July 10, 1945. R. E. DAVIS 2,379,885

REFRIGERATED DISPLAY CASE

Filed Dec. 3, 1943 2 Sheets-Sheet 1

Fig. 1.

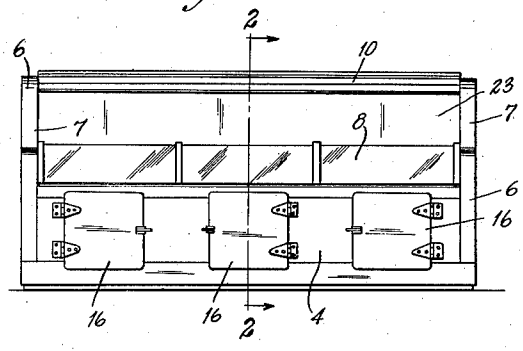


Fig. 4.

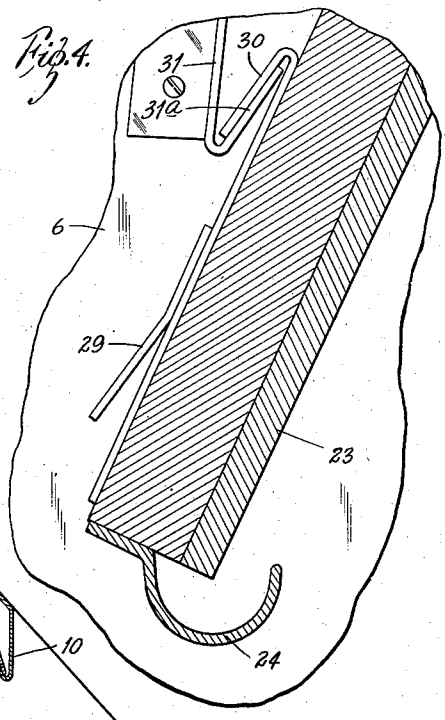
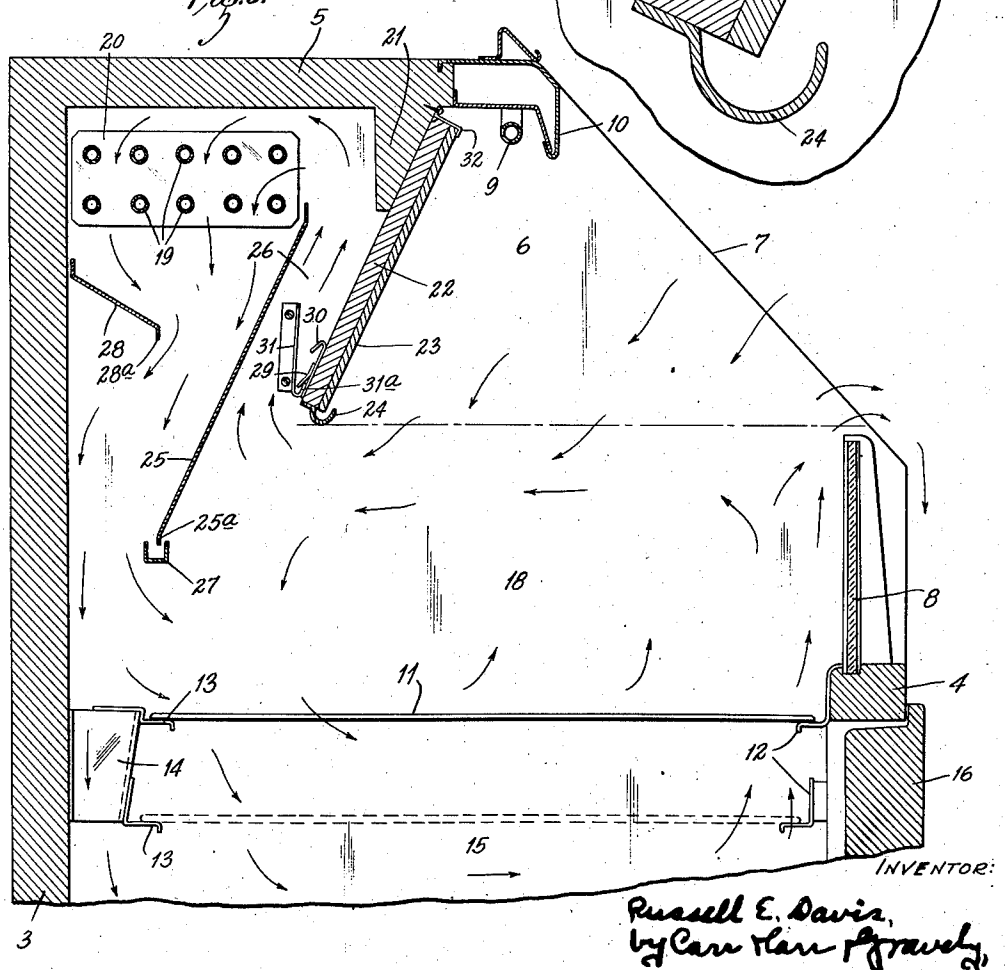


Fig. 3.



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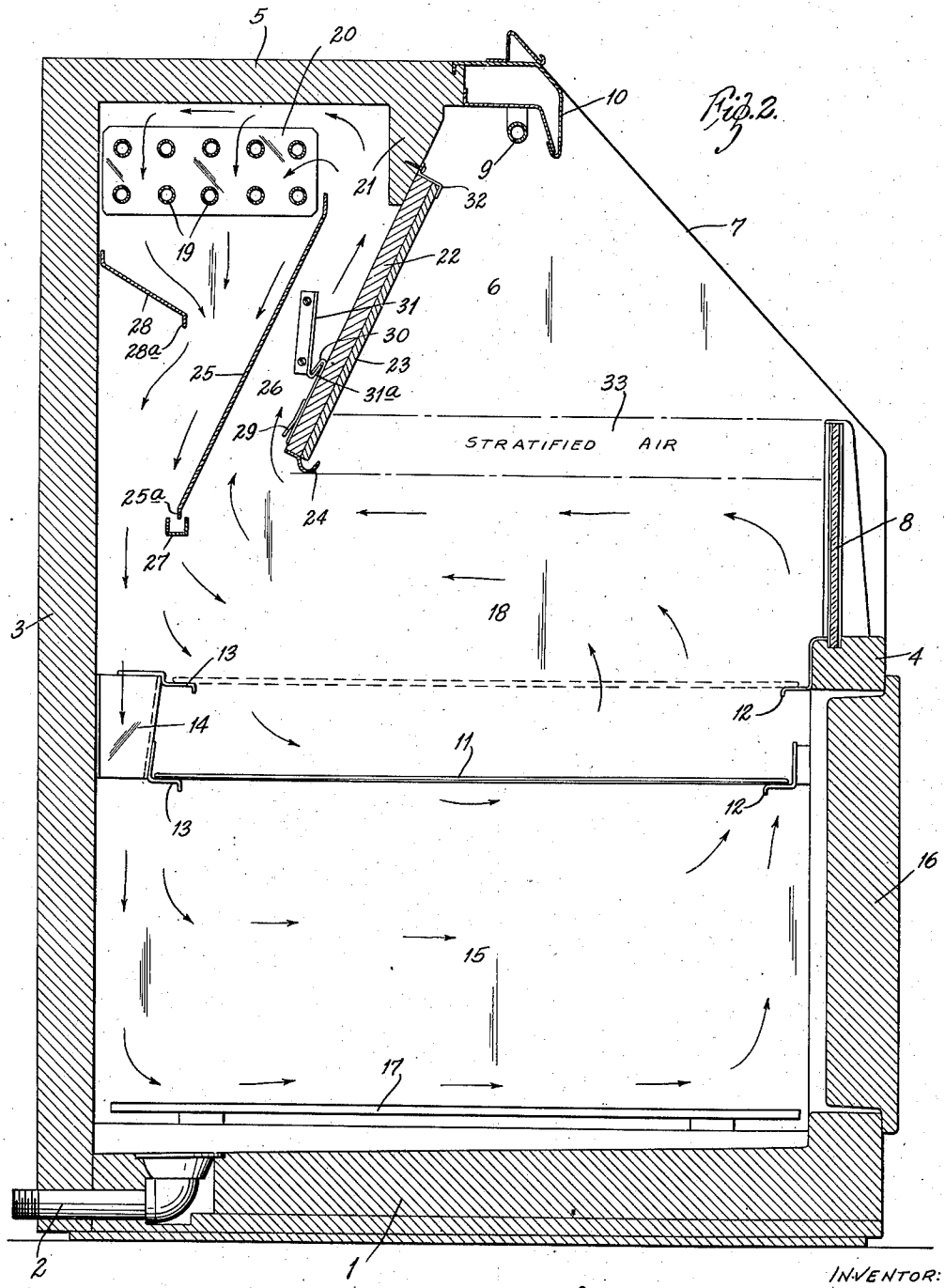


Fig. 2.

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UNITED STATES PATENT OFFICE

2,379,885

REFRIGERATED DISPLAY CASE

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Application December 3, 1943, Serial No. 512,695

8 Claims. (Cl. 62—89.5)

This invention relates to refrigerated display cases of the open top self-service type wherein the relatively low temperature and percentage of moisture required for the preservation of packaged meat and dairy products are maintained in the upwardly opening display chamber therefor by means of a baffle or curtain wall that is disposed in front of a cooling mechanism in the top of said case and extends below said mechanism and the level of the top of the front wall of said display chamber. The invention has for its principal objects to devise a refrigerated display case of the above type that is readily adjustable to provide a relatively high temperature and relative humidity therein for the preservation of fresh vegetable displays or to provide the comparatively low temperature and relative humidity heretofore provided for preserving packaged meat and dairy products. The invention consists in mounting the baffle or curtain wall so that it may be positioned with its lower edge below the level of the top of the front wall of the display chamber to obtain the relatively low temperature and percentage of moisture desired for packaged meat and dairy products or may be positioned with its lower edge above such level to obtain the higher temperature and relative humidity desired for fresh vegetables. The invention also consists in the open refrigerated display case and in the parts and combination of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a front elevational view of a refrigerated open-top self-service display case embodying my invention,

Fig. 2 is an enlarged vertical cross-sectional view through said case on the line 2—2 in Fig. 1, showing the case adjusted for displaying packaged meats and dairy products,

Fig. 3 is a view similar to Fig. 2 showing the case adjusted for displaying fresh vegetables; and

Fig. 4 is an enlarged fragmentary vertical cross-sectional view through the lower portion of the adjustable baffle, which is shown with its uppermost hook engaged with one of the supporting brackets therefor.

In the accompanying drawings, my invention is shown embodied in an open-top, self-service refrigerated display case comprising a bottom wall or floor portion 1 provided with a drain pipe 2, a relatively high rear wall 3, a relatively low front wall 4, a top wall or hood 5 extending from said rear wall and terminating short of said front wall, and end walls 6 having beveled front upper corners 7 that incline downwardly from the front edge of said top wall to the top edge of said front wall. As shown in the drawings, a glass plate or panel 8 constitutes the upper portion of the low front wall 4; and a suitable light, such as fluorescent tubing 9, is mounted on the underside of a wiring conduit, shade and reflector 10 which forms the front edge portion of the rearwardly disposed top wall 5 of the display case.

The case is provided below the level of the top edge of the low front wall 4 with an openwork or foraminous merchandise supporting tray or rack 11 whose forward edge rests on brackets 12 secured to said front wall and whose rear edges rest on brackets 13 secured to the front flanges of the upright channel-shaped members 14 whose rear flanges are secured to the high rear wall 3. Preferably a plurality of front brackets 12 and rear brackets 13 are provided at different levels so that said tray may be supported in said case at different levels. The space beneath the rack 11 constitutes a bottom storage chamber 15 to which access may be had through doors 16 in the front wall 4 below the glass upper portion thereof. The storage chamber 15 is shown provided with a suitable floor rack 17 for supporting merchandise therein clear of the floor 1, which slopes towards the drain pipe 2 so as to direct thereto any moisture that tends to accumulate in the bottom of the case. The space between the rack 11 and the level of the top edge of the front wall 4 constitutes an open-top display chamber or compartment 18.

Suitably supported in the rear upper portion of the display case close to the top wall 5 and rear wall 3 thereof is a refrigerating mechanism which extends substantially from end wall to end wall of the case and preferably comprises a series of tubes 19 that extend longitudinally thereof and are provided with transverse cooling fins or plates 20. The top wall or hood 5 is provided just rearwardly of the wiring conduit 10 along the front edge thereof with a depending strip or lip element 21 whose lower edge terminates a considerable distance above the level of the top edge of the front wall 4 of the case; and a curtain wall or baffle 22 inclines rearwardly and downwardly from said depending edge strip to a point above or below the level of said top edge of said front wall. The inclined curtain wall 22 extends from end wall 6 to end wall 6 of the case and is preferably provided with a mirror or other ornamental front facing 23 and has a gutter 24 along its bottom edge for receiving and carrying away

moisture that drips from said edge of said baffle.

The case is preferably provided rearwardly of and parallel with the rearwardly and downwardly inclined curtain wall 22 with a similarly inclined baffle 25 that extends from end wall to end wall of said case and cooperates with said curtain wall to form a flue 26 that leads upwardly from the lower edge of said curtain wall and opens into the upper portion of the case opposite the front side of the cooling unit. The inclined baffle 25 terminates at its upper edge close to the lower front corners of the radiating fins 20 of the cooling unit and extends below the level of the lower edge of the curtain wall 22 into the display chamber 18 where it terminates in a substantially vertical drip flange 25*a* that is disposed immediately above a trough 27 adapted to receive and carry away moisture that drips from said rear baffle member. A second baffle plate 28 is located immediately below the rear portion of the cooling unit and inclines forwardly and downwardly from the rear wall 3 of the case to a point short of the baffle 25 where it terminates in a depending drip flange 28*a* adapted to deposit moisture on the lower portion of said second baffle for delivery thereby to the trough or gutter 27.

The inclined curtain wall 22 is raised and lowered in the case to change the level of the lower edge of said wall preferably by means of downwardly opening hook members 29 and 30, respectively, that are rigidly secured to the back of said wall in vertically spaced relation and are adapted to be selectively engaged or interlocked with the upwardly hooked lower end portions 31*a* of supporting brackets 31 that are rigidly fixed to the end walls 6 of the display case. The upper end of the curtain wall 22 may be secured to the depending strip or lip 21 of the top wall 5 of the case by means of suitable brackets 32. By this arrangement, the curtain wall 22 may be adjusted so as to raise or lower the lower edge thereof relative to the top edge of the front wall 4 of the case. When the lowermost hook 29 on the curtain wall 22 is engaged with the supporting hooks 31*a* of the brackets 31, the lower edge of said wall is located slightly above the level of the top edge of the front wall 4 of the case. When the uppermost hook 30 carried by the curtain wall 22 is engaged with the support 31 therefor, said wall is disposed with its lower edge below the level of the upper edge of the front wall 4 of the case.

With the curtain wall 22 adjusted as shown in Fig. 2 to locate the lower edge of said wall below the level of the top of the low front wall 4 of the display case, the cycle of air circulation starts with the refrigerating unit chilling the air in the region thereof, thereby increasing the density of such air and causing it to drop through the space between the rear wall 3 of the case and the baffle 25 into the lower portion of the case, as indicated by the flow arrows. The refrigerated air in the lower portion of the case naturally becomes warmer and less dense, although still remaining colder and denser than room air, and the cold air in the space defined by the refrigerating unit, the rear wall 3 and the baffle 25 is denser and is located at a higher level than the air in the lower portion of the case; so that this denser, colder air moving downwardly from the refrigerating unit behind the baffle 25 feeds more cold air into the lower portion of the case, thereby causing a displacement of air rearwardly from the topmost layers of the refrigerated air and an upward flow of such displaced air through the flue 26 behind the curtain wall 22 to the refrigerating unit, where the displaced air is again chilled and the cycle continued. The low front wall 4 of the case extends above the level of the bottom edge of the curtain wall 22 thereof and thus permits the refrigerated air in the open top display chamber to rise above said lower edge of said curtain wall until this height, plus the atmospheric pressure exerted on the display space opening, balances the weight of the refrigerated air in the sealed spaced behind the curtain wall 22, thereby retaining the refrigerated air in the case. In the opening between the front wall 4 and the curtain wall 22 where the room air contracts the refrigerated air, there is substantially no displacement or mixing of the room air and refrigerated air, because the refrigerated air, being cold and dense, has a tendency to stay down, while the warmer and less dense room air has a tendency to stay up. In the area of contact between the room air and the refrigerated air between the level of the top edge of the front wall 4 and the level of the bottom edge of the curtain wall 22, a layer 33 of stratified air is formed, the temperature at the bottom of this layer is close to case temperature, and the temperature at the top of said layer is close to room temperature. This layer 33 of stratified or dead air insulates, to some degree, the refrigerated air from infiltration from the room air. Thus, a continuous closed thermo-siphon system is created which causes the air between the merchandise supporting rack 11 and the layer 33 of stratified air to pass upwardly through the flue 26 to the cooling unit where it is cooled to again start the hereinbefore described cooling cycle.

With the curtain wall 22 in the position of vertical adjustment shown in Fig. 3, that is, with its lower edge located adjacent to but entirely above the level of the top edge of the front wall 4 of the case, the cycle of air circulation starts with the air chilled by the refrigerating unit moving downwardly through the space between the rear wall 3 of the case and the baffle 25, as indicated by the flow arrows, and filling the lower portion of the case. The continuous downward movement of the dense cold air from the refrigerating unit into the lower portion of the case, causes the topmost layers of refrigerating air in the lower portion of the case to be displaced rearwardly and flow upwardly around the lower edge of the curtain wall through the flue 26 to the refrigerating unit where the displaced air is again chilled. As the top edge of the low front wall 4 of the case is slightly below the level of the bottom edge of the curtain wall 22, there is a continuous spillage or escape of refrigerated air from the lower portion of the case over the top edge of said low front wall, because the refrigerated air in the open top portion of the displaced chamber cannot rise high enough to balance the refrigerated air in the sealed space behind the curtain wall 22. This permits a continuous displacement of refrigerated air by room air entering at the lower edge of the curtain wall 22 thus bringing about a mixture of room air and refrigerated air, as indicated by the arrows in Fig. 3. A portion of the incoming room air mixes directly with the refrigerated air in the display chamber without passing over the refrigerating unit, and a portion passes over said unit. With the incoming room air comes moisture which raises the relative humidity of the mixture of refrigerated air and room air to a higher point. Thus, with the curtain wall 22 in the raised posi-

tion shown in Fig. 3, an open thermo-siphon system is created which provides a relatively higher refrigerating temperature and relative humidity in the case for the proper preservation of fresh vegetables. As there is a continuous spilling of air from the case over the top edge of the front wall 4 thereof and a continuous infiltration of room air into said case, a high relative humidity is maintained therein so long as the hereinbefore described air flow continues. Under certain conditions of operation, moisture may be deposited upon the vegetables due to the high relative humidity in the case and the closeness of the case air temperature to the dew point.

By the arrangement described, the same refrigerated display case may be used to properly refrigerate packaged meats and dairy products or fresh vegetables merely by adjusting the level of the lower edge of the curtain wall 22 of the case relative to the top edge of the front wall 4 thereof. Thus, with the curtain wall 22 adjusted so as to bring its lower edge below the level of the top edge of the front wall 4 of the case, a closed thermo-siphon system is provided which provides a relatively low temperature for the preservation of dairy and meat products and a relatively low relative humidity which prevents condensation of moisture on the wrappers of packaged products. On the other hand, when the curtain wall is raised to bring its lower edge above the level of the top edge of the front wall 4 of the case, an open thermo-siphon cooling system is provided wherein the temperature is higher and the relative humidity of percentage of moisture is greatly increased, a condition that is highly desirable for preserving fresh vegetables without loss of moisture therefrom.

Obviously, numerous arrangements may be provided for varying the level of the lower edge of the curtain wall relative to the top edge of the front wall of the case. Therefore, I do not wish to be limited to the specific form of curtain wall adjustment shown and described.

What I claim is:

1. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said rear wall above the level of said low front wall and terminating short of the latter, a refrigerating device in the top of said case above the level of said low front wall, a curtain wall depending from said top wall and in front of and extending below said refrigerating device, and means for selectively holding part of said curtain wall in such position that the bottom edge thereof is located a sufficient distance below the top edge of said low front wall to create a buffer layer of stratified air in said case between the air circulating therein and the atmosphere external thereto or in such position that said bottom edge is located a sufficient distance above said top edge to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case.

2. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said rear wall above the level of said low front wall and terminating short of the latter, a refrigerating device in the top of said case above the level of said low front wall, a curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, and means for selectively holding part of said curtain wall in such position that the bottom edge thereof is located a sufficient distance below the top edge of said low front wall to create a buffer layer of stratified air in said case between the air circulating therein and the atmosphere external thereto or in such position that said bottom edge is located a sufficient distance above said top edge to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case, said means comprising a support in said case and brackets fixed to said curtain wall in vertically spaced relation and adapted to be selectively engaged with such support.

3. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall and a top wall projecting from said rear wall above the level of said low front wall and terminating short of the latter, a refrigerating device in the top of said case above the level of said low front wall, a curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, a gutter rigid with said curtain wall along the lower edge thereof, a baffle spaced rearwardly of said curtain wall with its lower edge disposed below the level of the top edge of said low front wall, a gutter located beneath said lower edge of said baffle, and means for selectively holding part of said curtain wall in such position that the bottom edge thereof is located a sufficient distance below the top edge of said low front wall to create a buffer layer of stratified air in said case between the air circulating therein and the atmosphere external thereto or in such position that said bottom edge is located a sufficient distance above said top edge to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case.

4. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said rear wall above the level of said low front wall and terminating short of the latter, a refrigerating device in the top of said case above the level of said low front wall, a downwardly and rearwardly inclined curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, a downwardly and rearwardly inclined baffle spaced rearwardly of said curtain wall and extending above the level of the bottom of said refrigerating device and below the level of the top edge of said low front wall, a second baffle located below said refrigerating device and inclining downwardly from said high rear wall to a point located above the lower portion of said inclined first baffle, a gutter rigid with said curtain wall along the lower edge thereof, a second gutter along the lower edge of said first baffle, and means for selectively holding part of said curtain wall in such position that the bottom edge thereof is located a sufficient distance below the top edge of said low front wall to create a buffer layer of stratified air in said case between the air circulating therein and the atmosphere external thereto or in such position that said bottom edge is located a sufficient distance above said top edge to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case.

5. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said high rear wall above the level of said low front wall and terminating short thereof, a refrigerating device in the top of said case above the level of said low front wall, and a curtain wall depending from said top wall in front of said refrigerating device

and extending therebelow, said curtain wall being disposed with its lower edge adjacent to the level of the top edge of said low front wall but a sufficient distance above said level to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case.

6. A refrigerated display case comprising a base, end walls, a high rear wall, a low front wall, a top wall projecting from said high rear wall above the level of said low front wall and terminating short thereof, a refrigerating device in the top of said case above the level of said low front wall, a curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, said curtain wall being disposed with its lower edge adjacent to but above the level of the top edge of said low front wall, said lower edge of said curtain wall including a gutter extending longitudinally thereof, a baffle spaced rearwardly of said curtain wall with its lower edge disposed below the level of the top edge of said low front wall, and a gutter disposed longitudinally of said baffle beneath the lower edge thereof.

7. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said high rear wall above the level of said low front wall and terminating short thereof, a refrigerating device in the top of said case above the level of said low front wall, a downwardly and rearwardly inclined curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, said curtain wall being disposed with its lower edge adjacent to but above the level of the top edge of said low front wall, a downwardly and rearwardly inclined baffle spaced rearwardly of said curtain wall and extending above the level of the bottom of said refrigerating device and below the level of the top edge of said low front wall, a second baffle located below said refrigerating device and inclining downwardly from said high rear wall to a point located above the lower portion of said inclined first baffle, a gutter rigid with said curtain wall along the lower edge thereof, and a second gutter along the lower edge of said first baffle.

8. A refrigerated display case comprising a base, end walls, a low front wall, a high rear wall, a top wall projecting from said high rear wall above the level of said low front wall and terminating short thereof, a refrigerating device in the top of said case above the level of said low front wall, a foraminous tray supported in said case below the top edge of said low front wall and a substantial distance above said base to provide a relatively deep bottom storage chamber, a door in said low front wall through which access may be had to said bottom storage chamber, and a curtain wall depending from said top wall in front of said refrigerating device and extending therebelow, said curtain wall being disposed with its lower edge adjacent to the level of the top edge of said low front wall but a sufficient distance above said level to cause a spillage of air from said case over said top edge and a consequent infiltration of exterior air into said case.

RUSSELL E. DAVIS.