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(54) **REFRIGERATED SALES CABINET**

KÜHLSCHRANK VERKAUFT

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Description

[0001] The invention relates to a refrigerated sales cabinet comprising at least one transparent door which is configured to reduce the risk of condensation at such door.

[0002] In order to operate more efficiently, refrigerated sales cabinets are often equipped with transparent doors, in particular glass doors establishing a separation between a refrigerated sales space inside the refrigerated sales cabinet and the environment outside the refrigerated sales cabinet. A common problem is that condensate forms at the transparent doors, particularly at the inner surface of the transparent doors, which is undesirable and should be avoided.

[0003] US 4 478 047 shows a refrigerated display case having a display section within a cabinet and a movable door covering a front access opening to such display section. The door includes a frame member in which two glass members are mounted with an air space between the glass members. A refrigeration air conduit extends along the top, bottom and rear walls of the cabinet. The air conduit has an outlet opening and an inlet opening at opposing ends thereof with the openings being in alignment so that air leaving the outlet opening will be directed towards and received by the inlet opening thereby forming an air curtain across the front opening of the cabinet along the path inside the door. During a refrigeration cycle of operation of the display case, refrigerated air is circulated through the air conduit and a refrigeration mechanism arranged within the conduit so as to establish a refrigerated air band and a refrigerated air curtain across the front opening in the cabinet. In order to minimize any accumulation of condensation between the glass members in the door, an ambient air flow between the glass members is established when the door is in a closed position.

[0004] Accordingly, it is an object of the present invention to provide an improved refrigerated sales cabinet which avoids condensate formation at the transparent door(s) efficiently and without introducing active components, e.g. heaters or additional fans.

[0005] A refrigerated sales cabinet according to exemplary embodiments of the invention comprises the features of claim 1.

[0006] According to exemplary embodiments of the invention, the inner surface of the at least one transparent door, particularly the upper portion thereof, is ventilated with cooled air from the inside. Hence, condensate formation on the inner surface of the at least one transparent door, particularly at the upper portion thereof, can be prevented.

[0007] By preventing the formation and accumulation of condensate on the inner surface of the at least one transparent door, particularly at the upper portion thereof, the humidity within the refrigerated sales space is reduced and an unobstructed view from outside onto the goods stored within the refrigerated sales space is en-

sured.

[0008] It was discovered that when the at least one transparent door is closed a substantial amount of a warm ambient air may enter into the refrigerated sales space through gaps between two laterally adjacent transparent doors and/or through gaps between the door frame and the at least one transparent door, in case the transparent door is formed as a pivoting door, and/or through gaps between an upper sliding rail and the upper end of the at least one transparent door, in case the transparent door is formed as a sliding door.

[0009] By selecting an appropriate number of condensate prevention air flow channels and/or by selecting an appropriate cross-sectional area of the at least one condensate prevention air flow channel, it can be ensured that the main portion of the cooling air supply flow flowing through the upper air duct exits the upper cooling air supply grille substantially downwards and forms a cooling air curtain for cooling the goods stored within the refrigerated sales space, particularly on shelves disposed therein, and that only a small portion of the cooling air supply flow is branched off to form a condensate prevention air flow, which flows through the condensate prevention air flow channel, impinges onto the baffle in the front of the roof portion of the cabinet body, and which is guided by the baffle to the upper portion of the inner surface of the at least one transparent door. This has been proven to be sufficient to prevent the formation of condensate on the inner surface of the at least one transparent door.

[0010] The baffle can also be called diverting front section. The baffle can extend over the entire width of the refrigerated sales space. Since the baffle has a curved or inclined underside, it is ensured that the condensate prevention air flow in fact reaches the upper portion of the inner surface of the at least one transparent door and does not circumvent it, and prevents that condensate is forming there.

[0011] A further benefit of the exemplary embodiments of the invention is the simplicity with which the problem of condensate forming at the upper portion of the inner surface of the at least one transparent 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. The existing upper cooling air supply grille and the existing cooling air curtain can be maintained.

[0012] Existing refrigerated sales cabinets can be retrofitted with such solution by forming at least one condensate prevention air flow channel in or at the front end element of the upper air duct and by modifying the front section of the underside of the roof portion to form a baffle with a curved or inclined underside.

[0013] A number of optional features are set out below. These features may be realized in particular embodiments, alone or in combination with any of the other features.

[0014] The transparent door(s) of the refrigerated sales cabinet can be formed as glass doors of any kind.

Particularly, the transparent door(s) can be formed as sliding door(s) sliding along upper and lower horizontal sliding rails; or as pivoting door(s) arranged within a door frame.

[0015] By guiding the condensate prevention air flow downward along the inner surface of the at least one transparent door to entrain warm ambient air entering the refrigerated sales space through such gaps, the formation of condensate can be prevented on the entire inner surface of the at least one transparent door, not only at the upper portion thereof.

[0016] In another embodiment, the underside of the baffle has a rear end portion which is arranged above the level of the condensate prevention air flow channel and a front portion which is arranged below the level of the condensate prevention air flow channel and includes an angle with respect to a horizontal plane of 30 to 80 degrees. The front end portion of the baffle can end at a position directly adjacent the upper end of the at least one transparent door. The underside of the baffle can comprise a smooth and/or curved transition between its substantially horizontal rear end portion and its front end portion.

[0017] In another embodiment, in which the transparent door(s) can be formed as sliding door(s) sliding along upper and lower horizontal sliding rails, the upper horizontal sliding rail can be mounted to the baffle.

[0018] In another embodiment, the condensate prevention airflow forms a front cooling air curtain and the cooling air supply air flow forms a rear cooling air curtain. By having two such cooling air curtains arranged one after the other, both an improved temperature of the goods on the shelves in the refrigerated sales cabinet is achieved, and the formation of condensate is prevented on the entire inner surface of the at least one transparent door.

[0019] In another embodiment, at least one of the front end element of the upper air duct and the baffle is formed integral with the roof portion.

[0020] In another embodiment, the front end element of the upper air duct can be formed as one or more separate elements mounted to the roof portion, particularly as one horizontally extending beam mounted to the roof portion; and/or the baffle can be provided as one or more separate elements mounted to the roof portion, particularly as one horizontally extending beam mounted to the roof portion.

[0021] In another embodiment, the at least one condensate prevention air flow channel is dimensioned such that only 2 to 10 % of the mass flow of the cooling air supply air flow, is branched off from the cooling air supply flow flowing through the cooling air supply grille.

[0022] In another embodiment, one condensate prevention airflow channel is provided extending substantially over the width of the refrigerated sales cabinet that corresponds to the width occupied by the at least one transparent door. The height of the condensate prevention air flow channel can be in the range of 1 to 5 mm.

[0023] In another embodiment, a plurality of condensate prevention airflow channels are provided over the width of the refrigerated sales cabinet. 5 to 20 condensate prevention air flow channels can be provided per meter of width. Each of such condensate prevention air flow channels can have a cross-section of 2 to 20 mm².

[0024] Such embodiments provide a sufficiently dimensioned condensate prevention air flow and thus reliably avoid the formation of condensate on the inner surface of the at least one transparent door.

[0025] In another embodiment, the upper cooling air supply grille can be mounted with its rear end to the ceiling panel of the refrigerated sales space in an airtight fashion; and/or the upper cooling air supply grille can be mounted with its front end to the front end element of the upper air duct in an airtight fashion. Thus, the main portion of the cooling air supply air flow is forced to flow through the upper cooling air supply grille and to form a cooling air curtain extending from the upper cooling air supply grille to a bottom front portion, particularly to a return air grille arranged at the bottom front portion of the refrigerated sales cabinet.

[0026] In another embodiment, the front end element of the upper air duct comprises a stepped cross section.

The front end element of the upper air duct can comprise a stepped rear side where the upper cooling air supply grille is mounted, and/or a straight front face. The stepped rear side can comprise at least one inclined surface to guide the substantially horizontal cooling air supply air flow downward to exit the upper cooling air supply grille.

[0027] By way of such inclined surface arranged at the stepped rear side of the front end element of the upper air duct, the main portion of the cooling air supply air flow is guided through the upper cooling air supply grille to form the cooling air curtain which allows for an improved and continuous cooling air flow.

[0028] The at least one condensate prevention air flow channel can extend through such baffle or through a transition portion between the upper end of the baffle and a substantially horizontal roof panel of the roof portion.

[0029] In another embodiment, the front of the roof portion is set back in relation to the bottom front portion of the cabinet body. Alternatively, the front of the roof portion and the bottom front portion lie in one vertical plane. For both kinds of refrigerated sales cabinets described in the two paragraphs above, the formation of condensate on the inner surface of the at least one transparent door is prevented efficiently.

[0030] In another embodiment, at least one element of a vapor compression cycle, including an expansion device and an evaporator, is provided in one or more of the lower, upright and upper air ducts.

[0031] In the following, a refrigerated sales cabinet according to an exemplary embodiment of the invention is described in more detail with respect to the enclosed figures.

Fig. 1 shows a schematic side view of a refrigerated

sales cabinet; and

Fig. 2 shows an enlarged detail of the refrigerated sales cabinet of Fig. 1.

[0032] Fig. 1 shows a schematic side view of a refrigerated sales cabinet 2. For ease of illustration, the left side wall of the refrigerated sales cabinet 2 is removed in Fig. 1.

[0033] The refrigerated sales cabinet 2 comprises a cabinet body 4 including a roof portion 6, a rear wall 8 and a bottom portion 10 enclosing a refrigerated sales space 12 in which goods to be presented therein can be stored and placed on respective shelves. In the present embodiment, the refrigerated sales space 12 comprises a lowermost shelf and three intermediate shelves, onto which goods may be placed.

[0034] The refrigerated sales space 12 is limited by a lowermost shelf which is formed as a bottom panel 18, a preferably perforated rear panel 16, and a ceiling panel 14.

[0035] The bottom portion 10 comprises a substantially horizontal bottom plate and a bottom front portion extending upward therefrom.

[0036] A return air grille 34 is arranged between the front end of the bottom panel 18 and the bottom front portion. Return air is guided through such return air grille 34 out of the refrigerated sales space 12 and to an evaporator (not shown) of a conventional vapour compression cycle.

[0037] A lower air duct 40 is formed between the bottom plate of the bottom portion 10 of the cabinet body 4 and the bottom panel 18, an upright air duct 38 is formed between the rear wall 8 of the cabinet body 4 and the rear panel 16, and an upper air duct 36 is formed between the substantially horizontal roof portion 6 of the cabinet body 4 and the ceiling panel 14.

[0038] The refrigerated sales cabinet 2 is provided with transparent doors 30 and has an access area, which extends between the front of the roof portion 6 and the upper end of the bottom front portion.

[0039] In relation to the bottom front portion, the front of the roof portion 6 is set back by a distance X such that the access area is angled with respect to a vertical plane. In an alternative embodiment, which is not shown here, the front of the roof portion 6 and the bottom front portion lie in one vertical plane.

[0040] In Fig. 1, two transparent doors 30 are shown, and they are arranged in front of the refrigerated sales space 12. In the exemplary embodiment, they have a bent shape, the bent portion of which being arranged approximately in the lower third of the height of the transparent doors 30. The transparent doors 30 are formed as transparent sliding doors 30 which can be slid to the left and to the right and which are guided in lower and upper sliding rails 32, 28. The transparent sliding doors 30 can be moved between a closed position in which the goods access area extending between the front of the

roof portion 6 and the bottom front portion is closed and an access portion in which the transparent sliding doors 30 overlap and allow access to the refrigerated sales space 12 for a customer standing in front of the refrigerated sales cabinet 2.

[0041] However, it has been discovered that even in the closed position of the transparent sliding doors 30, some warm ambient air enters into the refrigerated sales space 12 through vertical gaps between the two laterally adjacent transparent sliding doors 30, through gaps between the upper sliding rail 28 and the upper end of the transparent sliding doors 30 and also through gaps between the lower sliding rail 32 and the lower end of the transparent sliding doors 30. In the embodiment of Fig. 1, the two transparent sliding doors 30 are arranged one behind the other.

[0042] It goes without saying that instead of transparent sliding doors 30 also transparent pivoting doors can be provided.

[0043] A cooling air supply grille 24 is arranged between the front end of the ceiling panel 14 and a front end element 20 of the upper air duct 36, to supply fresh refrigerated air to the refrigerated sales space 6 and to form a cooling air curtain 44 extending between the cooling air supply grille 24 and the cooling air return grille 34.

[0044] Particularly, the cooling air supply grille 24 is arranged in an inclined fashion, such that the cooling air curtain 44 formed by the cooling air flow exiting the cooling air supply grille 24 is guided into the direction of the cooling air return grille 34 and particularly such that the angle of inclination of the cooling air supply grille 24 with respect to a horizontal plane corresponds to the angle which is formed by a substantially vertical plane and the angle of a straight line connecting the cooling air supply grille 24 with the cooling air return grille 34.

[0045] A light unit 41 may be arranged in front of the cooling air supply grille 24.

[0046] The roof portion 6 of the cabinet body 4 comprises a roof plate which extends substantially horizontally to the front from the upper end of the rear wall 8. The roof portion 6 further comprises a front end element 20 and a baffle 26. The front end element 20 and the baffle 26 can be formed integral with the horizontal roof plate. Alternatively, one or both of the front end element 20 and the baffle 26 can be formed as separate elements mounted to the roof plate. Particularly, one or both of the front end element 20 and the baffle 26 can be formed as horizontally extending beams mounted to the roof plate 6.

[0047] The front end element 20 closes the upper air duct 36 to the front. It has a stepped cross-section, seen from top to bottom and particularly a stepped rear side, to the underside of which the upper cooling air supply grille 24 is mounted. The front face of the front end element 20 can be straight. The rear face of the upper, wider part of the front end element 20 can be inclined to form an inclined baffle for directing the substantially horizontal cooling air supply flow 42 downward to flow through the cooling air supply grille 24 and to exit the same into the

direction of the lower cooling air return grille 34 and to form a cooling air curtain 44.

[0048] At least one substantially horizontal condensate prevention air flow channel is provided and extends horizontally through the front end element 20 of the upper air duct 36.

[0049] The baffle 26 at the front of the roof plate has a curved or inclined underside which is configured and arranged with respect to the condensate prevention air flow channel 22 such that a condensate prevention air flow which is branched off the cooling air supply flow 42, flows through the condensate prevention air flow channel 22 and impinges onto the underside of the baffle 26 such that the condensate prevention air flow 46 is deflected and directed to the upper portion of the inner surface of the transparent sliding doors 30.

[0050] To achieve this, the underside of the baffle 26 can have a rear end portion which is arranged above the level of the condensate prevention air flow channel 22 and a front portion which is arranged below the level of the condensate prevention air flow channel 22 and includes an angle with respect to a horizontal plane of 30 to 80 degrees. The front end portion of the baffle 26 ends at a position directly adjacent the upper end of the transparent sliding doors 30. In the embodiment of Figs. 1 and 2, the underside of the baffle 26 comprises a smooth curved transition between its substantially horizontal rear end portion and its front end portion.

[0051] The size of the condensate prevention air flow channel 22 is dimensioned such that only a small portion of the cooling air supply air flow 42, particularly only between 2 to 10 % of the mass flow of the cooling air supply air flow 42, is branched off from the cooling air supply flow flowing through the cooling air supply grille 24 and forming the cooling air curtain 44.

[0052] To achieve this, the height of the condensate prevention air flow channel 22 is in the range of 1 to 5 mm, in case a continuous condensate prevention air flow channel 22 is provided extending substantially over the whole width of the refrigerated sales cabinet 2 that corresponds to the width occupied by the sliding doors 30.

[0053] If a plurality of condensate prevention air flow channels 22 are provided over the width of the refrigerated sales cabinet 2 at positions above the transparent sliding doors 30, 5 to 20 condensate prevention air flow channels 22 can be provided per meter of width, and each of such condensate prevention air flow channels 22 can have a cross-section of 2 to 20 mm².

[0054] As can be seen in Figs. 1 and 2, the condensate prevention airflow 46 is branched off from the cooling air supply air flow 42, flows through the one or more of the condensate prevention air flow channels 22, impinges onto the underside of the baffle 26, is deflected and directed to the upper portion of the inner surfaces of the transparent supplying doors 30, forms a second, front cooling air curtain which flows downward along the inner surface of the sliding doors 30 and merges with the first, rear cooling air curtain 44 at a position above or at the

cooling air return grille 34.

[0055] The condensate prevention air flow 46 thus forms a second cooling air curtain, the main purpose of which, however, is to avoid the formation of condensate on the transparent sliding doors 30 caused by warm ambient air entering into the refrigerated sales space 12 from outside the refrigerated sales cabinet 2.

[0056] Fig. 2 shows an enlarged detail of the refrigerated sales cabinet 2 of Fig. 1, namely the front top portion of the refrigerated sales cabinet 2 including the cooling air supply grille 24, the front end element 20, the baffle 26, the upper sliding rail 28 and the upper end of the transparent sliding doors 30.

[0057] As indicated by arrows 48, warm ambient air enters through gaps 50 between the two laterally adjacent transparent sliding doors (see the two lower arrows) and through gaps between the upper end of the transparent sliding doors 30 and the horizontal upper sliding rail 28.

[0058] The condensate prevention air flow 46 entrains such warm ambient air with it to merge with the condensate prevention air flow 46 thereby reliably avoiding the formation of condensate at the inner surface of the transparent sliding door 30.

[0059] 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 claims.

[0060] Therefore, it is intended that the invention not be limited to the particular embodiment disclosed, but that the invention includes all embodiments falling within the scope of the claims.

35 List of reference numerals

[0061]

2	refrigerated sales cabinet
40 4	cabinet body
6	roof portion
8	rear wall
10	bottom portion
12	refrigerated sales space
45 14	ceiling panel
16	rear panel
18	bottom panel
20	front end element
22	condensate prevention air flow channel
50 24	cooling air supply grille
26	baffle
28	upper sliding rail
30	sliding doors
32	lower sliding rail
55 34	cooling air return grille
36	upper air duct
38	upright air duct
40	lower air duct

41 light unit
 42 cooling air supply air flow
 44 cooling air curtain
 46 condensate prevention air flow
 48 warm ambient air
 50 gaps

Claims

1. Refrigerated sales cabinet (2), comprising:

a cabinet body (4) comprising a roof portion (6);
 and
 a refrigerated sales space (12) for storing goods to be presented therein;
 a ceiling panel (14) limiting the top side of the refrigerated sales space (12);
 at least one transparent door (30) arranged in front of the refrigerated sales space (12);
 wherein an upper air duct (36) is formed between the roof portion (6) and the ceiling panel (14), the upper air duct (36) extending from a rear portion to a front end element (20) of the upper air duct (36) and to an upper cooling air supply grille (24);
 the upper air duct (36) providing a cooling air supply air flow (42) which forms a cooling air curtain (44) extending from the upper cooling air supply grille (24) to a bottom front portion of the refrigerated sales cabinet (2);
 wherein at least one condensate prevention air flow channel (22) extends through the front end element (20) of the upper air duct (36) or between an upper panel of the roof portion (6) and the front end element (20) of the upper air duct (36), such that a condensate prevention air flow (46) is branched off the cooling air supply air flow (42), flows through the condensate prevention air flow channel (22), and impinges onto a baffle (26) of the roof portion (6) of the cabinet body (4); and
 wherein the baffle (26) is positioned in front of the front end element (20) of the upper air duct (36), forms the front end of the roof portion (6) of the cabinet body (4) and has a curved or inclined underside, such that the condensate prevention air flow (46) is directed to the upper portion of the inner surface of the at least one transparent door (30).

2. Refrigerated sales cabinet (2) according to claim 1,

wherein the at least one transparent door (30) is formed as a sliding door sliding along upper and lower horizontal sliding rails; or
 wherein the at least one transparent door is formed as pivoting door arranged within a door

frame.

3. Refrigerated sales cabinet (2) according to claim 1 or 2,

wherein the baffle (26) guides the condensate prevention air flow (46) such that it flows downward along the inner surface of the at least one transparent door (30) and entrains warm ambient air entering into the refrigerated sales space (12) through gaps between laterally adjacent transparent doors (30), and/or through gaps (50) between the door frame and the at least one transparent door formed as a pivoting door; and/or through gaps (50) between an upper sliding rail, preferably a horizontal upper sliding rail and the upper end of at least one transparent door (30) formed as a sliding door.

4. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the underside of the baffle (26) has a rear end portion which is arranged above the level of the condensate prevention air flow channel (22) and a front portion which is arranged below the level of the condensate prevention air flow channel (22) and includes an angle with respect to a horizontal plane of 30 to 80 degrees; and/or
 wherein the front end portion of the baffle (26) ends at a position directly adjacent the upper end of the at least one transparent door (30); and/or
 wherein the underside of the baffle (26) comprises a smooth curved transition between its substantially horizontal rear end portion and its front end portion.

5. Refrigerated sales cabinet (2) according to any of claims 2 to 4,

wherein the upper horizontal sliding rail (28) is mounted to the baffle (26).

6. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the condensate prevention air flow (46) forms a front cooling air curtain (44) and the cooling air supply air flow (42) forms a rear cooling air curtain.

7. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein at least one of the front end element (20) of the upper air duct (36) and the baffle (26) is formed integral with the roof portion (6).

8. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the front end element (20) of the upper

air duct (36) is formed as one or more separate elements mounted to the roof portion (6), particularly as one horizontally extending beam mounted to the roof portion (6); and/or wherein the baffle (26) is provided as one or more separate elements mounted to the roof portion (6), particularly as one horizontally extending beam mounted to the roof portion (6).

9. Refrigerated sales cabinet (2) according to any of the preceding claims, wherein the at least one condensate prevention air flow channel (22) is dimensioned such that only 2 to 10 % of the mass flow of the cooling air supply air flow (42), is branched off from the cooling air supply air flow (42) flowing through the cooling air supply grille (24).

10. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein one condensate prevention air flow channel (22) is provided extending substantially over the width of the refrigerated sales cabinet (2) that corresponds to the width occupied by the at least one transparent door (30); and/or wherein the height of the condensate prevention air flow channel (22) is in the range of 1 to 5 mm.

11. Refrigerated sales cabinet (2) according to any of claims 1 to 9,

wherein a plurality of condensate prevention air-flow channels (22) are provided over the width of the refrigerated sales cabinet (2) at positions above the at least one transparent door (30); and/or wherein 5 to 20 condensate prevention air flow channels (22) are provided per meter of width, and each of such condensate prevention air flow channels (22) has a cross-section of 2 to 20 mm².

12. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the upper cooling air supply grille (24) is mounted with its rear end to the ceiling panel (14) of the refrigerated sales space (12) in an airtight fashion; and/or wherein the upper cooling air supply grille (24) is mounted with its front end to the front end element (20) of the upper air duct (36) in an airtight fashion; and/or wherein the front of the roof portion (6) is set back in relation to the bottom front portion of the cabinet body (4), or the front of the roof portion (6) and the bottom front portion lie in one vertical

plane.

13. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the front end element (20) of the upper air duct (36) comprises a stepped cross section; wherein the front end element (20) of the upper air duct (36) comprises a stepped rear side where the upper cooling air supply grille (24) is mounted, and/or a straight front face; and/or wherein the stepped rear side comprises at least one inclined surface, for directing the substantially horizontal cooling air supply air flow (42) downward to exit the upper cooling air supply grille (24).

14. Refrigerated sales cabinet (2) according to any of the preceding claims,

wherein the roof portion (6) extends substantially horizontally to the front from the upper end of a substantially upright rear wall (8) of the cabinet body (4); and/or wherein an upright air duct (38) connected to the upper air duct (36) is formed between a rear wall of the cabinet body (4) and a rear panel (16) limiting the back of the refrigerated sales space (12); wherein the downside of the refrigerated sales space (12) is limited by a bottom panel (18); wherein a lower air duct (40) connected to the upright air duct (38) is formed between the bottom panel (18) and a bottom portion of the cabinet body (4); and/or wherein the lower air duct (40) extends from a return air grille (34) arranged at or behind a bottom front portion of the cabinet body (4) to a rear portion thereof.

15. Refrigerated sales cabinet (2) according to claim 14,

wherein the front and rear cooling air curtains merge at a position above or at the return air grille (34); and/or wherein at least one element of a vapor compression cycle, including an expansion device and an evaporator, is provided in one or more of the lower, upright and upper air ducts (40, 38, 36).

Patentansprüche

1. Gekühltes Verkaufsregal (2), umfassend:

einen Regalkörper (4), der einen Dachabschnitt (6) umfasst; und

einen gekühlten Verkaufsraum (12) zum Aufbewahren von Waren, die darin präsentiert werden sollen;

eine Deckenplatte (14), die die obere Seite des gekühlten Verkaufsraums (12) begrenzt;
mindestens eine durchsichtige Tür (30), die vor dem gekühlten Verkaufsraum (12) angeordnet ist;

wobei ein oberer Luftkanal (36) zwischen dem Dachabschnitt (6) und der Deckenplatte (14) ausgebildet ist, wobei sich der obere Luftkanal (36) von einem hinteren Abschnitt zu einem vorderen Endelement (20) des oberen Luftkanals (36) und zu einem oberen Kühlluftspeisegitter (24) erstreckt;

wobei der obere Luftkanal (36) eine Kühlluftzuluftströmung (42) bereitstellt, die einen Kühlluftschleier (44) ausbildet, der sich von dem oberen Kühlluftspeisegitter (24) zu einem unteren vorderen Abschnitt des gekühlten Verkaufsregals (2) erstreckt;

wobei sich mindestens ein Kondensatverhinderungsluftströmungskanal (22) durch das vordere Endelement (20) des oberen Luftkanals (36) oder zwischen einer oberen Platte des Dachabschnitts (6) und dem vorderen Endelement (20) des oberen Luftkanals (36) derart erstreckt, dass eine Kondensatverhinderungsluftströmung (46) von der Kühlluftzuluftströmung (42) abgezweigt wird, durch den Kondensatverhinderungsluftströmungskanal (22) strömt und auf eine Umlenkplatte (26) des Dachabschnitts (6) des Regalkörpers (4) auftrifft; und

wobei die Umlenkplatte (26) vor dem vorderen Endelement (20) des oberen Luftkanals (36) positioniert ist, das vordere Ende des Dachabschnitts (6) des Regalkörpers (4) ausbildet und eine gebogene oder schräge Unterseite aufweist, sodass die Kondensatverhinderungsluftströmung (46) auf den oberen Abschnitt der Innenfläche der mindestens einen durchsichtigen Tür (30) gelenkt wird.

2. Gekühltes Verkaufsregal (2) nach Anspruch 1,

wobei die mindestens eine durchsichtige Tür (30) als eine Schiebetür ausgebildet ist, die entlang oberer und unterer horizontaler Gleitschienen gleitet; oder

wobei die mindestens eine durchsichtige Tür als eine Schwenktür ausgebildet ist, die innerhalb eines Türrahmens angeordnet ist.

3. Gekühltes Verkaufsregal (2) nach Anspruch 1 oder 2,

wobei die Umlenkplatte (26) die Kondensatverhinderungsluftströmung (46) derart leitet, dass sie nach unten entlang der Innenfläche der mindestens einen

durchsichtigen Tür (30) strömt und warme Umgebungsluft mitreißt, die in den gekühlten Verkaufsraum (12) durch Spalten zwischen seitlich angrenzenden durchsichtigen Türen (30) und/oder durch Spalten (50) zwischen dem Türrahmen und der mindestens einen durchsichtigen Tür, die als eine Schwenktür ausgebildet ist; und/oder durch Spalten (50) zwischen einer oberen Gleitschiene, bevorzugt einer horizontalen oberen Gleitschiene und dem oberen Ende mindestens einer durchsichtigen Tür (30), die als eine Schiebetür ausgebildet ist, eindringt.

4. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, wobei die Unterseite der Umlenkplatte (26) einen hinteren Endabschnitt, der über dem Niveau des Kondensatverhinderungsluftströmungskanals (22) angeordnet ist, und einen vorderen Abschnitt aufweist, der unter dem Niveau des Kondensatverhinderungsluftströmungskanals (22) angeordnet ist und einen Winkel in Bezug auf eine horizontale Ebene von 30 bis 80 Grad hat; und/oder

wobei der vordere Endabschnitt der Umlenkplatte (26) an einer Position endet, die direkt an das obere Ende der mindestens einen durchsichtigen Tür (30) angrenzt; und/oder

wobei die Unterseite der Umlenkplatte (26) einen glatten gebogenen Übergang zwischen ihrem im Wesentlichen horizontalen hinteren Endabschnitt und ihrem vorderen Endabschnitt umfasst.

5. Gekühltes Verkaufsregal (2) nach einem der Ansprüche 2 bis 4, wobei die obere horizontale Gleitschiene (28) an der Umlenkplatte (26) montiert ist.

6. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, wobei die Kondensatverhinderungsluftströmung (46) einen vorderen Kühlluftschleier (44) ausbildet und die Kühlluftzuluftströmung (42) einen hinteren Kühlluftschleier ausbildet.

7. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, wobei mindestens eines aus dem vorderen Endelement (20) des oberen Luftkanals (36) und der Umlenkplatte (26) einstückig mit dem Dachabschnitt (6) ausgebildet ist.

8. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche,

wobei das vordere Endelement (20) des oberen Luftkanals (36) als ein oder mehrere getrennte Elemente ausgebildet ist, die an dem Dachab-

- schnitt (6) montiert sind, insbesondere als ein horizontal verlaufender Balken, der an dem Dachabschnitt (6) montiert ist; und/oder wobei die Umlenkplatte (26) als ein oder mehrere getrennte Elemente bereitgestellt ist, die an dem Dachabschnitt (6) montiert sind, insbesondere als ein horizontal verlaufender Balken, der an dem Dachabschnitt (6) montiert ist.
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9. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, 10
wobei der mindestens eine Kondensatverhinderungsluftströmungskanal (22) so bemessen ist, dass nur 2 bis 10 % des Massenstroms der Kühlluftzuluftströmung (42) von der Kühlluftzuluftströmung (42), 15
die durch das Kühlluftfeinspeisegitter (24) strömt, abgezweigt werden.
10. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, 20
wobei ein Kondensatverhinderungsluftströmungskanal (22) bereitgestellt ist, der sich im Wesentlichen über die Breite des gekühlten Verkaufsregals (2) erstreckt, die der Breite entspricht, die durch die mindestens eine durchsichtige Tür (30) eingenommen wird; und/oder 25
wobei die Höhe des Kondensatverhinderungsluftströmungskanals (22) im Bereich von 1 bis 5 mm liegt. 30
11. Gekühltes Verkaufsregal (2) nach einem der Ansprüche 1 bis 9, 35
wobei eine Vielzahl von Kondensatverhinderungsluftströmungskanälen (22) über die Breite des gekühlten Verkaufsregals (2) an Positionen über der mindestens einen durchsichtigen Tür (30) bereitgestellt sind; und/oder 40
wobei 5 bis 20 Kondensatverhinderungsluftströmungskanäle (22) pro Meter Breite bereitgestellt sind und jeder der Kondensatverhinderungsluftströmungskanäle (22) einen Querschnitt von 2 bis 20 mm² aufweist. 45
12. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, 50
wobei das obere Kühlluftfeinspeisegitter (24) mit seinem hinteren Ende an der Deckenplatte (14) des gekühlten Verkaufsraums (12) luftdicht montiert ist; und/oder 55
wobei das obere Kühlluftfeinspeisegitter (24) mit seinem vorderen Ende an dem vorderen Endelement (20) des oberen Luftkanals (36) luftdicht montiert ist; und/oder
wobei die Vorderseite des Dachabschnitts (6) im Verhältnis zum unteren vorderen Abschnitt des Regalkörpers (4) zurückgesetzt ist oder die Vorderseite des Dachabschnitts (6) und der untere vordere Abschnitt in einer vertikalen Ebene liegen.
13. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, 60
wobei das vordere Endelement (20) des oberen Luftkanals (36) einen abgestuften Querschnitt umfasst; 65
wobei das vordere Endelement (20) des oberen Luftkanals (36) eine abgestufte Rückseite, an der das obere Kühlluftfeinspeisegitter (24) montiert ist, und/oder eine gerade Vorderseite umfasst; und/oder
wobei die abgestufte Rückseite mindestens eine schräge Fläche umfasst, um die im Wesentlichen horizontale Kühlluftzuluftströmung (42) nach unten zu lenken, damit sie aus dem oberen Kühlluftfeinspeisegitter (24) austritt.
14. Gekühltes Verkaufsregal (2) nach einem der vorstehenden Ansprüche, 70
wobei sich der Dachabschnitt (6) von dem oberen Ende einer im Wesentlichen aufrechten hinteren Wand (8) des Regalkörpers (4) im Wesentlichen horizontal nach vorne erstreckt; und/oder
wobei ein aufrechter Luftkanal (38), der mit dem oberen Luftkanal (36) verbunden ist, zwischen einer hinteren Wand des Regalkörpers (4) und einer hinteren Platte (16), welche die Rückseite des gekühlten Verkaufsraums (12) begrenzt, ausgebildet ist; 75
wobei die Unterseite des gekühlten Verkaufsraums (12) durch eine untere Platte (18) begrenzt ist; 80
wobei zwischen der unteren Platte (18) und einem unteren Abschnitt des Regalkörpers (4) ein unterer Luftkanal (40) ausgebildet ist, der mit dem aufrechten Luftkanal (38) verbunden ist; und/oder
wobei sich der untere Luftkanal (40) von einem Rückluftgitter (34), das an oder hinter einem unteren vorderen Abschnitt des Regalkörpers (4) angeordnet ist, zu einem hinteren Abschnitt davon erstreckt.
15. Gekühltes Verkaufsregal (2) nach Anspruch 14, 85
wobei der vordere und der hintere Kühlluftschleier an einer Position über oder an dem Rückluftgitter (34) zusammenkommen; und/oder
wobei wenigstens ein Element eines Dampfkomppressionskreises, einschließlich eines Ex-

pansionsorgans und eines Verdampfers, in einem oder mehreren von dem unteren, dem aufrechten und dem oberen Luftkanal (40, 38, 36) bereitgestellt ist.

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Revendications

1. Armoire de vente réfrigérée (2), comprenant :

un corps d'armoire (4) comprenant une partie toit (6) ; et
 un espace de vente réfrigéré (12) pour l'entreposage des marchandises à y présenter ;
 un panneau de plafond (14) limitant la partie supérieure de l'espace de vente réfrigéré (12) ;
 au moins une porte transparente (30) placée devant l'espace de vente réfrigéré (12) ;
 dans laquelle un conduit d'air supérieur (36) est formé entre la partie toit (6) et le panneau de plafond (14), le conduit d'air supérieur (36) s'étendant d'une partie arrière à un élément d'extrémité avant (20) du conduit d'air supérieur (36) et à une grille supérieure d'alimentation en air de refroidissement (24) ;
 le conduit d'air supérieur (36) fournissant un écoulement d'air d'alimentation en air de refroidissement (42) qui forme un rideau d'air de refroidissement (44) s'étendant de la grille supérieure d'alimentation en air de refroidissement (24) à une partie avant inférieure de l'armoire de vente réfrigérée (2) ;
 dans laquelle au moins un canal d'écoulement d'air de prévention des condensats (22) s'étend à travers l'élément d'extrémité avant (20) du conduit d'air supérieur (36) ou entre un panneau supérieur de la partie toit (6) et l'élément d'extrémité avant (20) du conduit d'air supérieur (36), de sorte qu'un écoulement d'air de prévention des condensats (46) est dirigé hors de l'écoulement d'air d'alimentation en air de refroidissement (42), traverse le canal d'écoulement d'air de prévention des condensats (22) et s'écoule sur un déflecteur (26) de la partie toit (6) du corps d'armoire (4) ; et
 dans laquelle le déflecteur (26) est placé devant l'élément d'extrémité avant (20) du conduit d'air supérieur (36), forme l'extrémité avant de la partie toit (6) du corps d'armoire (4) et présente un dessous incurvé ou incliné, de sorte que l'écoulement d'air de prévention des condensats (46) est dirigé vers la partie supérieure de la surface interne de l'au moins une porte transparente (30).

2. Armoire de vente réfrigérée (2) selon la revendication 1,

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3. Armoire de vente réfrigérée (2) selon la revendication 1 ou 2,

dans laquelle le déflecteur (26) guide l'écoulement d'air de prévention des condensats (46) de sorte qu'il s'écoule vers le bas le long de la surface interne de l'au moins une porte transparente (30) et entraîne l'air ambiant chaud entrant dans l'espace de vente réfrigéré (12) à travers les espaces entre les portes transparentes (30) adjacentes latéralement, et/ou à travers les espaces (50) entre le châssis de porte et l'au moins une porte transparente formée comme une porte pivotante ; et/ou à travers les espaces (50) entre un rail coulissant supérieur, de préférence un rail coulissant supérieur horizontal et l'extrémité supérieure d'au moins une porte transparente (30) formée comme une porte coulissante.

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4. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle le dessous du déflecteur (26) a une partie arrière qui est disposée au-dessus du niveau du canal d'écoulement d'air de prévention des condensats (22) et une partie avant qui est placée en dessous du niveau du canal d'écoulement d'air de prévention des condensats (22) et comporte un angle par rapport à un plan horizontal de 30 à 80 degrés ; et/ou dans laquelle la partie avant du déflecteur (26) se termine à une position directement adjacente à l'extrémité supérieure de l'au moins une porte transparente (30) ; et/ou dans laquelle le dessous du déflecteur (26) comprend une transition incurvée lisse entre sa partie d'extrémité arrière sensiblement horizontale et sa partie d'extrémité avant.

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5. Armoire de vente réfrigérée (2) selon l'une des revendications 2 à 4,

dans laquelle le rail coulissant horizontal supérieur (28) est monté sur le déflecteur (26).

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6. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle l'écoulement d'air de prévention des condensats (46) forme un rideau d'air de refroidissement avant (44) et l'écoulement d'air d'alimentation en air de refroidissement (42) forme un rideau d'air de refroidissement arrière.

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7. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes, dans laquelle au moins l'un d'un élément d'extrémité avant (20) du conduit d'air supérieur (36) et du déflecteur (26) est intégré à la partie toit (6).

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8. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle l'élément d'extrémité avant (20) du conduit d'air supérieur (36) est formé comme un ou plusieurs éléments distincts montés sur la partie toit (6), en particulier comme une poutre s'étendant horizontalement montée sur la partie toit (6) ; et/ou

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dans laquelle le déflecteur (26) est fourni comme un ou plusieurs éléments séparés montés sur la partie toit (6), en particulier comme une poutre s'étendant horizontalement montée sur la partie toit (6).

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9. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes, dans laquelle l'au moins un canal d'écoulement d'air de prévention des condensats (22) est dimensionné de sorte que seulement 2 à 10 % de l'écoulement massique de l'écoulement d'air d'alimentation en air de refroidissement (42) sont débranchés de l'écoulement d'air d'alimentation en air de refroidissement (42) qui traverse la grille d'alimentation en air de refroidissement (24).

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10. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

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dans laquelle un canal d'écoulement d'air de prévention des condensats (22) est fourni, s'étendant sensiblement sur la largeur de l'armoire de vente réfrigérée (2) qui correspond à la largeur occupée par au moins une porte transparente (30) ; et/ou

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dans laquelle la hauteur du canal d'écoulement d'air de prévention des condensats (22) est comprise entre 1 et 5 mm.

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11. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications 1 à 9,

dans laquelle une pluralité de canaux d'écoulement d'air de prévention des condensats (22) sont fournis sur la largeur de l'armoire de vente réfrigérée (2) à des positions au-dessus d'au moins une porte transparente (30) ; et/ou dans laquelle 5 à 20 canaux d'écoulement d'air de prévention des condensats (22) sont fournis par mètre de largeur, et chacun de ces canaux d'écoulement d'air de prévention des condensats (22) a une section transversale de 2 à 20

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mm².

12. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle la grille d'alimentation en air de refroidissement supérieure (24) est montée avec son extrémité arrière au panneau de plafond (14) de l'espace de vente réfrigéré (12) de façon hermétique ; et/ou

dans laquelle la grille d'alimentation en air de refroidissement supérieure (24) est montée avec son extrémité avant sur l'élément d'extrémité avant (20) du conduit d'air supérieur (36) de façon hermétique ; et/ou

dans laquelle l'avant de la partie toit (6) est remplacé par rapport à la partie avant inférieure du corps d'armoire (4), ou l'avant de la partie du toit (6) et la partie avant inférieure se trouvent dans un plan vertical.

13. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle l'élément d'extrémité avant (20) du conduit d'air supérieur (36) comprend une section transversale étagée ;

dans laquelle l'élément d'extrémité avant (20) du conduit d'air supérieur (36) comprend un côté arrière étagé où la grille d'alimentation en air de refroidissement supérieure (24) est montée, et/ou une face avant droite ; et/ou

dans laquelle le côté arrière étagé comprend au moins une surface inclinée, pour diriger l'écoulement d'air d'alimentation en air de refroidissement (42) sensiblement horizontal vers le bas pour sortir de la grille d'alimentation en air de refroidissement supérieure (24).

14. Armoire de vente réfrigérée (2) selon l'une quelconque des revendications précédentes,

dans laquelle la partie toit (6) s'étend sensiblement horizontalement à l'avant de l'extrémité supérieure d'une paroi arrière (8) sensiblement verticale du corps d'armoire (4) ; et/ou

dans laquelle un conduit d'air vertical (38) relié au conduit d'air supérieur (36) est formé entre une paroi arrière du corps d'armoire (4) et un panneau arrière (16) limitant l'arrière de l'espace de vente réfrigéré (12) ;

dans laquelle la partie inférieure de l'espace de vente réfrigéré (12) est limité par un panneau inférieur (18) ;

dans laquelle un conduit d'air inférieur (40) relié au conduit d'air vertical (38) est formé entre le panneau inférieur (18) et une partie inférieure du corps d'armoire (4) ; et/ou

dans laquelle le conduit d'air inférieur (40) s'étend d'une grille d'air de retour (34) placée à ou derrière une partie avant inférieure du corps d'armoire (4) à une partie arrière de celui-ci.

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15. Armoire de vente réfrigérée (2) selon la revendication 14,

dans laquelle les rideaux d'air de refroidissement avant et arrière fusionnent à une position au-dessus ou au niveau de la grille d'air de retour (34) ; et/ou

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dans laquelle au moins un élément de un circuit de compression vapeur, comportant un dispositif d'expansion et un évaporateur, est fourni dans l'un ou plusieurs des conduits d'air inférieur, vertical et supérieur (40, 38, 36).

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Fig. 1

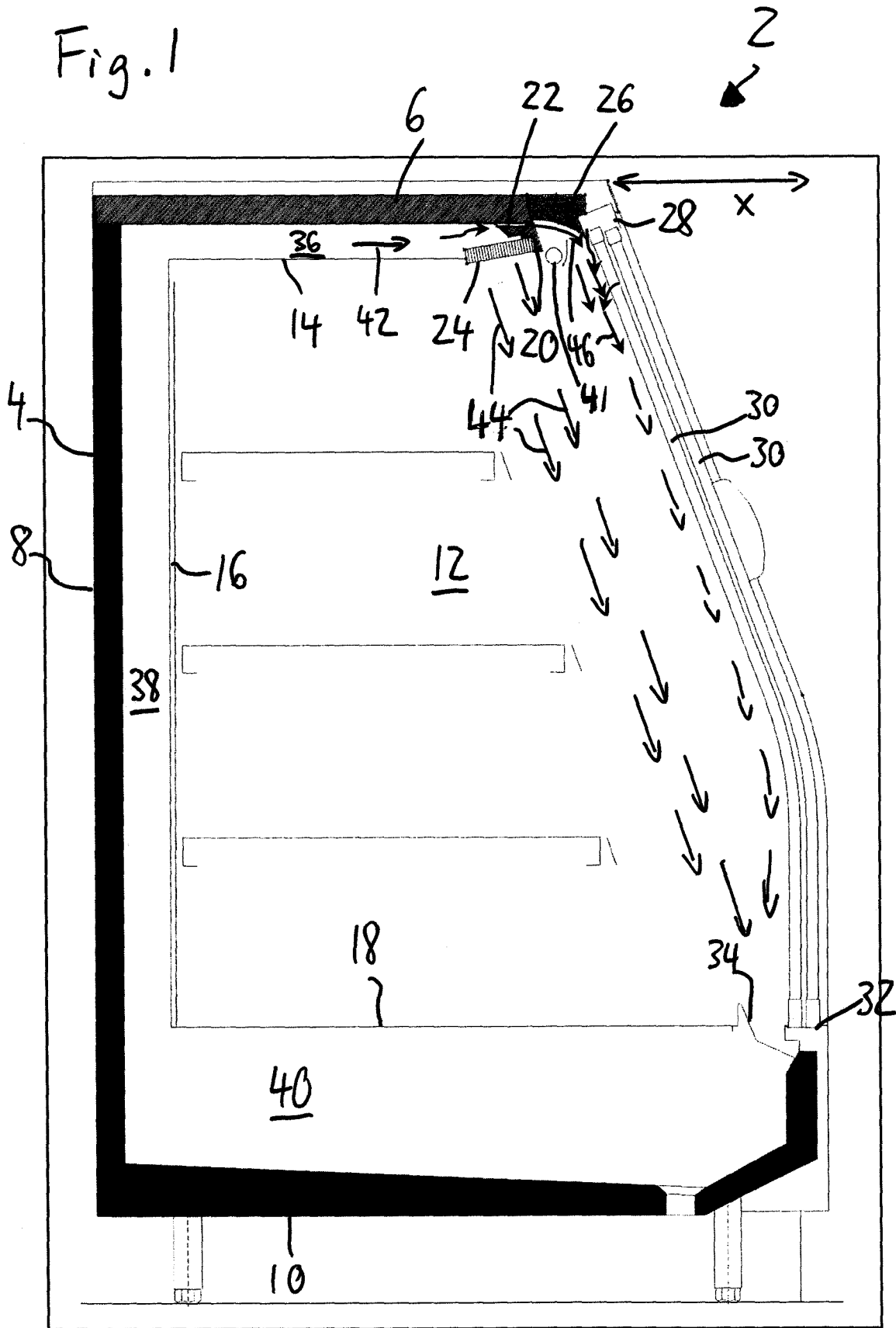
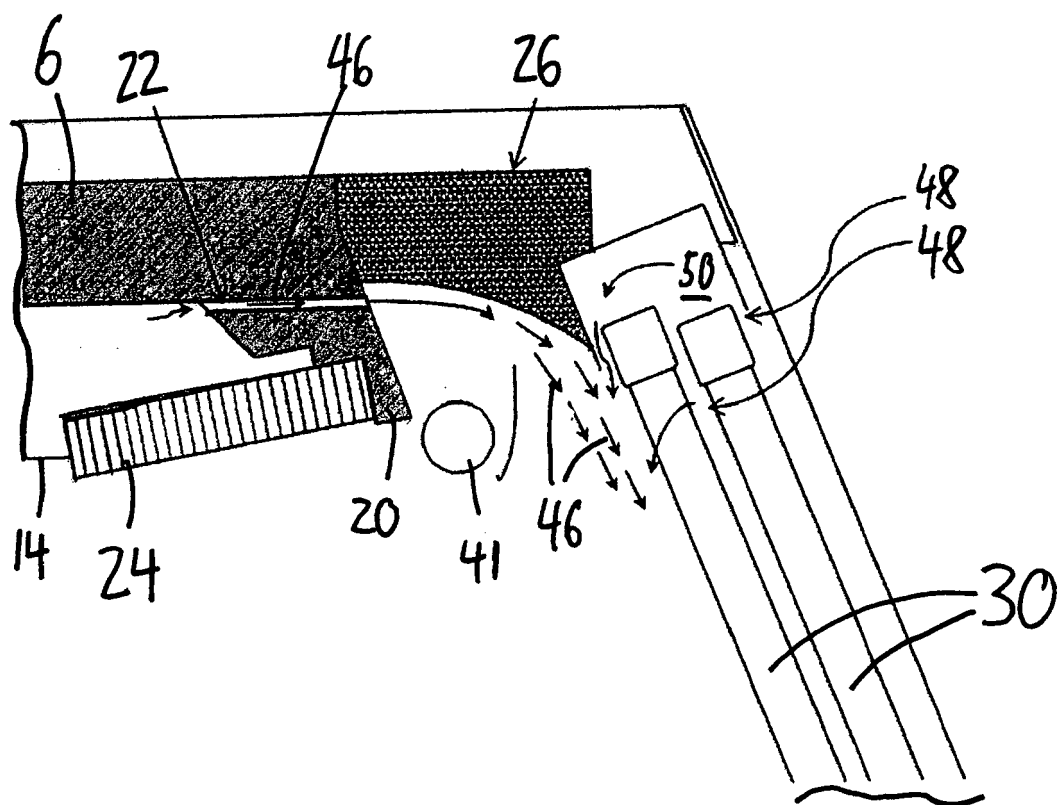


Fig. 2



REFERENCES CITED IN THE DESCRIPTION

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