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REFRIGERATED CASE

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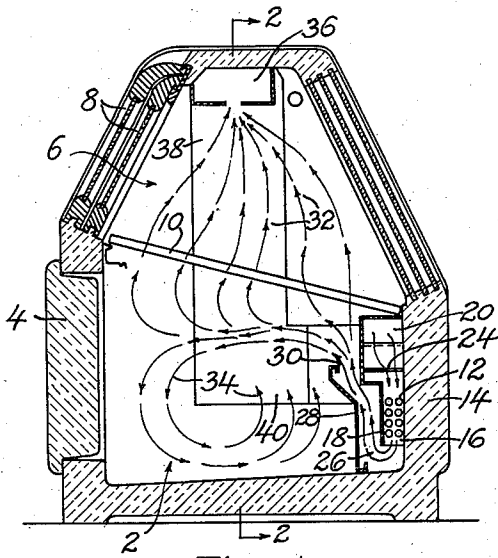


Fig. 1.

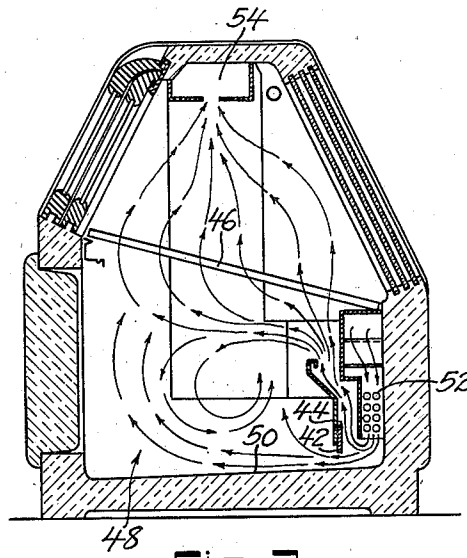


Fig. 3.

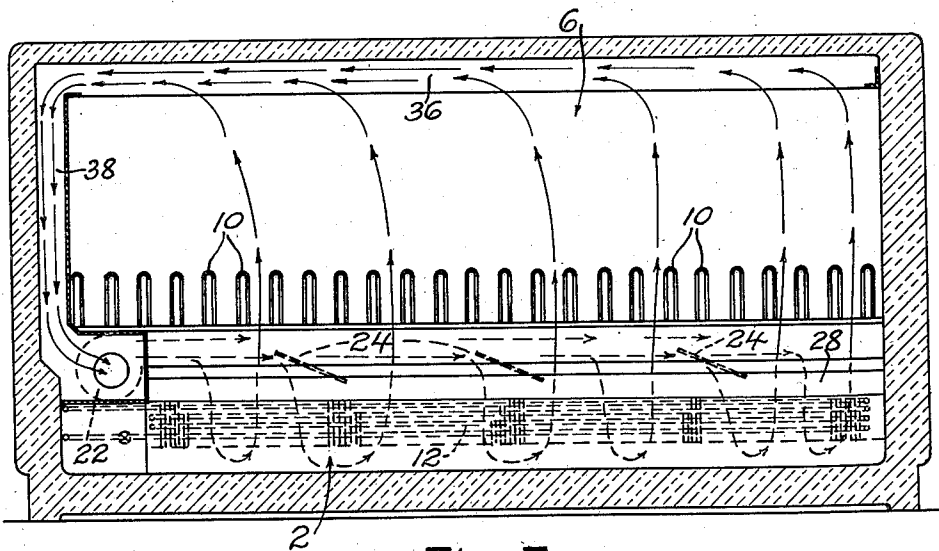


Fig. 2.

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REFRIGERATED CASE

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6 Claims. (Cl. 62-89.5)

My invention relates to refrigerated display cases having a storage chamber and a display chamber through which air is circulated, and particularly to constructions wherein the air within each chamber is circulated in such a manner as to insure the preservation of the desired storage conditions in each chamber.

It is well known that conditions which are best suited for the storage of meats and other products for long periods of time differ from those which are best for use in display chambers that are opened frequently for the removal of meats or the products on display and in which the products are generally kept for only a relatively short period of time. In order to maintain the desired conditions in each chamber of a case having both storage and display chambers it has been suggested heretofore that a supplemental cooling coil be located in the storage chamber so as to maintain the storage chamber at a lower temperature than the display chamber. However, when air is positively circulated through a case the effectiveness of such a supplemental cooling coil is reduced. Moreover, it is recognized that dehydration of meats and many other foods is dependent not only on the temperature and humidity of the air circulated but is also affected by the rate of flow of air through the chambers and over the products therein.

In accordance with the present invention the desired storage conditions and the desired display conditions are maintained by circulating air having substantially the same temperature and humidity through both chambers but at different velocities.

In the construction illustrated and described in my copending application, Serial No. 378,503, filed February 12, 1941, this result is attained, but since the case there shown is designed primarily for use with dairy products which are substantially unaffected by dehydration, the advantages inherent in controlled air velocities are not emphasized. The construction shown and described in this application is designed primarily for use with meats, vegetables and other products which are adversely affected by dehydration and insofar as my prior application relates to structures having storage and display chambers through which air is circulated at different velocities this application is a continuation of said copending application.

One of the objects of my invention is to provide a refrigerated case having display and storage chambers therein with novel means for cooling and circulating the air in said chambers.

Another object of my invention is to provide a refrigerated case having display and storage chambers therein and designed for use with products which are adversely affected by dehydration thereof, and to provide such a case with novel means for maintaining the desired conditions in each of said chambers.

A further object of my invention is to provide novel methods of air circulation and distribution within a refrigerated case having display and storage chambers therein.

A particular object of my invention is to provide a refrigerated case having storage and display chambers therein with means for circulating a portion of the cooled air in one path through the storage chamber and for circulating all of the cooled air through the display chamber.

These and other objects and features of my invention will appear from the following description thereof in which reference is made to the figures of the accompanying drawing.

In the drawing:

Fig. 1 is a vertical sectional view through one preferred form of storage and display case embodying my invention.

Fig. 2 is a vertical sectional view of the construction illustrated in Fig. 1 taken on the line 2-2 thereof, and

Fig. 3 is a vertical sectional view similar to Fig. 1 illustrating an alternative embodiment of my invention.

In the illustrative form of my invention shown in Figs. 1 and 2 of the drawing, a refrigerated case is provided with a lower storage chamber 2 having a door 4 at the rear thereof to provide access to the storage chamber. An upper display chamber 6 is provided with rear doors 8 for providing access to the display chamber. Perforate article supporting means 10 such as slats or an apertured plate extend from the front to the rear of the case between the storage and display chambers and is arranged in a generally horizontal direction so that air introduced into the storage chamber may flow upward through the article supporting means into the display chamber.

A refrigerating coil 12 is located adjacent the front wall 14 of the storage chamber and preferably is provided with the usual fins 16 for increasing the heat absorbing area of the coil. The coil is located within a housing 18 which communicates at the top with a plenum chamber 20 into which air is forced by means of a blower 22. The air is distributed longitudinally of the plenum chamber and is caused to flow downward over

the refrigerating coil 12 by means of deflecting plates 24.

The lower end of the housing 18 is open to permit air to flow therefrom into the air inlet duct 26 formed by the baffle 28 which is spaced from the coil housing 18. The upper edge of the baffle 28 is located below the article supporting means and cooperates therewith to form a rearwardly facing air inlet 30 adjacent and below the article supporting means. The duct 26 thus serves to direct air cooled by the coil upward into the upper portion of the storage chamber and rearwardly beneath the article supporting means 10 and horizontally across the upper portion of the storage chamber 2. A portion of the air directed upward and rearwardly in the storage chamber passes through the openings in the article supporting means directly into the display chamber 6 as indicated by the arrows 32 whereas another portion of the air is deflected by the article supporting means so as to be directed downward into the lower portion of the storage chamber as indicated by the arrows 34. The air which circulates through the storage chamber, as indicated by the arrows 34 is in the nature of an eddy current and returns to mingle with the air flowing across the upper portion of the storage chamber and eventually passes upward through the article supporting means into the display chamber.

The display chamber is provided with an air return duct 36 which preferably is located adjacent the top of the display chamber and extends the full length thereof. The air return duct extends downward at 38 adjacent one end wall of the case and communicates with the blower 22 through the conduit 40.

With this construction, air drawn from the upper portion of the display chamber is passed to the blower 22 by which it is forced through the plenum chamber 20 and distributed uniformly over the refrigerating coil 12. The downward flow of air over the coil 12 aids in driving moisture downward over the fins of the coil during the off-cycle of operation and prevents clogging of the spaces between the fins 16. The freezing of drops of moisture on the coil and fins is thus avoided and the operation of the device rendered uniform.

The cooled air passing from the coil housing flows upward through the air inlet duct 26 and is directed upward and rearwardly so that a portion only of the cooled air circulates downward in an eddy current into the lower portion of the storage chamber and returns to mingle with the air flowing upward through the display chamber to the air return duct 36.

Because only a portion of the cooled air is circulated about the articles stored in the storage chamber the volume of the air and the velocity of its flow is relatively low. Dehydration of the articles in the storage chamber therefore does not occur. However, all of the air passed to the refrigerating coil 22 and cooled by the coil is caused to circulate upward through the display chamber and the velocity of flow of air in the display chamber is therefore relatively higher than the velocity of the air circulating through the lower portion of the storage chamber. The greater volume of air and the higher velocity of flow thereof within the display chamber serves to offset the cold losses in the display chamber due to the frequent opening of the doors 8 for the removal of articles on display. Moreover, the relatively rapid rate of flow of cooled air within the display chamber maintains meats and other

articles on display therein in a bright, attractive condition. While in some instances the foods on display may undergo a certain amount of dehydration due to the higher air velocity in the display chamber the displayed products are not kept in the display chamber long enough to affect the condition thereof adversely.

By so controlling the velocity of flow of air in the case it is possible to preserve the desired and optimum storage conditions in both the storage chamber and the display chamber while the temperature and humidity of the air in both chambers is substantially the same. Control of the operation of the refrigerating elements is greatly simplified with this construction and the operating load on the refrigerating unit is maintained very low.

In that form of my invention shown in Fig. 3, the construction and arrangement of the elements is generally similar to that described above. However, the lower edge 42 of the baffle member 44 which serves to direct air upward toward the article supporting means 46 is spaced a short distance from the bottom of the storage chamber so that a small amount of air passes beneath the baffle member into the lower portion of the storage chamber 48. The position of the lower edge of the baffle 44 may be varied in each installation to control the flow of air about the articles in the storage chamber but generally the space between the edge 42 and the bottom 50 of the storage space is relatively small.

The construction shown in Fig. 3, like that shown in Figs. 1 and 2, serves to cause a portion only of the air cooled by the refrigerating coil 52 to circulate through the lower portion of the storage chamber and about the articles stored therein. However, all of the air cooled by the refrigerating coil is caused to flow upward through the display chamber to the return air duct 54 so that the desired and different rates of flow of air are maintained in the storage and display chambers. In this way the most effective storage conditions are preserved in the storage chamber to prevent dehydration of foods therein, whereas the conditions preserved in the display chamber serve to offset the cold losses due to frequent opening of the doors communicating with the display chamber and also serve to maintain the articles on display in a bright, attractive condition.

While I have shown and described two alternative constructions embodying my invention it will be apparent that the form, arrangement and manner of operating and controlling refrigerated cases in accordance with my invention may be varied considerably without departing from the spirit and scope thereof as defined by the following claims.

I claim:

1. A refrigerated display case having a lower storage chamber, an upper display chamber, article supporting means extending in a generally horizontal direction between the storage and display chambers and provided with openings for the circulation of air upward from the storage chamber to the display chamber, a downwardly opening housing in the storage chamber forming a refrigerating chamber, downwardly through the refrigerating chamber a refrigerating coil located in said refrigerating chamber, a blower for directing air over said coil and downwardly through the refrigerating chamber, a baffle positioned adjacent said housing and having the upper edge thereof located below said article

supporting means so as to form a rearwardly directed outlet through which air cooled by said coil may be passed through the case adjacent said article supporting means, and an air return duct communicating with the upper portion of the display chamber for conducting air from the display chamber to said blower.

2. A refrigerated display case having a lower storage chamber, an upper display chamber, article supporting means extending in a generally horizontal direction between the storage and display chambers and provided with openings for the circulation of air upward from the storage chamber to the display chamber, a refrigerating coil located in the storage chamber adjacent a wall thereof and below the article supporting means, a downwardly opening housing for said coil, a blower for forcing air through the housing, an air return duct communicating with the upper portion of the display chamber and leading to the blower for conducting air to the blower, and baffle means extending upward from the lower to the upper portion of the storage chamber adjacent said housing and terminating below said article supporting means whereby air cooled by said coil is caused to flow over the upper edge of the baffle and is directed generally horizontally through the upper portion of the storage chamber beneath the article supporting means and passes through the openings in the article supporting means to the display chamber and to said air return duct.

3. A refrigerated display case having an upper display chamber and a lower storage chamber, article supporting means arranged generally horizontally in said case and separating the display chamber from the storage chamber, said means having openings therein through which air may pass from one of said chambers to the other, a cooling coil located in the lower storage chamber adjacent a wall thereof and beneath said article supporting means, a downwardly opening housing for said coil, means forming an air passage extending from a point near the bottom of said housing to a point located beneath said article supporting means and arranged to direct air which has been cooled by passage over said coil in a generally horizontal direction beneath said article supporting means and across the upper portion of the storage chamber, and means for drawing air cooled by said coil upward from the storage chamber through said article supporting means and into the display chamber, said means serving to return said air to the housing for the cooling coil.

4. In a refrigerated display case having an upper display chamber and a lower storage chamber, article supporting means located between said chambers and provided with spaced air channels through which air may pass from the

storage chamber to the display chamber, a refrigerated coil located in said storage chamber, a partition in said storage chamber separating the coil from the storage space therein, the upper edge of said partition being located below said article supporting means whereby an air channel is formed having the outlet therefrom located between the upper edge of said partition and the lower surface of said article supporting means for directing air substantially horizontally across the upper portion of the storage chamber, a blower for directing air over said coil and through the air channel, and a duct having the intake end thereof located in said display chamber for withdrawing air from the display chamber and returning said air to said blower for recirculation over said coil.

5. A refrigerated display case having a lower storage chamber, an upper display chamber, article supporting means extending in a generally horizontal direction between the storage and display chambers and provided with openings for the circulation of air upward from the storage chamber to the display chamber, a baffle located in the front of the storage chamber and cooperating therewith to form a refrigerating chamber, said baffle having the lower edge thereof spaced from the bottom of the storage chamber and the upper edge thereof located below said article supporting means whereby two rearwardly directed outlets from the refrigerating chamber are provided, a refrigerating coil located in said refrigerating chamber, a blower communicating with said refrigerating chamber, means for directing air from the blower downwardly over said coil and means for conducting air from the display chamber to said blower.

6. A refrigerated display case having a lower storage chamber, an upper display chamber, article supporting means extending in a generally horizontal direction between the storage and display chambers and provided with openings for the circulation of air upward from the storage chamber to the display chamber, a baffle located in the front of the storage chamber and cooperating therewith to form a refrigerating chamber, said baffle having the lower edge thereof spaced a relatively short distance from the bottom of the storage chamber and the upper edge thereof located a greater distance from the article supporting means whereby a narrow lower outlet and a wider upper outlet are provided for directing air rearwardly from the refrigerating chamber to the storage chamber, a refrigerating coil located in said refrigerating chamber, a blower communicating with said refrigerating chamber for blowing air over said coil, and means for conducting air from the display chamber to said blower.

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