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REFRIGERATED DISPLAY CASE

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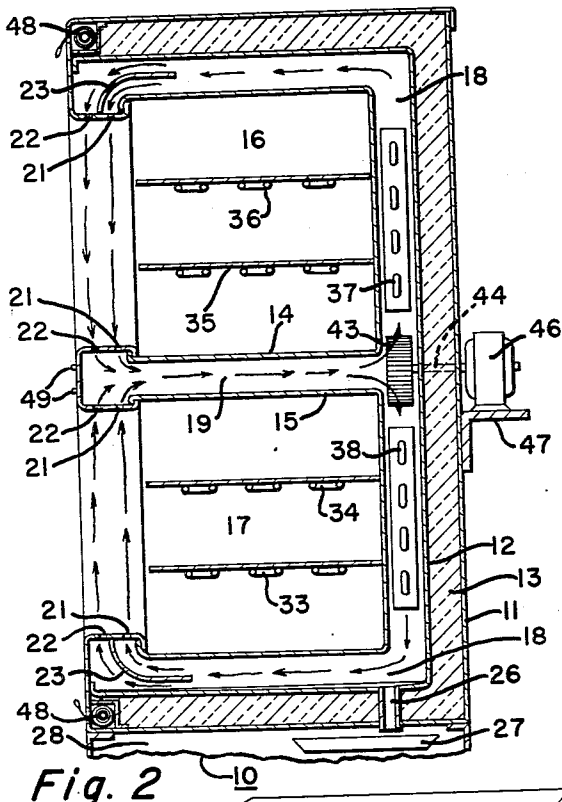


Fig. 2

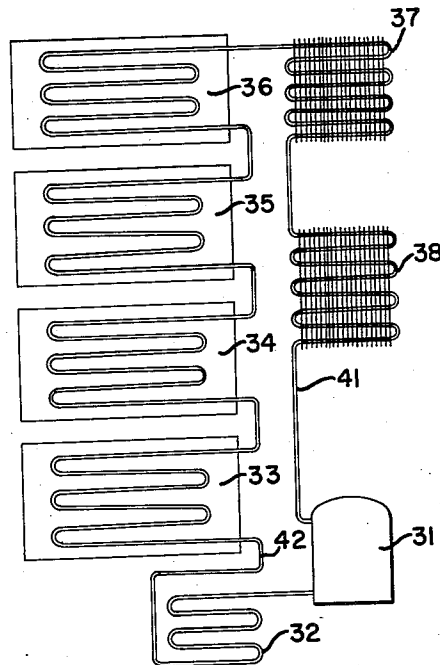


Fig. 3

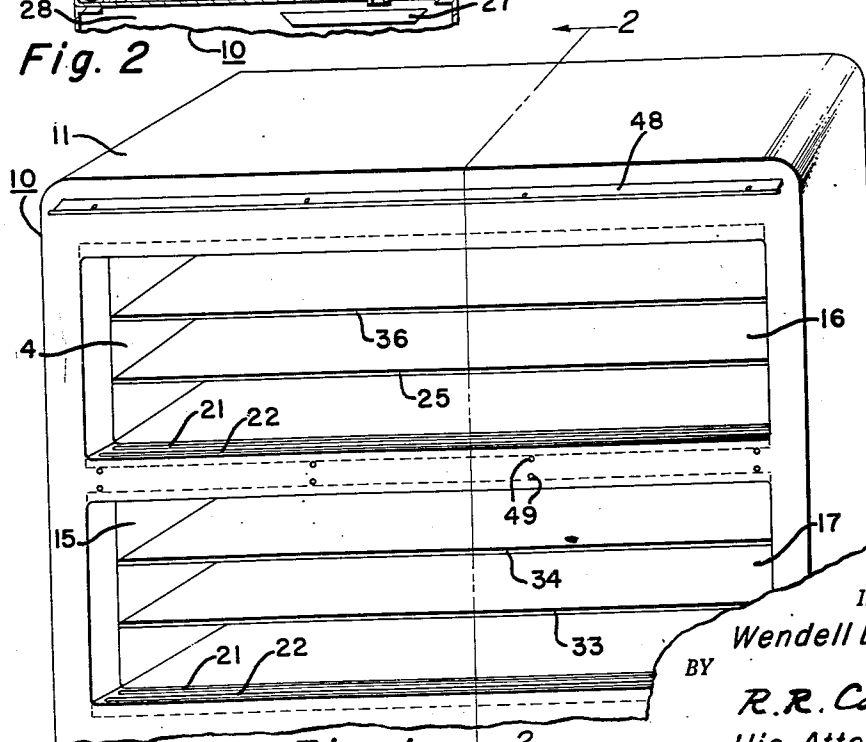


Fig. 1

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REFRIGERATED DISPLAY CASE

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This invention relates to refrigerated display cases of the self-serve type used in groceries to cool food products of a perishable nature while on display.

A primary object of my invention is to provide for the maintenance of proper air conditions in an open front reach-in type refrigerated display case having a suitable storage compartment or compartments and wherein it is desirable to maintain a free access opening at the front thereof at least during the time a grocery or the like in which the case is installed is open for business.

Another object of my invention is to maintain a blast of preferably cooled air across the access passage of an open front food storage compartment or chamber in an upright display case to inhibit flow of air from a room in which the case is located into the compartment.

A further object of my invention is to maintain a current of chilled air across the open front of a refrigerated compartment in an upright reach-in display case for maintaining a desirable air condition therein free from smoke and odors ambient to the cabinet structure of the case while service to the interior of the compartment is not obstructed or hampered.

A still further object of my invention is to provide means for stratifying or dividing a vertical stream or blast of chilled air maintained across an open front food storage compartment of an upright display case into a plurality of side by side streams of different velocity with a faster moving stream adjacent the compartment and a slower moving stream exposed to air ambient to the cabinet for protecting the faster moving stream and for reducing turbulence of air adjacent the open front compartment to a minimum.

A more specific object of my invention is to provide an upright open front compartment display case cabinet with hollow walls forming an air passageway around a compartment therein in which an air cooling means and means for circulating the cooled air around walls of the compartment to chill same and across an open front thereof are located and wherein vertically spaced apart individual refrigerated shelves are mounted in the compartment to augment cooling of foods supported therein.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Figure 1 is a front perspective view of an upright open front display case in which my invention is embodied;

Figure 2 is a vertical sectional view through the display case shown in Figure 1 and taken on the line 2—2 thereof; and

Figure 3 is a diagrammatic illustration of a refrigerating system associated with the display case.

Referring to the drawings which illustrate my invention, I show in Figure 1 thereof a display case comprising a substantially rectangularly shaped upright cabinet generally represented by the reference numeral

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10. The display case cabinet 10 comprises an outer metal sheath or panels 11 and a metal liner 12 having insulating material 13 disposed therebetween (see Figure 2). Cabinet 10 also includes two spaced apart metal liners 14 and 15 spaced from liner 12 and forming the top, bottom, sides and back walls of superimposed food storage compartments 16 and 17 within the cabinet. The spacing of liners 14 and 15 from liner 12 provides a tunnel or passageway 18 extending substantially across the top of compartment 16, across the bottom of compartment 17, and across the back of these compartments. The spacing apart of liners 14 and 15 provides a tunnel or passageway 19 between the bottom of compartment 16 and the top compartment 17 which communicates at its rear with passageway 18 (see Figure 2) for a purpose to be hereinafter described. The two compartment liners 14 and 15 are joined to liner 12 at the forward side of cabinet 10 to provide opposed walls about front access openings or passages for compartments 16 and 17. Both the upper and lower horizontal walls of the open front of each compartment 16 and 17 are provided with air inlet and outlet means in the form of elongated openings or slots 21 and 22 (see Figures 1 and 2). A curved splitter baffle 23 is mounted in any suitable manner between the slots 21 and 22 in passageway 18 at the upper wall of the access opening of compartment 16 and at the lower wall of the access opening of compartment 17. A drain pipe 26 extends from passageway 18 through the bottom insulated wall of cabinet 10 and is adapted to discharge water, upon defrosting an evaporator or evaporators of a refrigerating system located in passageway 18, into a pan or receptacle 27 located in a machine compartment 28 provided in the lower portion of cabinet 10. Defrost water received in pan 27 may be evaporated therefrom into the room air in any suitable manner as is now conventional and well known to those skilled in the art. The machine compartment 28 may house a refrigerant translating device portion of a closed refrigerating system associated with cabinet 10. This portion of the refrigerating system comprises a motor-compressor unit 31 and a condenser 32 (see Figure 3). The refrigerating system also includes four sheet metal plate-like evaporators 33, 34, 35 and 36 and two finned evaporator coils 37 and 38. Evaporators 33, 34, 35, 36, 37 and 38 are connected to one another and to the refrigerant translating device portion of the system by suitable conduits. The evaporators may be connected in series flow or parallel flow relationship in the system as desired. In the present disclosure the evaporators are connected in series and refrigerant is withdrawn from evaporator 38 by the compressor of unit 31 through a conduit 41. The withdrawn evaporated refrigerant is compressed in the unit 31 and discharged therefrom into condenser 32 wherein it is cooled and liquified, in any suitable or conventional manner, and forwarded to evaporator 33 through a conduit 42 under control of a suitable restrictor or expansion valve (not shown). In the present disclosure the sheet metal plate-like evaporators 33, 34, 35 and 36 form refrigerated shelves or food supports which are mounted in compartments 16 and 17 in any suitable or conventional manner and vertically spaced from one another. It is to be understood that the plate-like evaporators may be fabricated by any of the now well known methods and that in serving as shelves in compartments 16 and 17 they support and directly refrigerate food products placed thereon. The finned evaporators 37 and 38 are mounted one above the other in the rear portion of passageway 18 in cabinet 10. A fan or blower 43 is located in the rear portion of passageway 18 intermediate evaporators 37 and 38 and opposite the point of communication of passageway 19 with passageway 18. Fan or blower 43 is mounted

on the end of a shaft 44 of a motor 46 and extends through the rear insulated cabinet wall to the motor which is supported externally of cabinet 10 on a bracket or the like 47. It is to be understood that I contemplate the provision of more than one fan or blower and motor if desired or if found necessary. Since the food storage compartments 16 and 17 are open at their front it is desirable to provide some means of closing their front opening at night or at other times a grocery or the like store is closed. For this reason I provide a closure for the open front of each compartment in the form of a flexible rolled blind 48 at the front top side of cabinet 10 and at a point below compartment 17. These blinds 48 may be spring wound and provided with tabs at their end which may be buttoned to suitable buttons 49 or hooked over suitable hooks at the front central part of cabinet 10. In the present illustration the slots 21 and 22 in the top wall of the front opening of compartment 16 and the slots 21 and 22 in the bottom wall of the front opening of compartment 17 provide air outlets or discharge openings. The slots 21 and 22 in both the bottom wall of the front opening of compartment 16 and the top wall of front opening of compartment 17 provide air inlets.

In my display case the interior of compartments 16 and 17 and food products stored therein are cooled in two different ways to a desired low temperature. The interior of the compartments are cooled by the plate-like evaporators and by cool air circulated around walls of the compartments. According to my invention air is drawn into passageway 19 by fan or blower 43 circulated upward in passageway 18 over or through evaporator 37 and downwardly in passageway 18 over or through evaporator 38. These evaporators chill the air and the fan or blower forwards this chilled air through the horizontal portions of passageway 18 toward the upper and lower outlet means or slots 21 and 22. It is desirable to stratify air discharged from the upper and lower air outlets and for this reason I arrange the splitters 23 to scoop or pick up a greater amount of the circulating air and discharge same from slots or openings 21 in a first fast moving stream across the open front of compartments 16 and 17. Air which flows around the splitters 23 has farther to travel before being discharged from the outlet ends of passageway 18 and is consequently of slower speed than air scooped by the splitters. The lesser amount of air which flows around the splitters 23 is discharged from the slots or openings 22 in a second slower moving stream across the open front of compartments 16 and 17 in side by side relationship to the first stream of air. The air of the first or inner stream thereof adjacent the compartments 16 and 17 flows into the inlet slots 21 at the bottom wall of the front opening of compartment 16 and into the slot 21 at the top wall of the front opening of compartment 17, whereupon to return the same through passageway 19 to the fan or blower 43 for recirculation around the compartments and across their open fronts. The air of the second or outer stream thereof follows this same course but enters passageway 19 by way of the slots 22. In this manner I provide a vertical blast or curtain of cool air across the open front of each compartment 16 and 17 which air curtain inhibits loss of cold air from the compartments and entrance of warm air ambient to cabinet 10 into the compartments. The arrangement is such that the vertical blast or curtain or air circulated across the open front of compartments 16 and 17 comprises two streams in side by side relationship and of different velocity with respect to one another. This provides advantages over a single stream blast or curtain in that the outer or slower moving stream of air in the curtain thereof circulated across the open front of compartments 16 and 17 protects the inner faster moving streams and while eddy currents may sometimes occur in the outer stream of air the faster moving inner stream of air is not interrupted by such currents. The curtain of air is substantially uninterrupted except when a person

reaches into a compartment 16 or 17 to remove a food product therefrom which then momentarily breaks the continuous curtain. This break or interruption in the curtain of air across the front of a compartment is quickly closed or eliminated when the person removes his or her arm from within a compartment to reestablish the continuous curtain of air across the compartment open front.

From the foregoing it should be recognized that I have provided an apparatus wherein air conditions can be maintained in open front food storage compartments of an upright display case cabinet in an economical manner and without necessitating barriers for the compartments such, for example, as doors or windows which require operation by customers and surveillance by attendants to insure that the doors or windows are reclosed. The vertical air blast or curtain across the open front of food storage compartments in my display case permits desired low temperatures to be maintained in the compartments without being rendered disagreeable or contaminated by relatively warm, odor laden air in the room or store in which the display case is installed. While some of the air circulated in my display case may be lost to air externally thereof and particularly at the time customers are serving themselves from a food storage compartment therein this loss is infinitesimal and does not materially affect the refrigerating efficiency of cooling the compartments.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow:

What is claimed is as follows:

1. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of an open front food storage compartment therein, means for circulating air in a passageway around walls of said compartment, an evaporator of a refrigerating system within said passageway for cooling air circulated therein, one wall of said compartment front opening overlying another opposed spaced wall thereof and being provided with air outlet means therealong for discharging air from said passageway across the open front of said compartment, a splitter at said outlet means for stratifying air egressing therefrom into a plurality of side by side vertical streams of different velocity with the faster moving stream adjacent said compartment and protected from air ambient to said cabinet by the slower moving stream, and said another opposed wall of said compartment front opening being provided with air inlet means therealong for receiving air from said streams and returning same to said passageway.

2. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of an open front food storage compartment therein, means for circulating air in a passageway around walls of said compartment, an evaporator of a refrigerating system within said passageway for cooling air circulated therein, one wall of said compartment front opening overlying another opposed spaced wall thereof and being provided with air outlet means therealong for discharging air from said passageway across the open front of said compartment, a splitter at said outlet means for stratifying air egressing therefrom into a plurality of side by side vertical streams, the stream of air adjacent said compartment being protected from air ambient to said cabinet by another stream of air outermost of said compartment, and said another opposed wall of said compartment front opening being provided with air inlet means therealong for receiving and returning same to said passageway.

3. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of superimposed open front food storage compartments, said walls being hollow and providing a passageway around each of said compartments, means for circulating air in said passageway, an evaporator of a refrigerating system within said passageway for cooling air circulated therein, one wall of

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the open front of each compartment overlying another opposed spaced wall thereof and being provided with air outlet means therealong for discharging separate vertical curtains of air from said passageway across the open front of each of said compartments, and said another opposed wall of the open front of each compartment being provided with air inlet means therealong each receiving air from said separate curtains thereof and returning same to said passageway.

4. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of superimposed open front food storage compartments, said walls being hollow and providing a passageway around each of said compartments, means for circulating air in said passageway, an evaporator of a refrigerating system within said passageway for cooling air circulated therein, the upper wall of the open front of each compartment overlying the lower wall thereof, said upper wall of the open front of the top compartment and said lower wall of the open front of the bottom compartment each being provided with air outlet means therealong for discharging a first curtain of air from said passageway downwardly across the open front of said top compartment and a second separate curtain of air from said passageway upwardly across the open front of said bottom compartment, and said lower wall of the open front of said top compartment and said upper wall of the open front of said bottom compartment each being provided with air inlet means therealong for receiving air from said separate curtains thereof and returning same to said passageway.

5. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of an open front food storage compartment therein, means forming an air circulating passageway, means for circulating air through said passageway, one wall of said compartment front opening overlying another opposed spaced wall thereof and disposed in substantially the same vertical plane therewith, said one wall of said compartment front opening being provided with air outlet means therealong for discharging a curtain of air from said passageway across the open front of said compartment, a splitter at said outlet means for stratifying air egressing therefrom into a plurality of side by side vertical streams of different velocity with the faster moving stream adjacent said compartment and protected from air ambient to said cabinet by the slower moving outer stream, said another opposed wall of said compartment front opening being provided with air inlet means therealong for receiving air from said streams and returning same to said passageway, and means for refrigerating said compartment.

6. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of an open front food storage compartment therein, means forming an air

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circulating passageway, means for circulating air through said passageway, one wall of said compartment front opening overlying another opposed spaced wall thereof and disposed in substantially the same vertical plane therewith, said one wall of said compartment front opening being provided with air outlet means therealong for discharging a curtain of air from said passageway across the open front of said compartment, a splitter at said outlet means for stratifying air egressing therefrom into a plurality of side by side vertical streams of different velocity with the faster moving stream adjacent said compartment and protected from air ambient to said cabinet by the slower moving outer stream, said another opposed wall of said compartment front opening being provided with air inlet means therealong for receiving air from said streams and returning same to said passageway, means for cooling the air circulated across the open front compartment, and a plurality of vertically spaced apart refrigerated shelves within said compartment.

7. In a refrigerated display case, a cabinet having walls forming the top, bottom, sides and back of an open front storage compartment therein, a plurality of spaced apart superimposed food supports within said compartment, each of said plurality of food supports having their forward edge vertically aligned with one another and exposed at the open front of said compartment, means for circulating air in a passageway along walls of said compartment, an evaporator of a refrigerating system within said passageway for cooling the circulated air, one wall of said compartment front opening being disposed above another opposed spaced wall thereof and provided with air outlet means therealong for discharging air circulated by said circulating means from said passageway in a substantially vertical curtain past the forward edge of said food supports across the open front of said compartment, said another opposed wall of said compartment front opening being provided with air inlet means therealong for receiving air from said curtain and returning same to said passageway, and said alignment of the forward edge of said food supports substantially preventing diversion of said vertical air curtain in its flow across the open front of said compartment.

References Cited in the file of this patent

UNITED STATES PATENTS

2,241,854	Hall	May 13, 1941
2,261,681	Ullstrand	Nov. 4, 1941
2,332,174	Shreve	Oct. 19, 1943
2,516,432	Spencer	July 25, 1950
2,522,090	Brill	Sept. 12, 1950
2,558,997	Voelker	July 3, 1951