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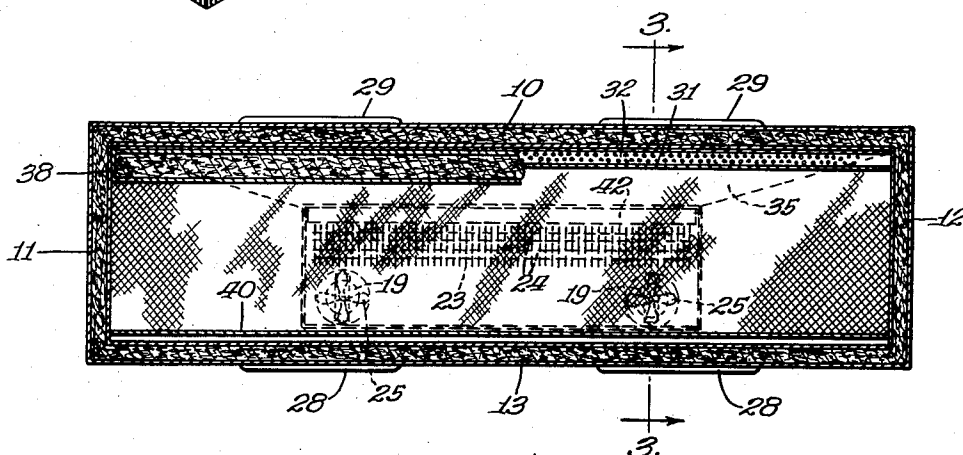
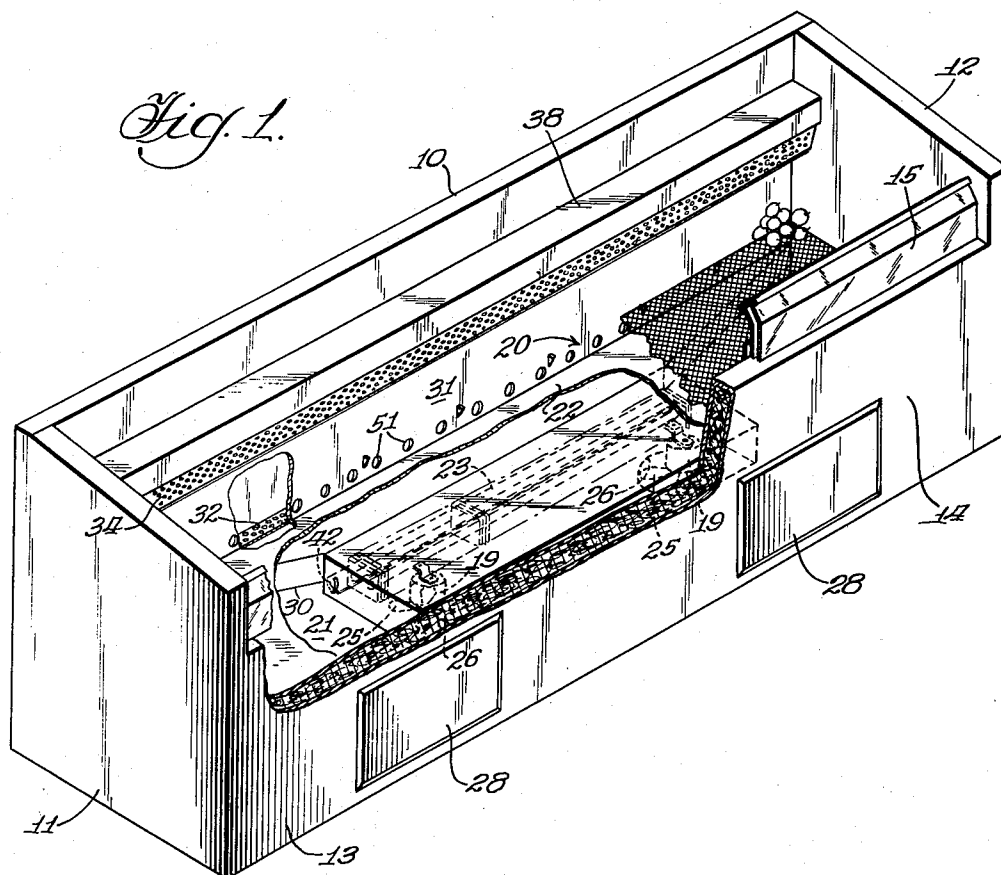
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2,657,545

REFRIGERATED DISPLAY CASE

Filed June 13, 1950

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

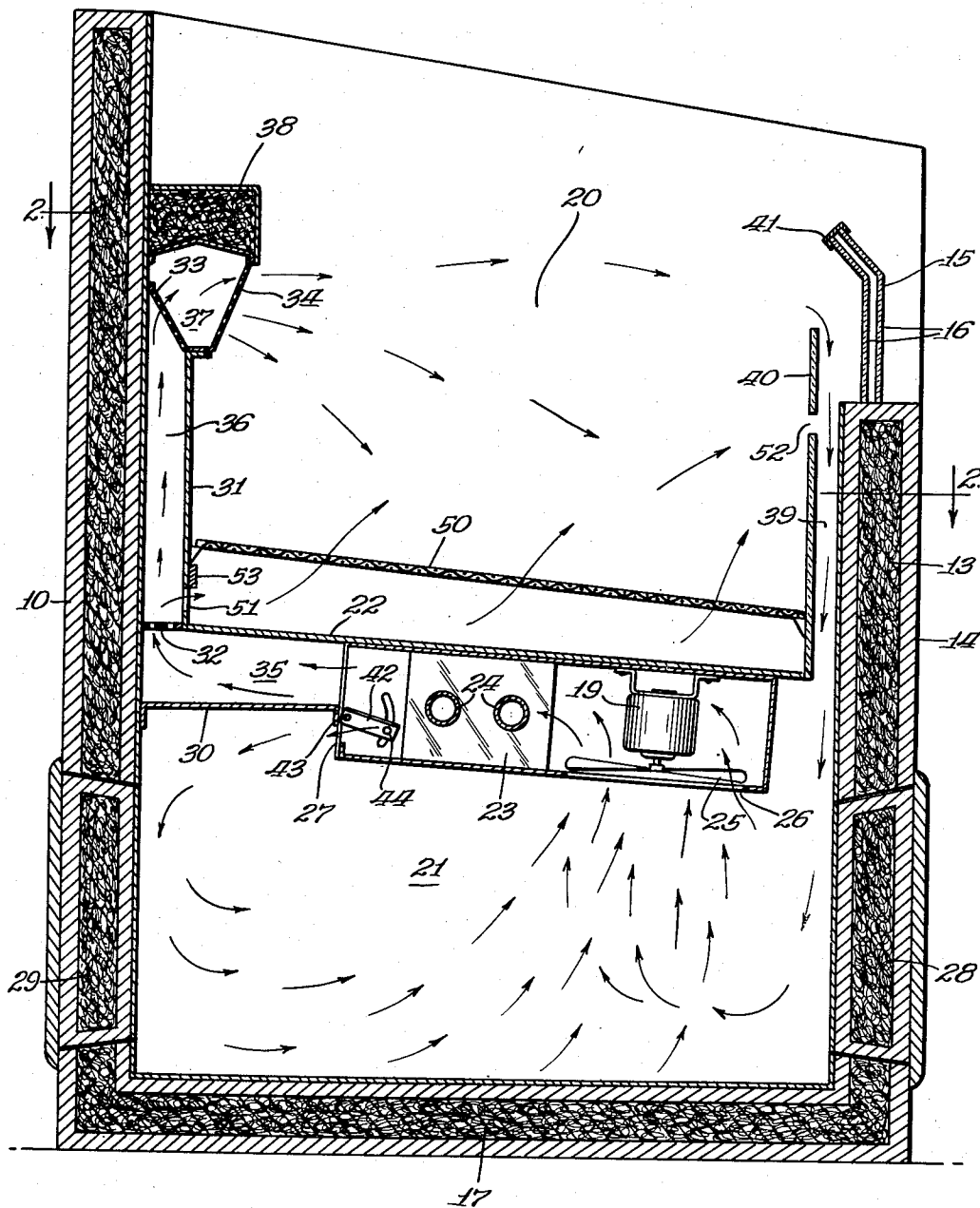


Fig. 3.

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REFRIGERATED DISPLAY CASE

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13 Claims. (Cl. 62—89.5)

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This invention relates to refrigerated display cases and particularly to such cases having an open display compartment and a closed storage compartment with a single refrigerating unit for circulating refrigerated air over both compartments.

Open top refrigerated display cases are in common use in many applications, such as in grocery, fruit and meat stores of the self-service type. These display cases are used to display goods attractively and in positions to be easily accessible to shoppers. It is desirable that such cases also include a closed storage compartment for additional goods which can be used to fill up the display bins by the salespersons. The storage compartment must also be kept cool so that the goods stored therein will remain in good condition. The open display compartment is, of course, greatly affected by the temperature of the room in which the display case is placed and the temperature and amount of air required to cool this compartment will vary in accordance with the surrounding temperature. It is therefore necessary to include provisions for selectively controlling the circulation of refrigerated air over the open display compartment and through the storage compartment.

It is therefore an object of the present invention to provide an improved refrigerated case having an upper open-top display compartment and a lower enclosed storage compartment.

A further object of this invention is to provide a refrigerated case having display and storage compartments and a refrigerating unit positioned for effectively cooling both compartments and so that a substantial amount of usable space is not taken up thereby.

Another object of this invention is to provide a refrigerated case having an open display compartment and a closed storage compartment in which the circulation of air through the two compartments can be controlled to provide the proper temperature and humidity in each compartment.

A still further object of this invention is to provide an improved refrigerated open display case in which refrigerated air is selectively circulated uniformly over the display compartment and through the goods provided in the display compartment.

A feature of this invention is the provision of a refrigerated case having an open display compartment and a closed storage compartment separated by a horizontal partition wall, with the refrigerating unit supported in the storage

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compartment on the underside of the partition wall and circulating refrigerated air through both compartments. By this arrangement a substantial amount of usable space is not taken up by the refrigerating unit and doors may be provided for the storage compartment on either or both sides of the case.

Another feature of this invention is the provision of a refrigerated case having display and storage compartments and a refrigerating unit for circulating cooled air through the two compartments, with the paths for air through the two compartments being substantially independent of each other. The refrigerating unit may include adjustable air outlet means for selectively dividing the refrigerated air between the two compartments to provide the temperatures required in each.

Still another feature of this invention is the provision of an open display case having a passage for refrigerated air with perforated baffles in the passage forming a plurality of interconnected plenum chambers which distribute the refrigerated air substantially uniformly along the case and direct the air substantially uniformly over the goods in the case. Openings may be provided in the cold air passage to provide circulation of refrigerated air through the goods in the display compartment.

Further objects, features and advantages will be apparent from a consideration of the following description when taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view partly broken away illustrating the refrigerated display case in accordance with the invention;

Fig. 2 is a cross sectional view along the lines 2—2 of Fig. 3; and,

Fig. 3 is a cross sectional view along the line 3—3 of Fig. 2.

In practicing the invention there is provided a refrigerated case including an upper open-top display compartment and a lower closed storage compartment. A refrigerating unit is provided in the storage compartment supported from the partition wall dividing the compartments. Duct means are provided on the back wall in the display compartment for the passage of air from the refrigerating unit over the goods in the display compartment. The duct means includes perforated baffles separating the passage into a plurality of interconnected plenum chambers which distribute the air substantially uniformly and reduce the velocity thereof. On the front wall in the upper display compart-

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ment is an exhaust passage which communicates with the lower storage compartment. The refrigerating unit includes an intake portion opening in the lower compartment adjacent the exhaust passage from the upper compartment. The refrigerating unit also includes an outlet portion for applying refrigerated air to the cold air duct means and also to the lower compartment. An adjustable baffle is provided for selectively controlling the distribution of air to the upper and lower compartments. Openings may be provided in the cold air duct below the support for articles therein for providing circulation of refrigerated air through the articles. The refrigerating unit is positioned in the lower compartment so that a minimum of useful space is taken up thereby and so that access may be had to the storage compartment from both front and back of the case.

Referring now more particularly to the drawings, the display case includes a back wall 10, side walls 11 and 12 and a front wall 13. The front wall includes a lower opaque portion 14 and an upper transparent portion 15 which makes it easier for a shopper to see the items in the upper display compartment. The transparent portion 15 may be composed of a pair of spaced transparent plates 16 so that good thermal insulation is provided thereby. The walls 10, 11, 12 and 14 and the base 17 of the case also include insulating material. An upper display compartment 20 and a lower storage compartment 21 are provided and are separated by the partition 22.

Supported on the partition wall 22 within the storage compartment 21 is a refrigerating unit 23 including coils 24 through which a refrigerant is circulated and fans 25 driven by motors 19 for circulating air over the coils 24. The fans 25 are positioned in the inlet portion of the unit adjacent an opening 26 communicating with the lower storage compartment. The refrigerating unit includes an outlet portion having an opening 27 through which refrigerated air is applied to the storage compartment. Doors 28 and 29 are provided on the front and back walls of the storage compartment 21 for providing access thereto. The position of the refrigerating unit in the storage compartment, and the configuration thereof are such that a minimum of useful space in the storage compartment is taken up thereby and so that doors can be positioned on the front and/or the back walls to permit easy access to the storage compartment.

For supplying refrigerated air from the refrigerating unit to the upper display compartment 20, there is provided a duct system including the plate members 30 and 31 and the perforated members 32, 33 and 34. The member 30 cooperates with partition 22 to provide a passage 35 from the refrigerating unit to the rear wall of the display case. As apparent in Figs. 1 and 2, this passage diverges so that air from the refrigerating unit, which is of lesser extent than the width of the display case, is distributed throughout the entire width of the display case. Air from the passage 35 is provided through the perforated baffle 32 to a second passage 36 formed by the rear wall of the case 10 and the member 31. The refrigerated air passes upwardly through the passage 36 and through the perforated member 33 into chamber 37 formed under the insulated shelf 38. The air from the chamber 37 is then directed through perforated member 34 downwardly and across the open dis-

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play compartment 20. The passages 35 and 36 and the chamber 37 all form plenum or equalizing chambers which tend to distribute the air therein uniformly and to somewhat decrease the velocity of the air passing therethrough. This results in a uniform steady stream of air from the outlet member 34 across the open display compartment.

Along the front wall of the case 13 there is provided an exhaust or return passage 39 for the air which is formed between the plate 40 and the front wall 13. This passage extends to the lower or storage chamber and discharges the air therein adjacent the inlet portion of the refrigerating unit so that this air is drawn by the fan through the unit. The top 41 of the transparent wall portion 15 may be inclined in the direction to extend over the passage 39 so that the suction created in the passage does not draw in a substantial amount of air from outside the case. This top 41 is at a level somewhat above that of the perforated member 34 through which air is introduced into the display compartment so that most of the refrigerated air introduced into the display compartment is drawn into the exhaust passage and a circulating path is provided which prevents escape of a substantial amount of air and which also does not draw in a large amount of air from outside the case.

To selectively control the amount of refrigerated air applied to the two compartments, a baffle member 42 is provided which is supported on pivots 43 adjacent the member 30 and which may be adjustably positioned at the end 44 adjacent the refrigerating coils 24 so that the amount of air directed through the passage 35 to the display compartment, and directly to the lower compartment 21 may be selectively controlled by the position of the end 44 of the baffle member 42. It is to be noted that two separate paths for refrigerated air are provided, one from the refrigerating unit through the opening 27 into the lower compartment and from the lower compartment to the opening 26 at the inlet portion of the refrigerating unit 23. The second path for refrigerated air extends through passages 35, 36 and chamber 37 to the upper display compartment and through the exhaust passage 39 to the lower compartment adjacent the inlet opening 26 of the refrigerating unit. It is apparent from this that the two paths are substantially entirely separate from each other and therefore the refrigeration action provided in the two chambers can be separately controlled.

It may be desirable in some cases to provide a small amount of refrigerated air through the goods in the open display compartment. This is particularly true when the case is quite deep, that is, when the distance between the back wall 10 and the front wall 13 is relatively great. In such case a screen or other perforated support member 50 may be provided in the display compartment on which the goods displayed are placed. Openings 51 may be provided in the member 31 below the support member 50 through which air is introduced to the passage between the member 50 and the partition wall 22, and from which it will be forced up through the perforated support member and goods thereon. It may also be desirable in such case to provide openings 52 in the wall 40 defining the exhaust passage 39 so that air may be drawn from the display compartment through the openings 52 into the exhaust passage 39. A slide or shutter 53 may be provided on the member 31 for selec-

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tively closing the openings 51 so that the amount of air provided over this path may thereby be controlled.

For satisfactory operation of the display case, the upper display compartment should be held at the required low temperature with a minimum flow of cool air and with the air being at a temperature not substantially below the temperature required in the display compartment. This is because the circulation of a large amount of very cold air would require a relatively large refrigerating unit, and the large volume of air would tend to dehydrate the articles in the display case and carry the moisture therefrom to the refrigeration coils thus causing an increase in the icing of the coils. In the construction shown, the amount of air circulated may be held to a minimum because only a small amount of cold air escapes from the display compartment, and the entry of warm air from outside the case is also held down. This is facilitated by the uniform flow of air produced by the plenum or equalizing chambers in the cold air duct. These equalizing chambers also permit the use of a refrigerating unit which extends over only a portion of the width of the case with the flow of air being distributed relatively uniformly over the entire width of the case.

The particular position of the refrigerating unit with respect to the two compartments of the display case results in efficient air circulating paths through these two compartments and satisfactory control of the cooling in the two compartments. The refrigerating unit has a relatively small vertical dimension and is positioned in the top portion of the storage compartment to take up a minimum amount of useful space in the storage compartment and so that access may be provided to the storage compartment from both the front and back of the display case.

The embodiment of the invention described is illustrative of the invention but it is obvious that various changes and modifications can be made therein without departing from the intended scope of the invention as defined in the appended claims.

I claim:

1. A refrigerated display case having an upper open-top compartment and a lower enclosed compartment, vertical walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in said lower compartment adjacent said partition, said refrigerating unit having a relatively small vertical dimension so that it extends only in the upper portion of said lower compartment, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment, a discharge portion communicating with both said cold air passage and said lower compartment, and means for drawing air into said intake portion and discharging the same from said discharge portion, whereby first and second paths for refrigerated air are individually provided through said upper and lower compartments.

2. A refrigerated display case having an upper open-top compartment and a lower enclosed

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compartment, vertical walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment and supported by said partition on the under side thereof, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having intake and discharge portions and means for circulating air therethrough, said intake portion communicating with said lower compartment adjacent said exhaust air passage, said discharge portion communicating with said cold air passage and said lower compartment, whereby substantially separate paths for refrigerated air are provided through said upper and lower compartments.

3. A refrigerated display case having an upper open-top compartment and a lower enclosed compartment, vertical walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having intake and discharge portions and means for circulating air therethrough, said intake portion communicating with said lower compartment adjacent said exhaust air passage, said discharge portion communicating with said cold air passage and said lower compartment and including adjustable means for controlling the portions of the cooled air applied to said cold air passage and to said lower compartment.

4. A refrigerated display case having an upper open compartment and a lower enclosed compartment, vertical walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said upper compartment, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment and a discharge portion communicating with both said cold air passage and said lower compartment, said refrigerating unit including means for drawing air into said intake portion and for discharging the same from said discharge portion, said exhaust air passage opening into said lower compartment adjacent said intake portion of said refrigerating unit, whereby substantially separate paths for refrigerated air are provided through said upper and lower compartments.

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5. A refrigerated display case having an upper open display compartment and a lower enclosed storage compartment, front, rear and side walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent said rear wall and communicating with said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said upper compartment, duct means defining an exhaust air passage in said upper compartment adjacent said front wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment and a discharge portion communicating with both said cold air passage and said lower compartment, said refrigerating unit including means for drawing air into said intake portion and for discharging the same from said discharge portion, said exhaust air passage opening into said lower compartment adjacent said intake portion of said refrigerating unit, whereby substantially separate paths for refrigerated air are provided through said upper and lower compartments.

6. A refrigerated display case having an upper open display compartment and a lower enclosed storage compartment, front, rear and side walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent said rear wall and communicating with said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said upper compartment, duct means defining an exhaust air passage in said upper compartment adjacent said front wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment and a discharge portion communicating with both said cold air passage and said lower compartment, said refrigerating unit including means for drawing air into said intake portion and for discharging the same from said discharge portion, said exhaust air passage opening into said lower compartment adjacent said intake portion of said refrigerating unit, whereby substantially separate paths for refrigerated air are provided through said upper and lower compartments, said discharge portion of said refrigerating unit including an adjustable baffle for dividing the cooled air therefrom between said cold air passage and said lower compartment.

7. A refrigerated case having an upper open-top display compartment and a lower closed compartment with a horizontal partition separating said compartments, a refrigerating unit having a relatively small vertical dimension disposed in said lower compartment adjacent said partition and extending only in the upper portion of said lower compartment, said refrigerating unit including intake and discharge portions and means for drawing in air to be cooled and for discharging cooled air with said portions communicating with said lower compartment for

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circulating air therethrough, duct means interconnecting said discharge portion and said upper compartment, means providing a passage from said upper compartment to said lower compartment, whereby a path for circulation of cooled air through said upper compartment is provided, said discharge portion including adjustable means for dividing the cooled air therefrom between said upper and lower compartments.

8. A refrigerated display case including front, rear, side and bottom walls forming a display compartment, a refrigerating unit having a relatively small vertical dimension supported on said bottom wall below said display compartment, said refrigerating unit having intake and discharge portions and means for circulating air therethrough, a perforated supporting member in said display compartment spaced from said bottom wall, duct means defining a cold air passage in said display compartment adjacent said rear wall and communicating with said discharge portion of said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said display compartment, said refrigerating unit having an extent less than the width of the display case and said duct means extending throughout substantially the entire width of the display case so that said duct means and said baffle means distributes said refrigerated air substantially uniformly across the width of the display case, said duct means having openings therein communicating with the space between said supporting member and said bottom wall for providing cooled air thereto, said front wall extending above the level of said apertures of said duct means for retaining said refrigerated air in the display case, and second duct means defining an exhaust air passage in said display compartment adjacent said front wall and communicating with said intake portion of said refrigerating unit.

9. A refrigerated display case including front, rear, side and bottom walls forming a display compartment, a refrigerating unit having a relatively small vertical dimension supported on said bottom wall below said display compartment, said refrigerating unit having intake and discharge portions and means for circulating air therethrough, a perforated supporting member in said display compartment spaced from said bottom wall, duct means defining a cold air passage in said display compartment adjacent said rear wall and communicating with said discharge portion of said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having discharge apertures at a level substantially above said supporting member for directing refrigerated air down and across said display compartment, said duct means having openings therein communicating with the space between said supporting member and said bottom wall for providing cooled air thereto, and second duct means defining an exhaust air passage in said display compartment adjacent said front wall and communicating with said intake portion of said refrigerating unit, said second duct means extending to substantially the same level as said discharge apertures and having openings therein at a lower level for drawing air from said display compartment.

10. A refrigerated display case having an upper open compartment and a lower enclosed compartment, vertical walls forming said compart-

ments and a horizontal partition separating said upper and lower compartments, a perforated supporting member in said upper compartment above said horizontal partition, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said upper compartment, said cold air passage having openings therein communicating with the space between said supporting member and said horizontal partition, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment and a discharge portion communicating with both said cold air passage and said lower compartment, said refrigerating unit including means for drawing air into said intake portion and for discharging the same from said discharge portion, said exhaust air passage opening into said lower compartment adjacent said intake portion of said refrigerating unit, whereby substantially separate paths for refrigerated air are provided through said upper and lower compartments.

11. A refrigerated display case having an upper opening compartment and a lower enclosed compartment, vertical walls forming said compartments and a horizontal partition separating said upper and lower compartments, a refrigerating unit disposed in the upper portion of said lower compartment adjacent said partition, duct means defining a cold air passage extending in said upper compartment adjacent one of said vertical walls and communicating with said refrigerating unit, said duct means including baffle means providing a plurality of plenum chambers and having apertures for directing refrigerated air across said upper compartment, duct means defining an exhaust air passage in said upper compartment adjacent the vertical wall opposite to said one wall and communicating with said lower compartment, said refrigerating unit having an intake portion communicating with said lower compartment and a discharge portion communicating with both said cold air passage and said lower compartment, said refrigerating unit including means for drawing air into said intake portion and for discharging the same from said discharge portion, said exhaust air passage opening into said lower compartment adjacent said intake portion of said refrigerating unit, whereby substantially separate paths for refrigerated air are

provided through said upper and lower compartments, said refrigerating unit extending over only a portion of the width of said case and said duct means extending across the entire width thereof so that said cooled air is distributed substantially uniformly across the width of said case.

12. A refrigerating unit for a refrigerated display case having upper and lower refrigerated compartments and a horizontal partition separating the same, said refrigerating unit having a relatively small vertical dimension and having an upper surface adapted to be supported on the undersurface of the horizontal partition, said unit including an intake portion at one end thereof, a discharge portion at the other end thereof, refrigerating means between said portions, and means for drawing air into said intake portion, passing the same over said refrigerating means, and discharging the same from said discharge portion, said discharge portion including adjustable baffle means for dividing the cooled air discharged therefrom into two portions for application to said upper compartment and said lower compartment, to thereby provide controlled circulation of the cooled air through the two compartments.

13. In a refrigerated display case having upper and lower refrigerated compartments and a horizontal partition separating the same, a compact refrigerating unit having a relatively small vertical dimension and having an upper surface adapted to be supported on the undersurface of the horizontal partition, said unit including an intake portion at one end thereof, a discharge portion at the other end thereof, refrigerating coils positioned between said intake and discharge portions, and means for drawing air into said intake portion, passing the same over said refrigerating coils, and discharging the same from said discharge portion, said discharge portion including adjustable baffle means for dividing the cooled air discharged therefrom between said upper compartment and said lower compartment, to thereby provide controlled circulation of the cooled air through the two compartments.

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