10
8. Refrigerated sales furniture (10) of claim 6 or 7, wherein the warm air channel openings (14, 14a, 14b, 14c) comprise at least one of circular warm air channel openings (14a), rectangular warm air channel openings (14b), longitudinal warm air channel openings (14c), elliptical warm air channel openings, or any combination thereof. 15 20
9. Refrigerated sales furniture (10) of any of claims 6 to 8, wherein the warm air channel openings (14, 14a, 14b, 14c), in combination, provide an opening area of 25% to 55%, in particular of 30% to 50%, and more particular of 35% to 45% of the perforated vertical surface of the stopper bar (12) situated below the sealing element (9). 25
10. Refrigerated sales furniture (10) of any of the preceding claims, wherein the first portion (17a) of the warm air channel (17) has a height (H) of 5 mm to 10 mm, in particular a height (H) of 6 mm to 8 mm. 30
11. Refrigerated sales furniture (10) of any of the preceding claims comprising at least one return air opening (34) within the refrigerated sales space (28), the at least one return air opening (34) being arranged next to the at least one warm air channel (17) and being configured for receiving the warm air which has been sucked through the at least one warm air channel (17) after merging with the flow of cold air (C) from the refrigerated sales space (28). 35 40
12. Refrigerated sales furniture (10) of claim 11, wherein the at least one return air opening (34) is fluidly connected to a return air duct (26) comprising at least one fan (3) configured for delivering air, which has been received by at least one return air opening (34) to an evaporator (2), which is part of a refrigeration circuit. 45 50
13. Method of reducing the risk of condensation on the surface of a door (8) of a refrigerated sales furniture (10), the refrigerated sales furniture (10) comprising: 55
 - a furniture body (1) providing a refrigerated sales space (28) for storing products to be presented therein;

at least one access area (11) providing access to the refrigerated sales space (28); and at least one door (8), which is provided at the at least one access area (11) and which is movable between a closed position closing the at least one access area (11) and at least one open position allowing access to the refrigerated sales space (28) via the at least one access area (11); a door support frame; a stopper bar (12) provided at a lower portion (6b) of the door support frame; and a sealing element (9) provided at the stopper bar (12) and extending forwardly in a substantially horizontal direction, wherein the sealing element (9) is configured for abutting against a rear side of a lower portion of the inner glass pane (8a) of the at least one door (8) for providing a sealing between the stopper bar (12) and the at least one door (8); and at least one warm air channel (17) extending below the at least one door (8) from a front side of the refrigerated sales furniture (10) into the refrigerated sales furniture (10) and comprising a first portion (17a) extending horizontally between the underside of the at least one door (8) in its closed position and an upper side of the lower portion (6b) of the door support frame, an adjacent second portion (17b) extending in a substantially horizontal direction between the stopper bar (12) and a virtual plane defined by the inner glass pane (8a), and a third portion (17c) provided by at least one warm air channel opening (14) formed in the stopper bar (12), wherein the third portion (17c) extends in a substantially horizontal direction; wherein the method comprises the steps of:

- providing a flow of cold air (C) flowing substantially vertically in a downward direction in at least a lower front portion of the refrigerated sales space (28) next to the inside of a lower portion of the at least one door (8) into a return air opening (34) provided at the bottom of the refrigerated sales space (28);
- flowing warm air from an area in front of the refrigerated sales furniture (10) into the refrigerated sales furniture (10) through the warm air channel (17), when the door (8) is in its closed position for increasing the temperature at a lower portion of the at least one door (8) and as a consequence keeping it above the dew point temperature;
- sucking the flow of warm air (W) through the at least one warm air channel (17) by the flow of cold air (C) and merging the same with the flow of cold air (C).

14. Method of claim 13, further comprising the step of drawing the flow of cold air (C) after it has merged with the flow of warm air (W), through a return air duct (26) into an evaporator (2), the return air duct (26) and/or the evaporator (2) preferably being arranged below or behind the refrigerated sales space (28), and/or wherein the step of providing a flow of cold air (C) includes flowing the flow of cold air (C) substantially vertically in a downward direction in front of the refrigerated sales space (28) and along the inside of the at least one door (8), when it is in its closed position.

Patentansprüche

1. Gekühltes Verkaufsmöbel (10), umfassend:

einen Möbelkörper (1), der einen gekühlten Verkaufsraum (25) zum Aufbewahren von Produkten bereitstellt, die darin präsentiert werden sollen;
 mindestens einen Zugriffsbereich (11), der einen Zugriff auf den gekühlten Verkaufsraum (28) bereitstellt; und
 mindestens eine Tür (8), die an dem mindestens einen Zugriffsbereich (11) bereitgestellt ist und die zwischen einer geschlossenen Position, in der sie den mindestens einen Zugriffsbereich (11) verschließt, und mindestens einer offenen Position, in der sie einen Zugriff auf den gekühlten Verkaufsraum (28) über den mindestens einen Zugriffsbereich (11) ermöglicht, bewegbar ist;
 eine Rückluftöffnung (34), die am Boden des gekühlten Verkaufsraums (28) neben der mindestens einen Tür (8) bereitgestellt ist, um einen Kaltluftstrom (C) aufzunehmen, der im Wesentlichen vertikal in einer abwärtigen Richtung in mindestens einem unteren Frontabschnitt des gekühlten Verkaufsraums (28) strömt;
 einen Türstützrahmen;
 eine Anschlagleiste (12), die an einem unteren Abschnitt (6b) des Türstützrahmens vorgesehen ist; und ein Dichtungselement (9), das an der Anschlagleiste (12) vorgesehen ist und sich in einer im Wesentlichen horizontalen Richtung nach vorn erstreckt, wobei das Dichtungselement (9) dazu konfiguriert ist, an einer Rückseite eines unteren Abschnitts der inneren Glasscheibe (8a) der mindestens einen Tür (8) anzulegen, um eine Dichtung zwischen der Anschlagleiste (12) und der mindestens einen Tür (8) bereitzustellen;
 wobei das gekühlte Verkaufsmöbel (10) ferner mindestens einen Warmluftkanal (17) umfasst, der sich unterhalb der mindestens einen Tür (5) von einer Vorderseite des gekühlten Verkaufs-

möbels (10) in das gekühlte Verkaufsmöbel (10) erstreckt,
 wobei der Warmluftkanal (17) dazu konfiguriert ist, Warmluft aus einem Bereich vordem gekühlten Verkaufsmöbel (10) in das gekühlte Verkaufsmöbel (10) strömen zu lassen, um die Temperatur an dem unteren Abschnitt der mindestens einen Tür (5) oberhalb der Taupunkttemperatur zu halten;
 wobei das gekühlte Verkaufsmöbel (10) derart konfiguriert ist, dass der Warmluftstrom (W) von dem Kaltluftstrom (C) durch den mindestens einen Warmluftkanal (17) gesaugt wird und sich mit dem Kaltluftstrom (C) vermischt;
 wobei der Warmluftkanal (17) mindestens einen ersten Abschnitt (17a), der sich horizontal zwischen der Unterseite der mindestens einen Tür (8) in ihrer geschlossenen Position und einer Oberseite des unteren Abschnitts (6b) des Türstützrahmens erstreckt, einen benachbarten zweiten Abschnitt (17b), der sich in einer im Wesentlichen horizontalen Richtung zwischen der Anschlagleiste (12) und einer durch die innere Glasscheibe (8a) definierten virtuellen Ebene erstreckt, und
 einen dritten Abschnitt (17c) umfasst, der durch mindestens eine Warmluftkanalöffnung (14) bereitgestellt ist, die in der Anschlagleiste (12) ausgebildet ist,
dadurch gekennzeichnet, dass sich der dritte Abschnitt (17c) in einer im Wesentlichen horizontalen Richtung erstreckt.

2. Gekühltes Verkaufsmöbel (10) nach Anspruch 1, umfassend einen Kaltluftstrom führenden Abschnitt (32) mit einer reduzierten Breite zum Erhöhen der Geschwindigkeit des Kaltluftstroms (C), wobei der Kaltluftstrom führende Abschnitt (32) insbesondere zwischen der Vorderseite eines Bodenabschnitts des gekühlten Verkaufsraums (235) und der Rückseite des untersten Abschnitts der mindestens einen Tür (28) und/oder der Rückseite des unteren Abschnitts (6b) eines Türstützrahmens angeordnet ist.
3. Gekühltes Verkaufsmöbel (10) nach Anspruch 1 oder 2, wobei das gekühlte Verkaufsmöbel (10) dazu konfiguriert ist, einen Kaltluftstrom (C) bereitzustellen, der im Wesentlichen vertikal in einer abwärtigen Richtung vor dem gekühlten Verkaufsraum (28) entlang der Innenseite der mindestens einen Tür (8) strömt, wenn diese sich in ihrer geschlossenen Position befindet.
4. Gekühltes Verkaufsmöbel (10) nach einem der vorhergehenden Ansprüche, wobei das Dichtungselement (9) eine Dichtungslippe ist, und/oder wobei das Dichtungselement (9) und/oder die Anschlagleiste (12) zum Ablenken des Kaltluftstroms (C) konfigu-

riert sind.

5. Gekühltes Verkaufsmöbel (10) nach einem der vorhergehenden Ansprüche, wobei sich das Dichtungselement (9) über die ganze Breite der mindestens einen Tür (85) erstreckt. 5
6. Gekühltes Verkaufsmöbel (10) nach einem der vorhergehenden Ansprüche, wobei in der Anschlagleiste (12) eine Vielzahl von Warmluftkanalöffnungen (14a, 14b, 14c) vorgesehen sind. 10
7. Gekühltes Verkaufsmöbel (10) nach Anspruch 6, wobei die Warmluftkanalöffnungen (14, 14a, 14b, 14c) über die ganze Breite der Tür (8) verteilt sind und/ oder wobei die Warmluftkanalöffnungen (14, 14a, 14b, 14c) über einen Bereich mit einer Höhe von 3 bis 12 mm, insbesondere einer Höhe h von 8 mm bis 10 mm verteilt sind. 15
8. Gekühltes Verkaufsmöbel (10) nach Anspruch 6 oder 7, wobei die Warmluftkanalöffnungen (14, 14a, 14b, 14c) mindestens eines von kreisförmigen Warmluftkanalöffnungen (14a), rechteckigen Warmluftkanalöffnungen, quadratischen Warmluftkanalöffnungen (14b), länglichen Warmluftkanalöffnungen (14c), elliptischen Warmluftkanalöffnungen oder eine beliebige Kombination daraus umfassen. 20
9. Gekühltes Verkaufsmöbel (10) nach einem der Ansprüche 6 bis 8, wobei die Warmluftkanalöffnungen (14, 14a, 14b, 14c) in Kombination einen Öffnungsbereich von 25 % bis 55 %, insbesondere von 30 % bis 50 % und spezieller von 35 % bis 45 % der perforierten vertikalen Fläche der Anschlagleiste (12) unterhalb des Dichtungselements (9) bereitstellen. 25
10. Gekühltes Verkaufsmöbel (10) nach einem der vorhergehenden Ansprüche, wobei der erste Abschnitt (17a) des Warmluftkanals (17) eine Höhe (H) von 5 mm bis 10 mm, insbesondere eine Höhe (H) von 6 mm bis 8 mm aufweist. 30
11. Gekühltes Verkaufsmöbel (10) nach einem der vorhergehenden Ansprüche, umfassend mindestens eine Rückluftöffnung (34) innerhalb des gekühlten Verkaufsraums (28), wobei die mindestens eine Rückluftöffnung (34) neben dem mindestens einen Warmluftkanal (17) angeordnet und dazu konfiguriert ist, Warmluft aufzunehmen, die durch den mindestens einen Warmluftkanal (17) gesaugt wurde, nachdem sie sich mit dem Kaltluftstrom (C) aus dem gekühlten Verkaufsraum (28) vermischt hat. 35
12. Gekühltes Verkaufsmöbel (10) nach Anspruch 11, wobei die mindestens eine Rückluftöffnung (34) fluidisch mit einer Rückluftleitung (26) verbunden ist, die mindestens ein Gebläse (3) umfasst, das dazu 40

konfiguriert ist, Luft, die durch mindestens eine Rückluftöffnung (34) aufgenommen wurde, einem Verdampfer (Z) zuzuführen, der Teil eines Kühlkreislaufes ist.

13. Verfahren zum Reduzieren des Risikos der Kondensation auf der Fläche einer Tür (8) eines gekühlten Verkaufsmöbels (10), wobei das gekühlte Verkaufsmöbel (10) Folgendes umfasst: 45

einen Möbelkörper (1), der einen gekühlten Verkaufsraum (28) zum Aufbewahren von Produkten bereitstellt, die darin präsentiert werden sollen;
 mindestens einen Zugriffsbereich (11), der einen Zugriff auf den gekühlten Verkaufsraum (28) bereitstellt; und
 mindestens eine Tür (8), die an dem mindestens einen Zugriffsbereich (11) bereitgestellt ist und die zwischen einer geschlossenen Position, in der sie den mindestens einen Zugriffsbereich (11) verschließt, und mindestens einer offenen Position, in der sie einen Zugriff auf den gekühlten Verkaufsraum (28) über den mindestens einen Zugriffsbereich (11) ermöglicht, bewegbar ist;
 einen Türstützrahmen;
 eine Anschlagleiste (12), die an einem unteren Abschnitt (6b) des Türstützrahmens vorgesehen ist; und
 ein Dichtungselement (9), das an der Anschlagleiste (12) vorgesehen ist und sich in einer im Wesentlichen horizontalen Richtung nach vorn erstreckt, wobei das Dichtungselement (9) dazu konfiguriert ist, an einer Rückseite eines unteren Abschnitts der inneren Glasscheibe (8a) der mindestens einen Tür (8) anzuliegen, um eine Dichtung zwischen der Anschlagleiste (12) und der mindestens einen Tür (8) bereitzustellen; und
 mindestens einen Warmluftkanal (17), der sich unterhalb der mindestens einen Tür (5) von einer Vorderseite des gekühlten Verkaufsmöbels (10) in das gekühlte Verkaufsmöbel (10) erstreckt und mindestens einen ersten Abschnitt (17a), der sich horizontal zwischen der Unterseite der mindestens einen Tür (8) in ihrer geschlossenen Position und einer Oberseite des unteren Abschnitts (6b) des Türstützrahmens erstreckt, einen benachbarten zweiten Abschnitt (17b), der sich in einer im Wesentlichen horizontalen Richtung zwischen der Anschlagleiste (12) und einer durch die innere Glasscheibe (8a) definierten virtuellen Ebene erstreckt, und einen dritten Abschnitt (17c) umfasst, der durch mindestens eine Warmluftkanalöffnung (14) bereitgestellt ist, die in der Anschlagleiste (12) ausgebildet ist, wobei sich der dritte Ab- 50

schnitt (17c) in einer im Wesentlichen horizontalen Richtung erstreckt;
wobei das Verfahren die folgenden Schritte umfasst:

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- Bereitstellen eines Kaltluftstroms (C), der im Wesentlichen vertikal in einer abwärtigen Richtung in mindestens einem unteren Frontabschnitt des gekühlten Verkaufsraums (28) neben der Innenseite eines unteren Abschnitts der mindestens einen Tür (8) in eine Rückluftöffnung (34) strömt, die am Boden des gekühlten Verkaufsraums (28) vorgesehen ist;
- Strömenlassen von Warmluft aus einem Bereich vor dem gekühlten Verkaufsmöbel (10) in das gekühlte Verkaufsmöbel (10) durch den Warmluftkanal (17), wenn sich die Tür (8) in ihrer geschlossenen Position befindet, um die Temperatur an einem unteren Abschnitt der mindestens einen Tür (8) zu erhöhen und diese infolgedessen oberhalb der Taupunkttemperatur zu halten;
- Saugen des Warmluftstroms (W) durch den Kaltluftstrom (C) durch den mindestens einen Warmluftkanal (17) und Vermischen desselben mit dem Kaltluftstrom (C).
14. Verfahren nach Anspruch 13, ferner umfassend den Schritt des Saugens des Kaltluftstroms (C) nach dessen Vermischen mit dem Warmluftstrom (W) durch einen Rückluftkanal (26) in einen Verdampfer (2), wobei der Rückluftkanal (26) und/ oder der Verdampfer (2) vorzugsweise unterhalb oder hinter dem gekühlten Verkaufsraum (28) angeordnet sind, und/oder wobei der Schritt des Bereitstellens eines Kaltluftstroms (C) das Strömenlassen des Kaltluftstroms (C) im Wesentlichen vertikal in einer abwärtigen Richtung vor dem gekühlten Verkaufsraum (28) und entlang der Innenseite der mindestens einen Tür (8) beinhaltet, wenn diese sich in ihrer geschlossenen Position befindet.

Revendications

1. Meuble pour vente de produits réfrigérés (10) comprenant :
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- un corps de meuble (1) prévoyant un espace de vente de produits réfrigérés (28) pour y stocker les produits à présenter ;
- au moins une zone d'accès (11) donnant accès à l'espace de vente de produits réfrigérés (28) ;
- et
- au moins une porte (8), qui est prévue au niveau

de l'au moins une zone d'accès (11) et qui peut se déplacer entre une position fermée fermant l'au moins une zone d'accès (11) et au moins une position ouverte permettant l'accès à l'espace de vente de produits réfrigérés (28) par l'intermédiaire de l'au moins une zone d'accès (11) ;

une ouverture d'air de retour (34) qui est prévue au fond de l'espace de vente de produits réfrigérés (28) à côté de l'au moins une porte (8) pour recevoir un écoulement d'air froid (C) s'écoulant sensiblement à la verticale dans une direction descendante dans au moins une partie avant inférieure de l'espace de vente de produits réfrigérés (28) ;

un cadre de support de porte ;

une barre d'arrêt (12) prévue au niveau d'une partie inférieure (6b) du cadre de support de porte ; et

un élément d'étanchéité (9) prévu au niveau de la barre d'arrêt (12) et s'étendant vers l'avant dans une direction sensiblement horizontale, dans lequel l'élément d'étanchéité (9) est conçu pour prendre appui contre un côté arrière d'une partie inférieure de la vitre intérieure (8a) de l'au moins une porte (8) pour assurer une étanchéité entre la barre d'arrêt (12) et l'au moins une porte (8) ;

le meuble pour vente de produits réfrigérés (10) comprenant en outre au moins un canal d'air chaud (17) s'étendant sous l'au moins une porte (8) depuis un côté avant du meuble pour vente de produits réfrigérés (10) dans le meuble pour vente de produits réfrigérés (10),

le canal d'air chaud (17) étant conçu pour faire circuler de l'air chaud depuis une zone située devant le meuble pour vente de produits réfrigérés (10) dans le meuble pour vente de produits réfrigérés (10) en maintenant la température au niveau d'une partie inférieure de l'au moins une porte (8) au-dessus de la température de point de rosée ;

dans lequel le meuble pour vente de produits réfrigérés (10) est conçu de sorte que l'écoulement d'air chaud (W) est aspiré à travers l'au moins un canal d'air chaud (17) par l'écoulement d'air froid (C) et fusionne avec ledit écoulement d'air froid (C) ;

dans lequel le canal d'air chaud (17) comprend une première partie (17a) s'étendant horizontalement entre le côté inférieur de l'au moins une porte (8) dans sa position fermée et un côté supérieur de la partie inférieure (6b) du cadre de support de porte, une deuxième partie adjacente (17b) s'étendant dans une direction sensiblement horizontale entre la barre d'arrêt (12) et un plan virtuel défini par la vitre intérieure (8a), et une troisième partie (17c) prévue par au moins

- une ouverture de canal d'air chaud (14) formée dans la barre d'arrêt (12),
caractérisé en ce que la troisième partie (17c) s'étend dans une direction sensiblement horizontale.
2. Meuble pour vente de produits réfrigérés (10) selon la revendication 1, comprenant une section de guidage d'écoulement d'air froid (32) ayant une largeur réduite pour augmenter la vitesse de l'écoulement d'air froid (C), la section de guidage d'écoulement d'air froid (32) en particulier étant située entre l'avant d'une partie inférieure de l'espace de vente de produits réfrigérés (28) et le côté arrière de la partie la plus basse de l'au moins une porte (8) et/ou le côté arrière de la partie inférieure (6b) d'un cadre de support de porte.
 3. Meuble pour vente de produits réfrigérés (10) selon la revendication 1 ou 2, dans lequel le meuble pour vente de produits réfrigérés (10) est conçu pour fournir un écoulement d'air froid (C) s'écoulant sensiblement à la verticale dans une direction vers le bas devant l'espace de vente de produits réfrigérés (28) le long de l'intérieur de l'au moins une porte (8), lorsqu'elle est dans sa position fermée.
 4. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications précédentes, dans lequel l'élément d'étanchéité (9) est une lèvre d'étanchéité, et/ou dans lequel l'élément d'étanchéité (9) et/ou la barre d'arrêt (12) sont conçus pour dévier l'écoulement d'air froid (C).
 5. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications précédentes, dans lequel l'élément d'étanchéité (9) s'étend sur toute la largeur de l'au moins une porte (8).
 6. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications précédentes, dans lequel une pluralité d'ouvertures de canal d'air chaud (14a, 14b, 14c) est prévue dans la barre d'arrêt (12).
 7. Meuble pour vente de produits réfrigérés (10) selon la revendication 6, dans lequel les ouvertures de canal d'air chaud (14, 14a, 14b, 14c) sont réparties sur toute la largeur de la porte (8) et/ou dans lequel les ouvertures de canal d'air chaud (14, 14a, 14b, 14c) sont réparties sur une zone ayant une hauteur de 3 à 12 mm, notamment une hauteur h de 8 mm à 10 mm.
 8. Meuble pour vente de produits réfrigérés (10) selon la revendication 6 ou 7, dans lequel les ouvertures de canal d'air chaud (14, 14a, 14b, 14c) comprennent au moins les unes parmi des ouvertures de canal d'air chaud circulaires (14a), des ouvertures de canal d'air chaud rectangulaires, des ouvertures de canal d'air chaud carrées (14b), des ouvertures de canal d'air chaud longitudinales (14c), des ouvertures de canal d'air chaud elliptiques, ou toute combinaison de celles-ci.
 9. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications 6 à 8, dans lequel les ouvertures de canal d'air chaud (14, 14a, 14b, 14c), en combinaison, prévoient une zone d'ouverture de 25 % à 55 %, en particulier de 30 % à 50 %, et plus particulièrement de 35 % à 45 % de la surface verticale perforée de la barre d'arrêt (12) située sous l'élément d'étanchéité (9).
 10. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications précédentes, dans lequel la première partie (17a) du canal d'air chaud (17) a une hauteur (H) de 5 mm à 10 mm, en particulier une hauteur (H) de 6 mm à 8 mm.
 11. Meuble pour vente de produits réfrigérés (10) selon l'une quelconque des revendications précédentes, comprenant au moins une ouverture d'air de retour (34) à l'intérieur de l'espace de vente de produits réfrigérés (28), l'au moins une ouverture d'air de retour (34) étant agencée à côté de l'au moins un canal d'air chaud (17) et étant conçue pour recevoir l'air chaud qui a été aspiré à travers l'au moins un canal d'air chaud (17) après la fusion avec l'écoulement d'air froid (C) provenant de l'espace de vente de produits réfrigérés (28).
 12. Meuble pour vente de produits réfrigérés (10) selon la revendication 11, dans lequel l'au moins une ouverture d'air de retour (34) est reliée de manière fluide à un conduit d'air de retour (26) comprenant au moins un ventilateur (3) conçu pour distribuer l'air, qui a été reçu par au moins une ouverture d'air de retour (34), à un évaporateur (2) faisant partie d'un circuit de réfrigération.
 13. Procédé de réduction du risque de condensation à la surface d'une porte (8) d'un meuble pour vente de produits réfrigérés (10), le meuble pour vente de produits réfrigérés (10) comprenant :
 un corps de meuble (1) prévoyant un espace de vente de produits réfrigérés (28) pour y stocker les produits à présenter ;
 au moins une zone d'accès (11) donnant accès à l'espace de vente de produits réfrigérés (28) ;
 et
 au moins une porte (8), qui est prévue au niveau de l'au moins une zone d'accès (11) et qui peut se déplacer entre une position fermée fermant l'au moins une zone d'accès (11) et au moins

une position ouverte permettant l'accès à l'espace de vente de produits réfrigérés (28) par l'intermédiaire de l'au moins une zone d'accès (11) ;

un cadre de support de porte ;

une barre d'arrêt (12) prévue au niveau d'une partie inférieure (6b) du cadre de support de porte ; et

un élément d'étanchéité (9) prévu au niveau de la barre d'arrêt (12) et s'étendant vers l'avant dans une direction sensiblement horizontale, dans lequel l'élément d'étanchéité (9) est conçu pour prendre appui contre un côté arrière d'une partie inférieure de la vitre intérieure (8a) de l'au moins une porte (8) pour assurer une étanchéité entre la barre d'arrêt (12) et l'au moins une porte (8) ; et

au moins un canal d'air chaud (17) s'étendant sous l'au moins une porte (8) depuis un côté avant du meuble pour vente de produits réfrigérés (10) dans le meuble pour vente de produits réfrigérés (10) et comprenant une première partie (17a) s'étendant horizontalement entre le côté inférieur de l'au moins une porte (8) dans sa position fermée et un côté supérieur de la partie inférieure (6b) du cadre de support de porte, une deuxième partie adjacente (17b) s'étendant dans une direction sensiblement horizontale entre la barre d'arrêt (12) et un plan virtuel défini par la vitre intérieure (8a), et une troisième partie (17c) prévue par au moins une ouverture de canal d'air chaud (14) formée dans la barre d'arrêt (12), dans lequel la troisième partie (17c) s'étend dans une direction sensiblement horizontale ;

dans lequel le procédé comprend les étapes :

de fourniture d'un écoulement d'air froid (C) s'écoulant sensiblement à la verticale dans une direction descendante dans au moins une partie avant inférieure de l'espace de vente de produits réfrigérés (28) à côté de l'intérieur d'une partie inférieure de l'au moins une porte (8) dans une ouverture d'air de retour (34) prévue au fond de l'espace de vente de produits réfrigérés (28) ;

de mise en circulation d'air chaud depuis une zone située devant le meuble pour vente de produits réfrigérés (10) dans le meuble pour vente de produits réfrigérés (10) à travers le canal d'air chaud (17), lorsque la porte (8) est dans sa position fermée pour augmenter la température au niveau d'une partie inférieure de l'au moins une porte (8) et par conséquent la maintenir au-dessus de la température de point de rosée ;

d'aspiration de l'écoulement d'air chaud (W) à travers l'au moins un canal d'air chaud

(17) par l'écoulement d'air froid (C) et la fusion de celui-ci avec ledit écoulement d'air froid (C).

- 5 **14.** Procédé selon la revendication 13, comprenant en outre l'étape d'aspiration de l'écoulement d'air froid (C) après sa fusion avec l'écoulement d'air chaud (W), à travers un conduit d'air de retour (26) dans un évaporateur (2), le conduit d'air de retour (26) et/ou l'évaporateur (2) étant de préférence agencés sous ou derrière l'espace de vente de produits réfrigérés (28), et/ou dans lequel l'étape de fourniture d'un écoulement d'air froid (C) comprend la mise en circulation de l'écoulement d'air froid (C) sensiblement à la verticale dans une direction vers le bas devant l'espace de vente de produits réfrigérés (28) et le long de l'intérieur de l'au moins une porte (8), lorsqu'elle est dans sa position fermée.

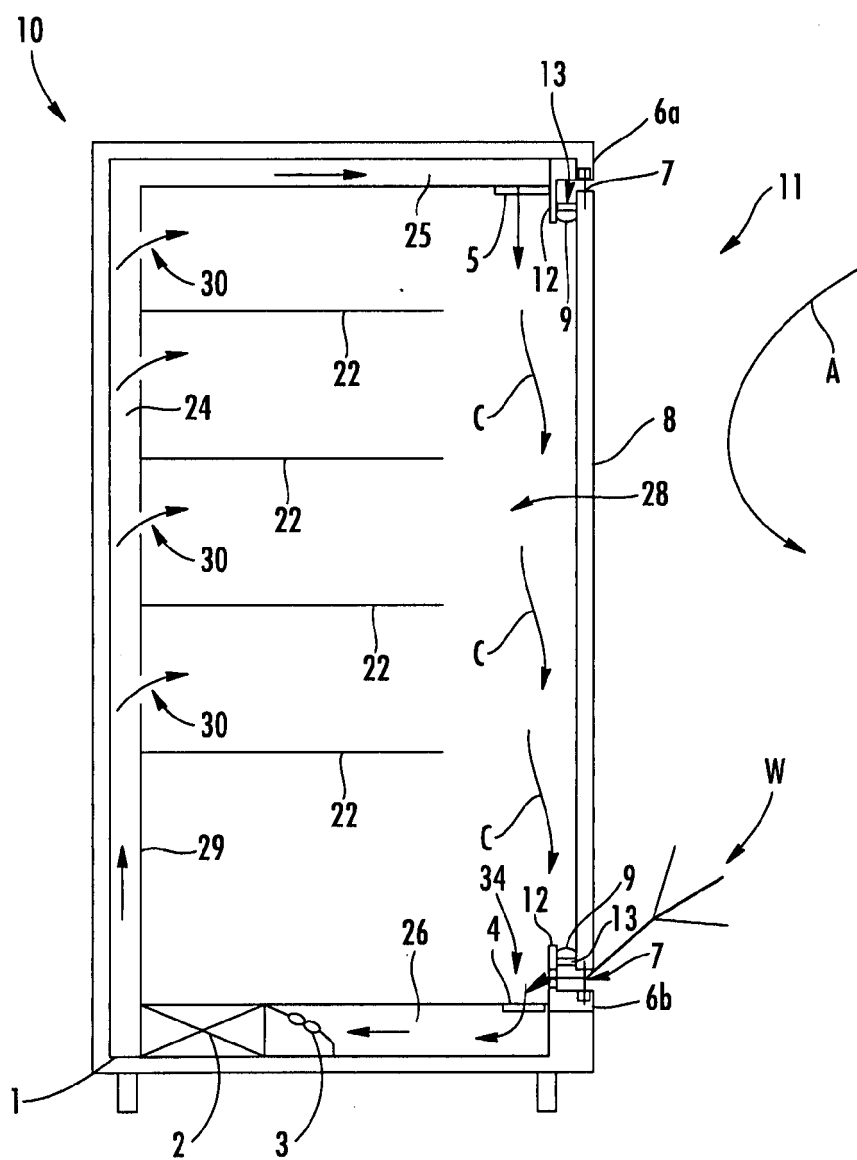


FIG. 1

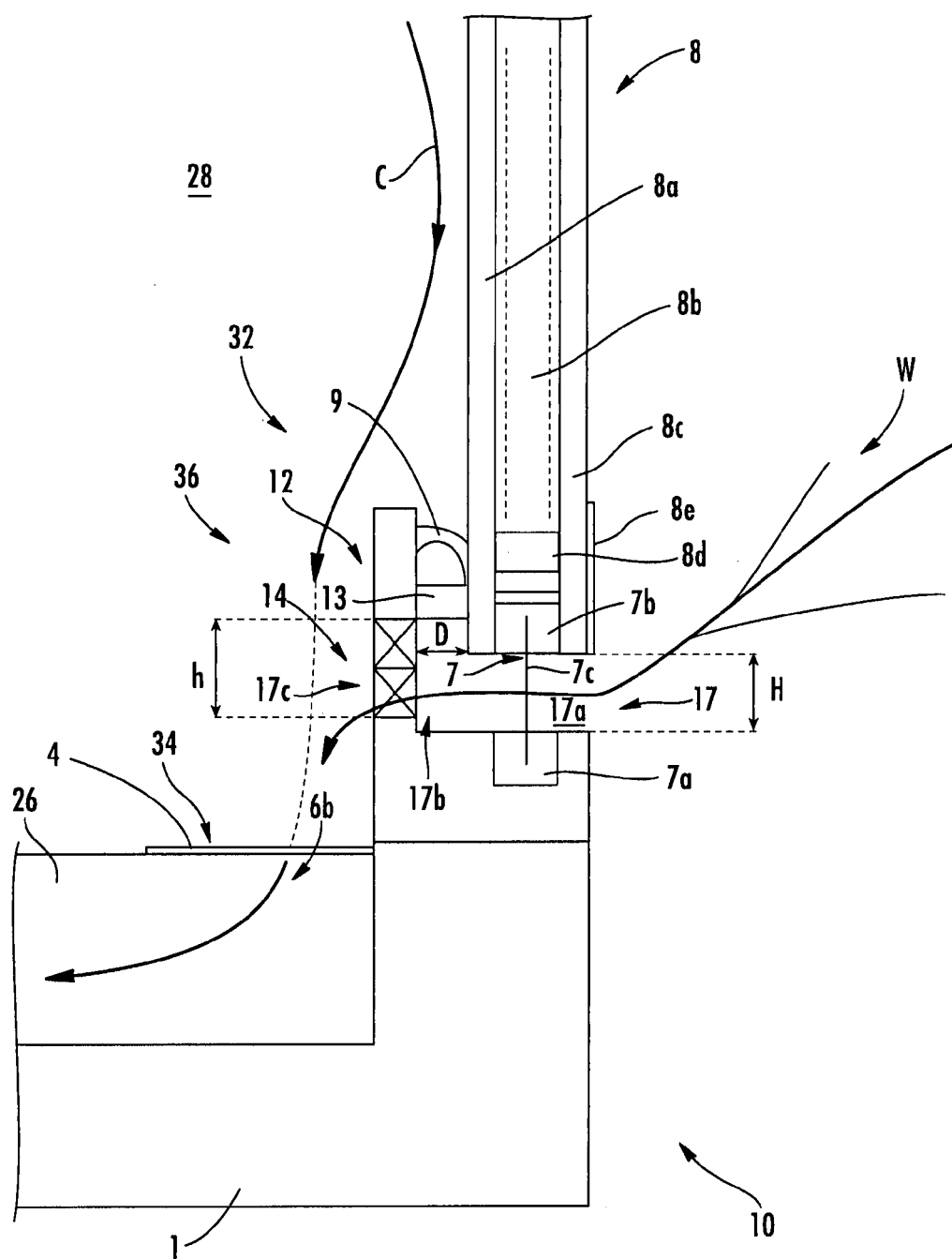


FIG. 2

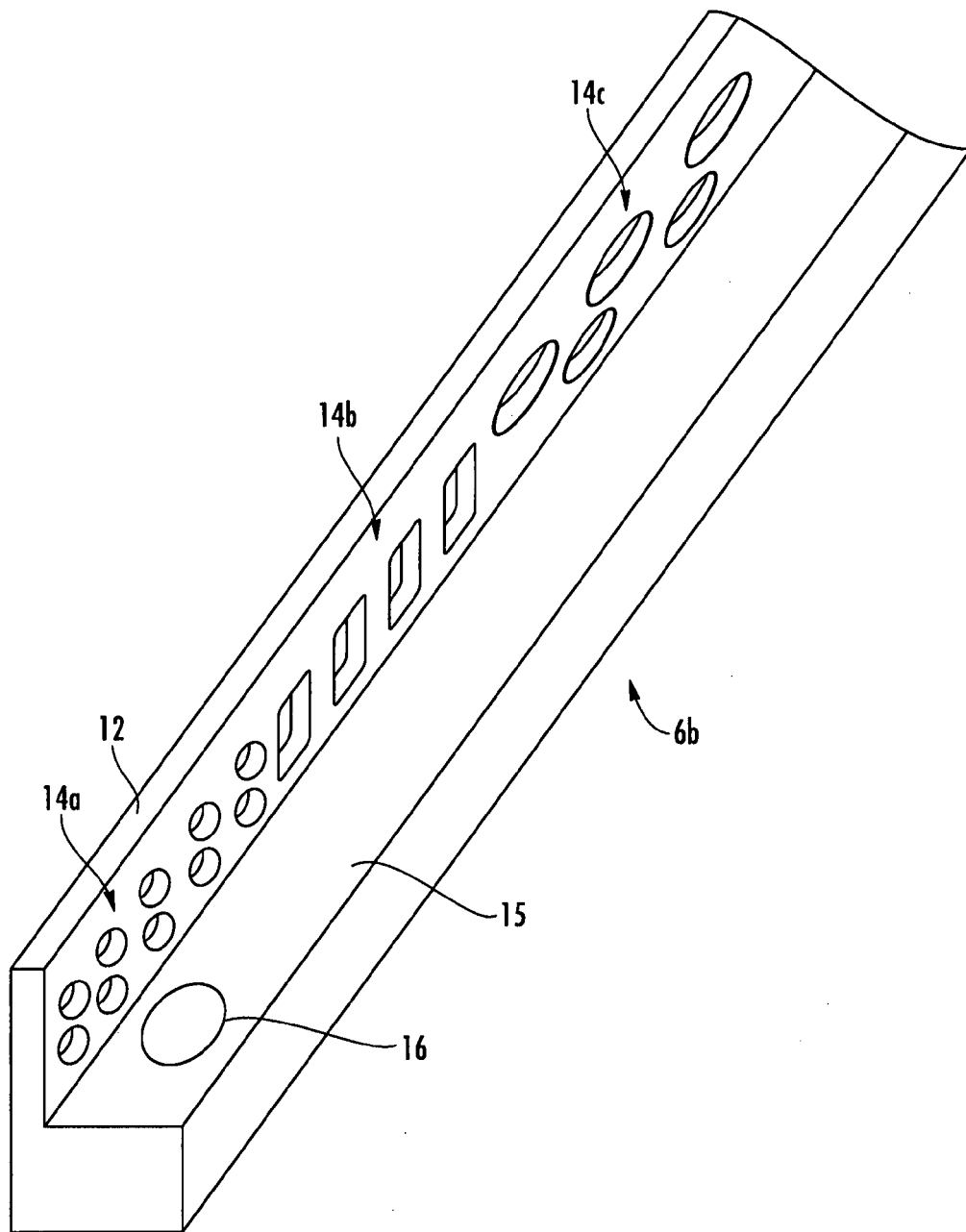


FIG. 3

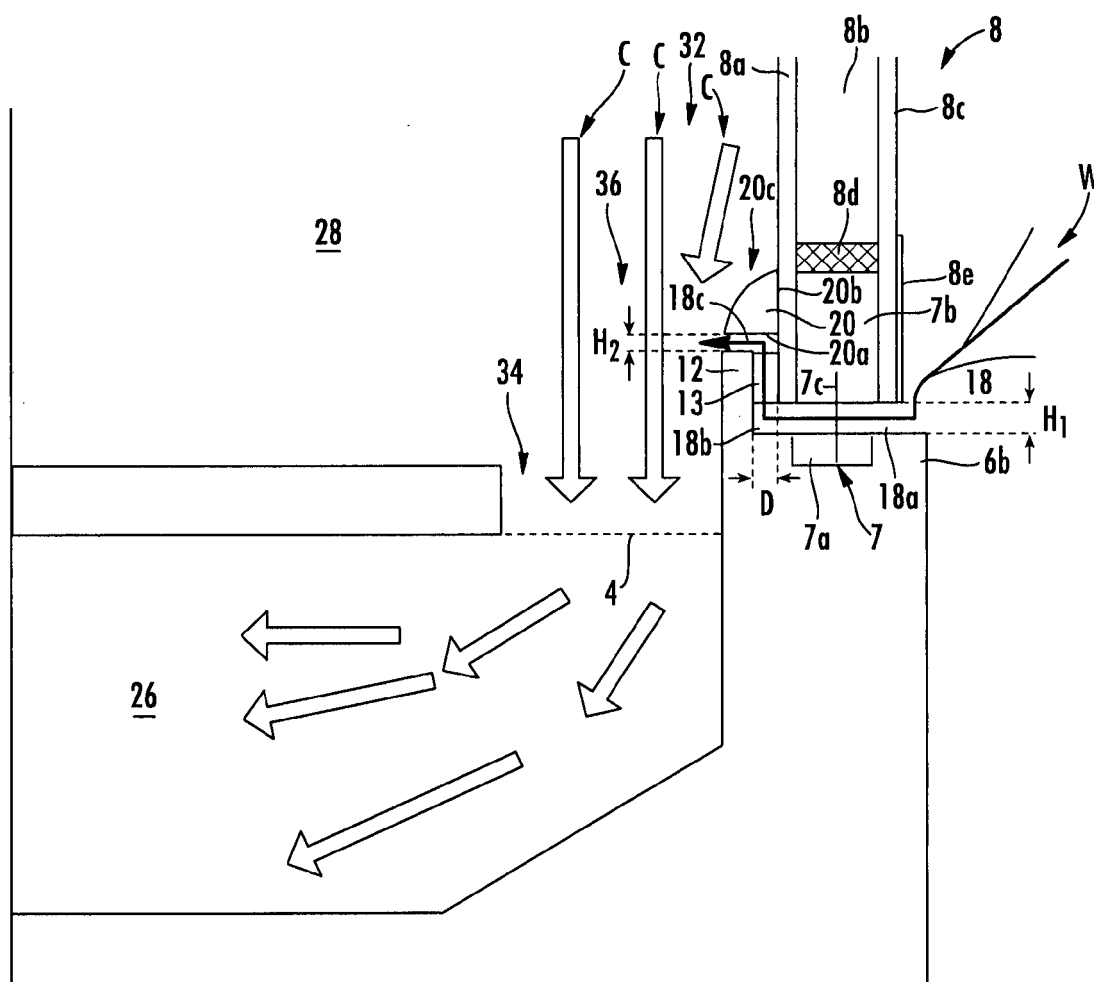


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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