Oct. 5, 1954 J. R. PICHLER 2,690,650

OPEN TOP DISPLAY REFRIGERATING APPARATUS

Filed Sept. 23, 1952 3 Sheets-Sheet 1

Fig. 2

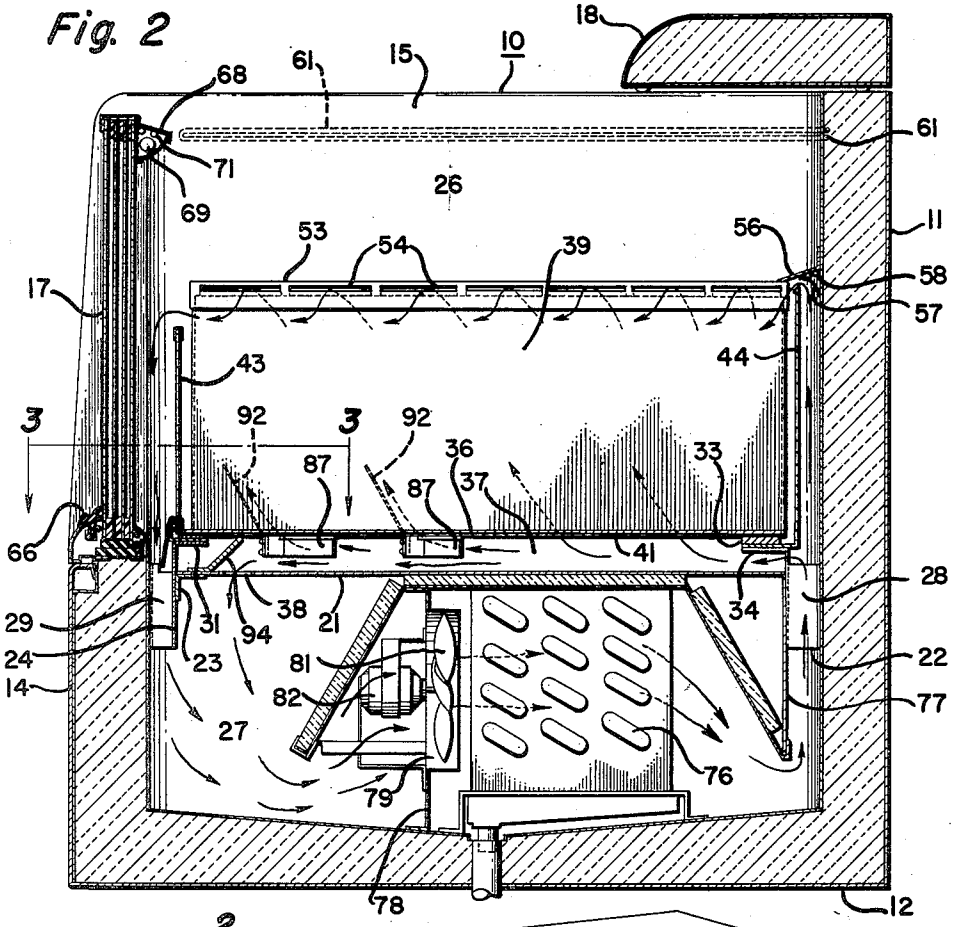
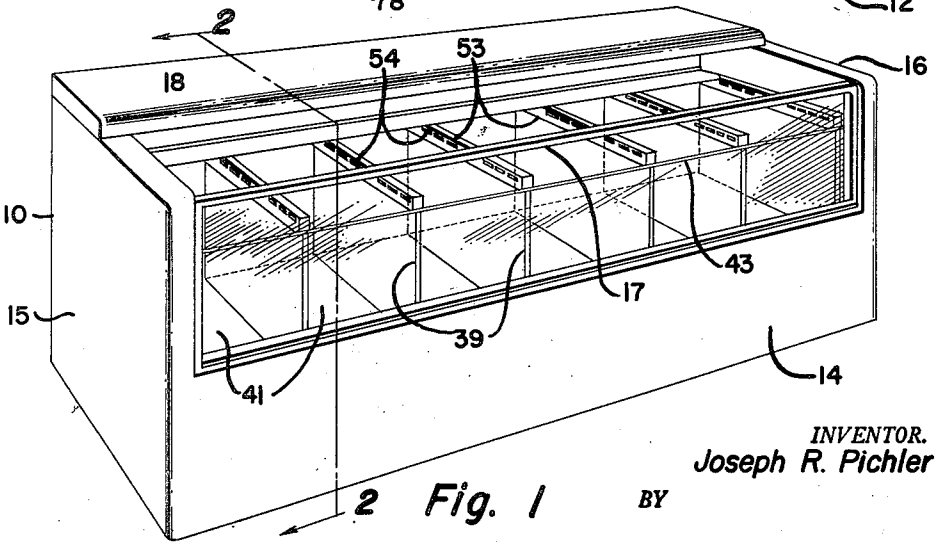


Fig. 1



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OPEN TOP DISPLAY REFRIGERATING APPARATUS

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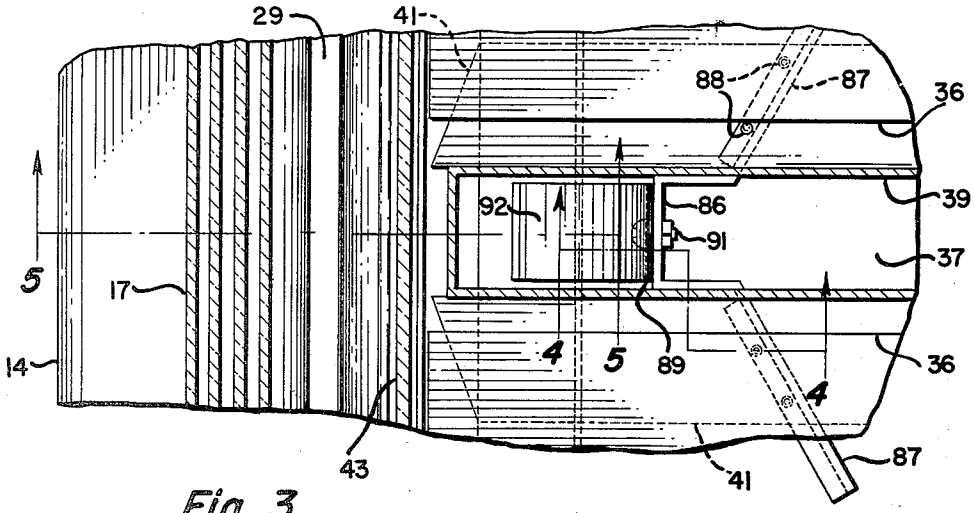


Fig. 3

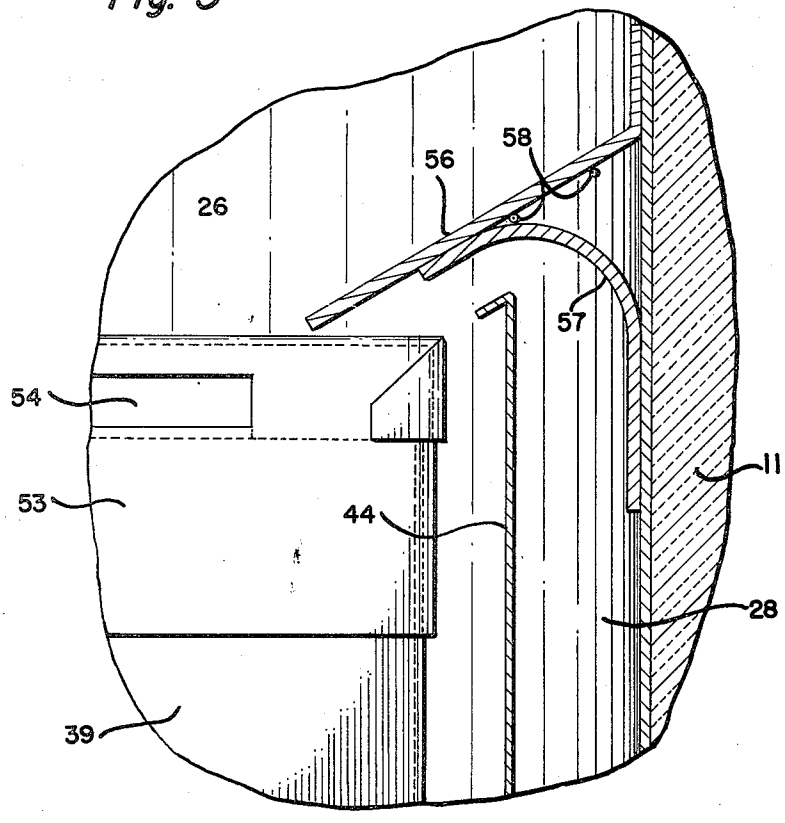


Fig. 6

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OPEN TOP DISPLAY REFRIGERATING APPARATUS

Filed Sept. 23, 1952 3 Sheets-Sheet 3

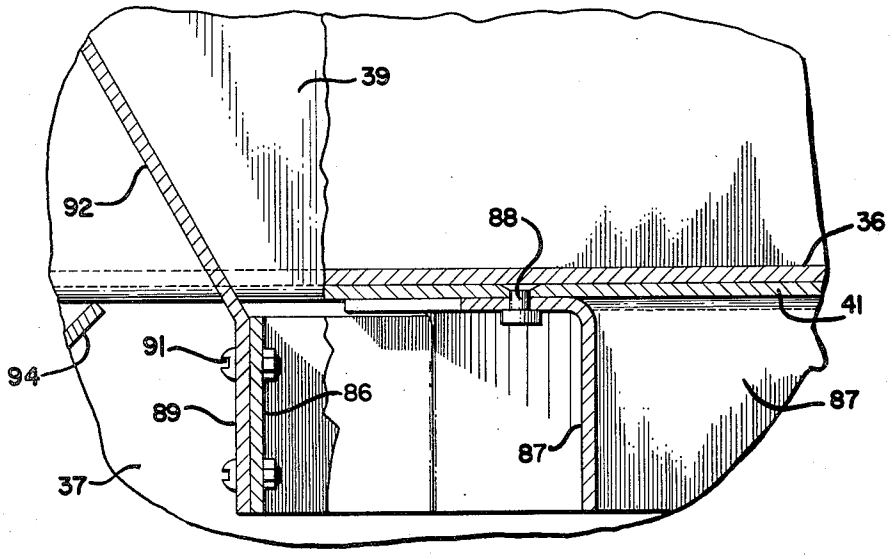


Fig. 4

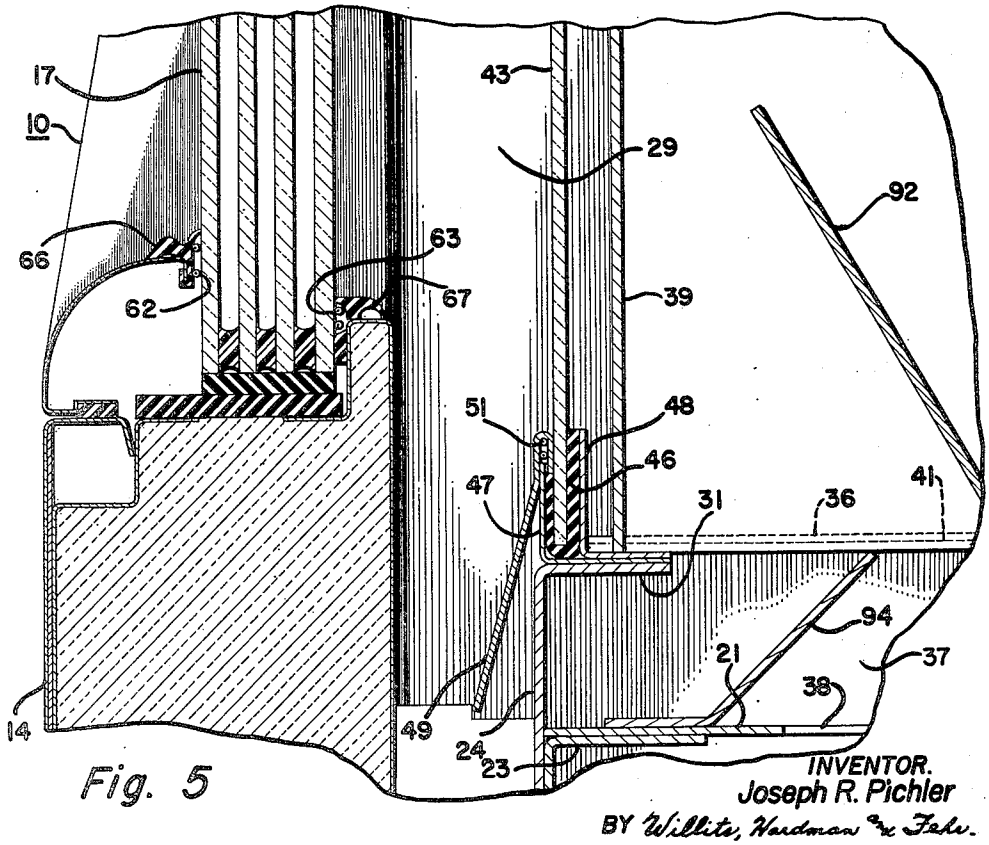


Fig. 5

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2,690,650

UNITED STATES PATENT OFFICE

2,690,650

OPEN TOP DISPLAY REFRIGERATING APPARATUS

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Application September 23, 1952, Serial No. 310,959

15 Claims. (Cl. 62—89.5)

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This invention relates to refrigerated display cases.

An object of my invention is to provide improvements in the construction of substantially open top refrigerated food storage and display cabinets and to improve the circulation of air in such cabinets.

Another object of my invention is to provide a more uniform circulation of air upwardly through narrow elongated vertically disposed hollow flues dividing a food supporting device located in an open top display case into a plurality of food storage compartments.

A further object of my invention is to provide means for preventing the accumulation of moisture, frost or ice on elements within an open top low temperatured food storage and display case exposed to air which enters the case.

A still further and more specific object of my invention is to provide scoops along vertically extending hollow flues in a refrigerated display case for directing air circulated about the case and particularly beneath and in a direction paralleling the open bottom end of the flues upwardly therethrough.

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 perspective view of a substantially open top low temperature frozen food storage and display case having my invention embodied therein;

Figure 2 is an enlarged vertical sectional view of the display case shown in Figure 1 and is taken on the line 2—2 thereof;

Figure 3 is an enlarged fragmentary horizontal sectional view of a portion of the display case and is taken on the line 3—3 of Figure 2;

Figure 4 is an enlarged fragmentary vertical sectional view taken on the line 4—4 of Figure 3 showing an air scoop associated with a vertical flue;

Figure 5 is an enlarged fragmentary vertical sectional view taken on the line 5—5 of Figure 3; and

Figure 6 is an enlarged fragmentary sectional view showing a deflector over an air passage at the rear of the display case and having heating means associated therewith.

This application is specifically directed to improvements in refrigerated display cases of the type disclosed and described in the copending

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application of Marshall W. Baker S. N. 193,795 filed November 3, 1950, Patent No. 2,661,604 dated December 8, 1953.

Referring now to the drawings, for illustrating the present improvement invention, I show in Figure 1 thereof an elongated substantially open top refrigerated food storage and display case generally represented by the reference character 10. This display case includes a cabinet provided with a long side or rear vertical wall 11 (see Figure 2), a bottom wall 12, a long side or front vertical wall 14 and vertical end walls 15 and 16. The walls 11, 12, 14, 15 and 16 are formed by spaced apart inner and outer metal sheets or panels having suitable insulating material therebetween as is conventional in the art. All the upright or vertical walls of cabinet 10 terminate in substantially the same horizontal plane. A multiple glass pane structure 17 forms the upper portion of the front wall 14 and extends from one end wall 15 to the other end wall 16 to provide a window through which foods or packaged food products on display in the cabinet or case may be viewed. A semi-ceiling 18 extends from the long side or rear wall 11 forwardly a short distance over the cabinet or case, relative to the other long side or front wall 14, to provide an opening at the top of case 10 as to permit customers to reach into the case and remove articles therefrom which they desire to purchase. While I have shown the display case 10 as including the semi-ceiling 18 it is to be understood that the semi-ceiling may be omitted to provide access through the open top of the case from either side thereof.

A sheet metal member 21 (see Figure 2) extends from end to end of case 10 throughout the length thereof and is secured, in any suitable or desirable manner, to a plurality of substantially Z-shaped or the like metal brackets 22 spaced apart along and mounted upon the long back wall 11 of the case. The sheet member 21 is supported from the long front wall 14 of cabinet 10 by being mounted on an angle iron 23 secured, in any suitable manner, to a closure member 24 having offset portions bolted to wall 14. This closure member 24 serves a dual purpose in a construction of the type disclosed which will become apparent from the following description. Member 21 is vertically spaced from the cabinet bottom wall 12 to divide the interior of case 10, intermediate its bottom and open top, into an upper chamber 26 and a lower chamber 27. The brackets 22 and closure member 24 project inwardly of the side walls 11 and 14

respectively of case 10 and the edges of member 21 are spaced from these side walls, throughout the length of the case, to provide a vertical uptake air passage 28 along wall 11 and a vertical return air passage 29 along wall 14. The air passages 28 and 29 provide communication between the upper and lower chambers 26 and 27 respectively of case 10. A bent inwardly projecting part 31 (see Figure 5) of closure member 24 extends along the long or front side wall of case 10 above the dividing member 21. A thick flat metal strip 33 extends along the other long side or rear wall of case 10 above member 21 and is carried by an inturned bent portion 34 on the horizontally spaced apart back brackets 22. The part 31 of closure member 24 and strip 33 form longitudinally extending mounting rails or the like for receiving a food supporting and storage device to now be described.

A food supporting device or structure is located in the upper chamber 26 of case 10 and rests on the longitudinal rails 31 and 33. This structure or device is coextensive with the dividing member 21 and comprises a plurality of imperforate portions in the form of flat plates 36 spaced vertically from member 21 to provide a passageway 37 therebetween which extends horizontally substantially across the interior of the case and has an inlet communicating with the uptake air passage 28. Plates 36 are disposed in spaced side-by-side relation and form the bottom of the food supporting device. The other front side or end of passageway 37 is closed by closure member 24 and a plurality of elongated openings 38 are provided in member 21, spaced inwardly of closure member 24, to form air outlets for the passageway 37 communicating with the lower chamber 27. It will be noted that divider member 21 forms the bottom wall of passageway 37 and the top wall of lower chamber 27. The food supporting device also comprises a plurality of narrow sleeve-like hollow vertical metal flues 39 disposed between the plates 36 (see Figure 3) and having outwardly directed feet 41 located beneath the edge portion of plates 36. Flues 39 extend transversely of the display case substantially across the food supporting device and are horizontally spaced apart along the length thereof. These flues provide double walled partitions dividing the food supporting device and consequently the interior of upper chamber 26 into a plurality of open top food receiving and storing compartments. The food supporting device further includes a vertically disposed long glass plate 43 forming the front wall thereof and a vertical metal plate 44 forming the rear wall of the device. Plate 43 is supported upon the inwardly directed part 31 of closure member 24 and has its lower edge imbedded in suitable resilient material 46 encased in metal elements 47 and 48 which are secured to part 31 in any desired or conventional manner (see Figure 5). An angular deflector 49 is hooked over metal element 47 for a purpose to be hereinafter described and provides a space under the hooked portion thereof for the reception of electric resistance heating means 51. Glass plate 43 is spaced from the multiple glass pane windowed wall portion 17 of the front wall 14 of case 10 and forms an upward continuation of the return air passage 29. Metal plate 44 is spaced from the inner surface of the case rear wall 11 to form an upper continuation of the uptake air passage 28 at the back of the cabinet. Plate 44 has an inturned foot portion secured between the rail 33 and the part 34 on the back brackets 22. The plates 43, 44 and the upper end of flues 39 terminate below the top of the upright walls of case 10. A cap 53, provided with a plurality of air outlet openings 54, is located over the open upper end of each of the flues 39. The caps 53 are telescoped over the flues so as to be readily removed therefrom. Openings 54 in caps 33 are adapted to direct air egressing from the upper end of flues 39 laterally and downwardly onto and over food stored in the compartments adjacent the flues.

An angularly disposed metal piece 56 and a curved metal piece 57 both secured to the inner surface of the inner panel of the case back wall 11 (see Figure 6) cooperate to form a deflector cap over the uptake air passage 28 and an electric resistance heating means 58 is secured to metal piece 56 within the space between this piece and the curved metal piece 57. An electric resistance heating means 61 is imbedded in the insulating material of walls 11, 15 and 16 and disposed in heat exchange relationship with the inner metal surface or panel of these walls. Similar electric resistance heating means 62 and 63 are mounted under rubber or the like gaskets 66 and 67 respectively at opposite sides of the lower portion of multiple pane glass front wall structure 17 of case 10 (see Figure 5). The upper part of the multiple pane glass structure 17 carries a metal lamp bracket 68, containing a suitable lamp such as a fluorescent bulb 69, and an electric resistance heating means 71 is located in thermal exchange relationship with the under side of this bracket (see Figure 1). The purpose of all these electric heating means will be described hereinafter.

An elongated refrigerant evaporator 76, forming a part of a closed refrigerating system (not shown), is disposed within the lower chamber 27 of display case 10 and the refrigerating effect produced by this evaporator provides refrigerating means which cools the air within the case to a sub-freezing temperature. Evaporator 76 may be of any suitable or conventional construction and is preferably of the tube and fin type extending substantially throughout the length of case 10. A plate 77 forms a lower extension of the uptake air passage 28 into the bottom chamber 27. A vertical metal partition 78 within lower chamber 27 of the display case extends substantially throughout the length thereof and is provided with a plurality of longitudinally spaced apart round openings 79. A fan or blower 81, driven by an electric motor 82, is located in each of the openings 79. These fans form means for forcing air over the evaporator 76 where it is cooled thereby and thereafter circulated throughout the interior of case 10 in a manner to now be described.

Operation of the refrigerating system causes evaporation of refrigerant within evaporator 76, as is well-known to those skilled in the art, and the energization of each motor 82 rotates the same to drive the fans 81. Rotation of fans or blowers 81 causes the same to create a low pressure area within chamber 27 of case 10 in the vicinity of the return air passage 29 and draws air therefrom and circulates this air over the evaporator. This causes air to be withdrawn from the upper food storage chamber 26 of the display case 10. Air cooled by evaporator 76 is forced under plate 77 and upwardly through the uptake air passage 28. The inlet end of horizontal passageway 37 is an open communication

with the air duct or passage 28, intermediate its ends, and some of the cold air flowing upwardly in the duct or passage will enter the passageway 37. Air entering passageway 37 flows transversely across the display case in a direction paralleling the flues 39. The open bottom ends of the flues 39 communicate with passageway 37 and the food supporting device divides the air entering this passageway into a plurality of streams of air some of which flow upwardly through the flues 39 and are discharged over or upon frozen food products stored in the food storage compartments while the other streams of air flow from the inlet end of passageway 37 to a point adjacent the front portion of case 10. These other or transversely flowing streams of air are directed out of passageway 37, by way of the openings 38 in divider member 21, downwardly into the lower chamber 27 without exposure to air exteriorly of the case. These other streams of air are mixed with air egressing from the return air passage 29, within chamber 27, and are thus tempered or blended prior to flow thereof over evaporator 16. At this time air flowing upwardly through the uptake air passage 28 is directed, by the deflector cap means, formed by the metal pieces 56 and 57, into the food storage compartments and over or upon foods therein. Air discharged from the flues 39 and from the uptake passage 28 flow toward the front of the open top display case and over the top of glass plate 43 into the return air duct or passage 29. Thus air flowing over or into the food supporting device provides a film or blanket of air, at a below-freezing temperature, over foods stored in the upper chamber 26. The air circulation described provides a flow of cold air along the bottom of the food compartments and also along all upstanding walls thereof as well as into direct contact with packaged foods stored in the compartments.

It has been discovered that, due to the air being circulated across passageway 37 in a direction parallel to the extention of the flues 39, this cold air will not readily rise into the flues. This is particularly true in a structure of the type herein disclosed in the vicinity of the front side of passageway 37 where the fans or blowers tend to create a low pressure area. I therefore provide means which insure a positive flow of sufficient air upwardly through these flues at or adjacent to their forward ends. For this purpose I locate one or more means within passageway 37 which cooperate with the open bottom end of flues 39 for scooping a portion of the air flowing across passageway 37 into the flues for circulation upwardly therethrough. This means in the present disclosure includes air scoops formed of a metal piece having a substantially U-shaped portion 86 (see Figure 3) and integral laterally extending wings 87 disposed at an angle relative to the flues 39 and secured to the feet 41 thereof by rivets or the like 88 (see Figures 3 and 4). The angular disposition of wings 87 of the air scoops form funnel-like obstructions in the path of air flowing from the rear or inlet end substantially to the front or other end of passageway 37 and directs some of this air upwardly into the flues 39. Wings 87 are spaced vertically from divider member 21 to permit some of the air to pass therebetween. Each air scoop also includes another metal piece 89 (see Figure 4), secured to the U-shaped portion 86 of the winged metal piece by bolts 91, having a tongue 92 extending angularly up into the flues 39 a short distance.

It is desired to prevent the cold air flowing in passageway 37 from contacting the front portions of the passageway forming means so as to prevent the formation of frost or ice on the elements exposed to the return air duct or passage 29. For this reason I prevent the flow of air out of the front end of passageway 37 by blocking the same with closure member 24 and provide deflecting means within passageway 37 intermediate closure member 24 and the spaced apart elongated openings 38 in divided member 21 to prevent the by-passed cold air from contacting the closure member along the passageway 37. This deflecting means comprises a metal baffle angularly secured within the passageway 37 (see Figures 1 and 5) and extending throughout the length of the food supporting device. Baffle 94 forms a dead air pocket between it and the closure member 24 and serves to direct that portion of the air passing the air scoops in passageway 37 out of this passageway and downwardly into the display case bottom chamber 27 by way of the openings 38.

Moisture in air which infiltrates the display case through its open top tends to collect, in the form of condensation, frost or ice, on the cold surfaces of elements of the case exposed thereto. According to my invention I reduce or prevent such collection or accumulation by warming the cold surfaces of the exposed elements. This is the purpose of the electric heating means 51, 58, 61, 62, 63 and 71. These electric means comprise lengths of suitably insulated wires which offer resistance to the flow of electric current therethrough and thus become warm. The wires 51, 58, 61, 62, 63, and 71 may be secured in place to the various elements or parts of display case 10, hereinbefore described, in any suitable or well-known manner. Heat dissipated by the resistance wires prevents condensation of moisture out of the infiltrated air to thereby maintain the elements of the display case exposed to such air clear of moisture, frost or ice. For example, heat dissipated by wires 51, together with the fact that cold air flowing across passageway 37 is prevented from contacting the passageway and closure member 24, in addition to preventing the formation of frost on the inner metal wall of return air passage 29 also maintains the glass plate 43 clear of moisture. Heat dissipated by wires 58 is transmitted to the air deflector cap, formed by the metal pieces 56 and 57, to keep the upper surface of this deflector free of frost. Heat transmitted to the multiple pane glass structure 17 by wires 62 and 63 maintains the inner and outer surfaces of this structure clear of moisture condensation to permit viewing the contents of the display case through this structure. Heat applied to the upper portion of the display case walls 11, 15 and 16 by wires 61 prevent condensation of moisture on these walls and eliminate flow of condensate water downwardly therealong. Wires 71 heat the top surface of lamp bracket 68 to prevent the collection of condensate thereon.

In view of the foregoing it should be apparent that I have provided improvements in the construction of a display case which produces a uniform and more efficient flow of air upwardly through vertical flues from the one end to the other end thereof. By directing the cold air passing through the by-pass horizontal passageway out of the same inwardly of its front portion frost or ice is prevented from building up on the wall of the return air passage and obstructing the flow of air therethrough. Also by

providing means for warming elements of an open top display case exposed to air which enters the same I prevent the accumulation of moisture, frost or ice thereon.

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 food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air into said passageway in a direction paralleling said flues, and means cooperating with the open bottom end of said flues and extending laterally therefrom within said passageway for scooping a portion of the air circulated thereinto upwardly through said flues.

2. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air into said passageway in a direction paralleling said flues, means cooperating with the open bottom end of said flues and extending laterally therefrom within said passageway for scooping a portion of the air circulated thereinto upwardly through said flues, and means within said passageway beyond said air scooping means for directing that portion of the air passing said scooping means downwardly out of said passageway.

3. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air from one side to substantially the other side of said passageway in a direction paralleling said flues, air scoops cooperating with the open bottom end of said hollow flues for directing a portion of the air flowing into said passageway upwardly through said flues, said air scoops including wings disposed in said passageway and extending laterally from the sides of said flues, and said air scoops also including a tongue extending angularly upwardly into said flues.

4. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air from one side to substantially the other side of said passageway in a direction paralleling said flues, air scoops cooperating with the open bottom end of said hollow flues for directing a portion of the air flowing into said passageway upwardly through said flues, said air scoops including wings disposed in said passageway and extending laterally from the sides of said flues, said air scoops also including a tongue extending angularly upwardly into said flues, and a baffle within said passageway extending along said other side thereof for directing that portion of the air passing said scoops downwardly out of the passageway.

5. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air from one side to substantially the other side of said passageway in a direction paralleling said flues, closure means for said other side of said passageway, means cooperating with the open bottom end of said flues and extending laterally therefrom within said passageway for scooping a portion of the air circulated thereinto upwardly through said flues, and a baffle within said passageway and spaced inwardly from said closure means for directing that portion of the air passing said scoops downwardly out of the passageway.

6. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air from one side to substantially the other side of said passageway in a direction paralleling said flues, closure means for said other side of said passageway, air scoops cooperating with the open bottom end of said hollow flues for directing a portion of the air flowing into said passageway upwardly through said flues, said air scoops including wings disposed in said passageway and extending laterally from the sides of said flues and a tongue extending angularly upwardly thereinto, and means within said passageway spaced inwardly from said closure means thereof for directing that portion of the air passing said scoops downwardly out of the passageway.

7. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air into said passageway in a direction paralleling said flues, means cooperating with the open bottom end of said flues for scooping a portion of the air circulated into said passageway upwardly through said flues, said air scooping means including wings disposed in said passageway in spaced relation to said first named means and extending

laterally from the sides of said flues, and said air scooping means also including a tongue extending angularly upwardly into said flues.

8. In a refrigerated display case, a food supporting device therein, means spaced from the bottom of said device and forming a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of food storage compartments, said flues having their bottom end communicating with said passageway, means for cooling air within said case, means for circulating at least some of the cooled air into said passageway in a direction paralleling said flues, means cooperating with the open bottom end of said flues for scooping a portion of the air circulated into said passageway upwardly through said flues, said air scooping means including wings disposed in said passageway in spaced relation to said first named means and extending laterally from the sides of said flues, and a tongue extending angularly upwardly into said flues, and means within said passageway beyond said air scooping means for directing that portion of the air passing said scooping means downwardly out of said passageway.

9. In a refrigerated display case, a cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and extending from one end wall to the other end wall of said cabinet to divide the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide an uptake air passage along one side wall of said cabinet and a return air passage along the other side wall thereof, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said member being spaced from said cabinet side walls to permit communication of said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber through said uptake air passage, some of the air circulated into said uptake passage flowing into said horizontal passageway in a direction paralleling said flues, means cooperating with the open bottom end of said hollow flues and extending laterally therefrom within said horizontal passageway for scooping a portion of the air entering the same upwardly through said flues, means for directing that portion of the air passing said air scooping means downwardly out of said horizontal passageway into said lower chamber wherein it is mixed with air circulated downwardly from said upper chamber through said return air passage, and refrigerating means within said lower chamber in the path of mixed air flowing thereacross for cooling the same.

10. In a refrigerated display case, a cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and extending from one end wall to the other end wall of said cabinet to divide the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide an uptake air passage along one side wall of said cabinet and a return air passage along the other side wall thereof, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said member being spaced from said cabinet side walls to permit communication of said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber over foods stored in said compartments through said uptake air passage, some of the air circulated into said uptake passage flowing into said horizontal passageway from one side to substantially the other side thereof, said device dividing the air entering said horizontal passageway into a plurality of streams of air some of which flow substantially across said horizontal passageway while others flow upwardly through said flues and over food stored in said horizontal passageway, air scoops cooperating with the open bottom end of said hollow flues for directing a portion of the air entering said passageway upwardly through said flues, said air scoops including wings disposed in said horizontal passageway in spaced relation to said dividing member and extending laterally from the sides of said flues, closure means for said other side of said horizontal passageway, means within said horizontal passageway spaced inwardly from said closure means thereof for directing that portion of the air passing said scoops downwardly out of said horizontal passageway into said lower chamber wherein it is mixed with air circulated downwardly from said upper chamber through said return air passage, and refrigerating means within said lower chamber in the path of mixed air flowing thereacross for cooling the same.

11. In a refrigerated display case, an elongated open top cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and extending from one end wall to the other end wall of said cabinet to divide the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said dividing member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide a return air passage along one side wall and an uptake air passage along the other side wall thereof, a deflector cap over said uptake air passage, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate open top food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said member being spaced from said cabinet side walls to permit communication of said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber over foods stored in said compartments through said uptake air passage, some of the air circulated into said uptake passage flowing into said horizontal passageway from one side to substantially the other side thereof, said device dividing the air entering said horizontal passageway into a plurality of streams of air some of which flow substantially across said horizontal passageway while others flow upwardly through said flues and over food stored in said

compartments, closure means for said other side of said horizontal passageway, means spaced inwardly from said closure means for directing air flowing across said horizontal passageway through said dividing member and into said lower chamber wherein it is mixed with air circulated downwardly from said upper chamber through said return air passage, refrigerating means within said lower chamber in the path of mixed air flowing thereacross for cooling the same to a temperature below freezing, and electric heating means disposed in thermal exchange relationship with said uptake air passage deflector cap and with said passageway closure means for warming the same and preventing formation of frost or ice thereon.

12. In a refrigerated display case, an elongated open top cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and extending from one end wall to the other end wall of said cabinet to divide the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said dividing member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide a return air passage along one side wall and an uptake air passage along the other side wall thereof, a deflector cap over said uptake air passage, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate open top food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said member being spaced from said cabinet side walls to permit communication of said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber over foods stored in said compartments through said uptake air passage, some of the air circulated into said uptake passage flowing into said horizontal passageway from one side to substantially the other side thereof, said device dividing the air entering said horizontal passageway into a plurality of streams of air some of which flow substantially across said horizontal passageway while others flow upwardly through said flues and over food stored in said compartments, closure means for said other side of said horizontal passageway, means spaced inwardly from said closure means for directing air flowing across said horizontal passageway through said dividing member and into said lower chamber wherein it is mixed with air circulated downwardly from said upper chamber through said return air passage, refrigerating means within said lower chamber in the path of mixed air flowing thereacross for cooling the same to a temperature below freezing, and electric means disposed in thermal exchange relationship with the inner surface of the upper portion of said cabinet side and end walls, with said uptake air passage deflector cap and with said passageway closure means for warming the same.

13. In a refrigerated display case, an open top cabinet including a bottom wall, upright side walls and upright end walls, a partitioning member spaced vertically from said cabinet bottom wall and dividing the interior of the cabinet into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in vertically spaced relation to said partitioning member to form a passageway therebetween, said device including spaced apart hollow vertical flues extending thereacross and dividing the same into a plurality of open top food storage compartments, said flues having their bottom end communicating with said passageway, said device being spaced from each of two opposed upright walls of said cabinet to provide air passages therearound communicating with said upper and said lower chambers, means within said lower chamber for cooling air in said cabinet, means for circulating the cooled air about said device and substantially across said passageway, means within said passageway cooperating with the open bottom end of said flues, and said last named means including wings disposed at an angle relative to the flow of air across said passageway for scooping some of the air upwardly through said flues.

14. In an open-top refrigerated display case, a cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and dividing the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide an uptake air passage along one side wall of said cabinet and a return air passage along the other side wall thereof, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate open-top food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said member being spaced from said cabinet side walls to permit communication of said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber through said uptake air passage, means within said cabinet for cooling the air circulated therein, some of the air circulated transversely across said lower chamber toward said uptake passage flowing into said horizontal passageway in a direction paralleling said flues, and means within said passageway depending from and cooperating with the open bottom end of said hollow flues for scooping a portion of the air entering the passageway upwardly through said flues.

15. In a refrigerated display case, a cabinet including a bottom wall, upright side walls and upright end walls, a member spaced vertically from said cabinet bottom wall and extending from one end wall to the other end wall of said cabinet to divide the interior thereof into an upper chamber and a lower chamber, a food supporting device inset within said upper chamber and mounted in spaced relation to said member to form a horizontal passageway therebetween, said device being spaced from said cabinet side walls to provide an uptake air passage along one side wall of said cabinet and a return air passage along the other side wall thereof, said device including a plurality of spaced apart vertical hollow flues extending thereacross and dividing the same into separate food storage compartments, said flues having their bottom end communicating with said horizontal passageway, said mem-

ber being spaced from said cabinet side walls to permit communication with said air passages with said upper and said lower chambers respectively, means for circulating air downwardly from said upper chamber through said return air passage, transversely across said lower chamber and back to said upper chamber through said uptake air passage, some of the air circulating toward said uptake passage flowing into said horizontal passageway, the air flowing into said passageway being divided into a plurality of streams of air one of which flows transversely across said cabinet beneath said food compartments toward said return passage while others flow upwardly through said flues and are discharged into said compartments, means preventing said one stream of air from entering said return passage,

means for directing said one stream of air out of said horizontal passageway into said lower chamber in the vicinity of said another cabinet side wall wherein it mixes with air circulated downwardly from said upper chamber through said return air passage, and refrigerating means within said lower chamber in the path of mixed air flowing thereover for cooling the same.

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