

Dec. 29, 1942.

M. D. MacMASTER

2,306,969

REFRIGERATED DISPLAY CASE

Filed Sept. 4, 1941

2 Sheets-Sheet 1

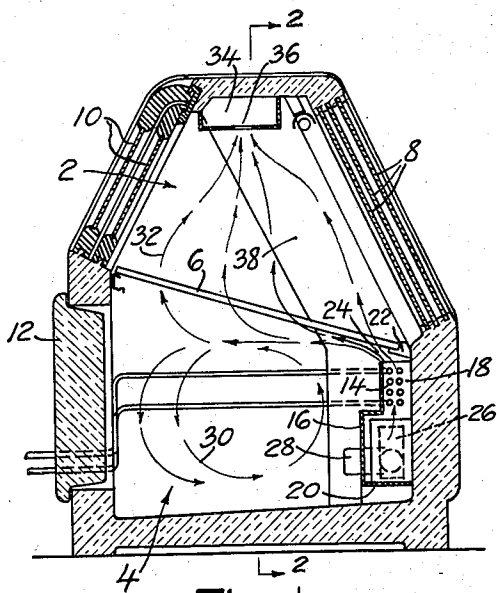


Fig. 1.

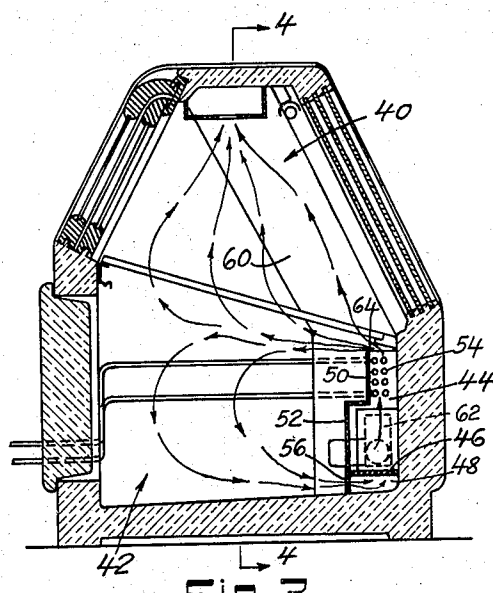


Fig. 3.

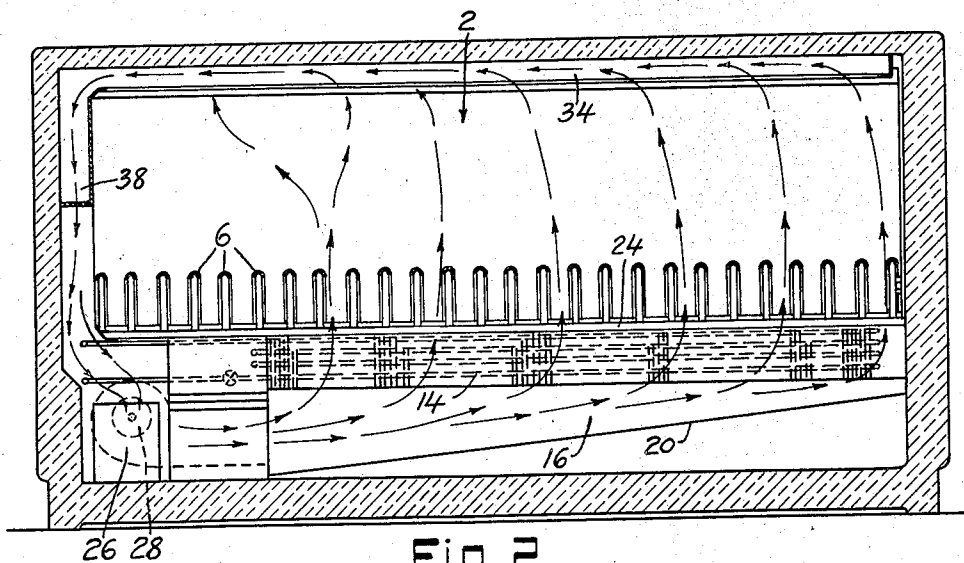


Fig. 2.

INVENTOR.
MALCOLM D. MACMASTER

BY

Albert Sperry
ATTORNEY.

Dec. 29, 1942.

M. D. MacMASTER

2,306,969

REFRIGERATED DISPLAY CASE

Filed Sept. 4, 1941

2 Sheets-Sheet 2

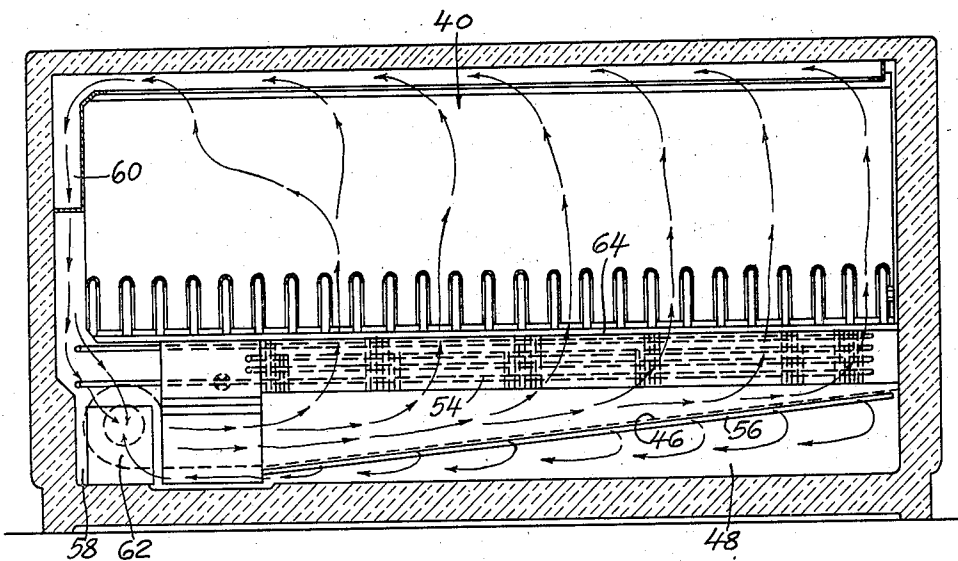


Fig. 4.

INVENTOR.

MALCOLM D. MACMASTER

BY

Albert Sperry
ATTORNEY.

UNITED STATES PATENT OFFICE

2,306,969

REFRIGERATED DISPLAY CASE

Malcolm D. MacMaster, Yardley, Pa., assignor to
C. V. Hill & Company, Inc., a corporation of
New Jersey

Application September 4, 1941, Serial No. 409,468

7 Claims. (Cl. 62—89.5)

My invention relates to refrigerated display cases which embody an upper display chamber and a lower storage chamber and particularly to constructions in which the air is cooled and a portion thereof circulated through the display chamber while another portion of the air is circulated through the storage chamber thereby avoiding overcooling of either chamber.

Many types of display cases have been designed heretofore in which the air is cooled and positively circulated through storage and display chambers. However it has been very difficult with such constructions to cool each chamber to the desired temperature and avoid overcooling of one chamber or undercooling of the other. This has been due primarily to the fact that the air is usually passed through one chamber and then is passed on through the other chamber so that the air entering the second chamber has its temperature raised by the heat absorbed in the first chamber.

Some attempt has been made to overcome this objection by arranging auxiliary cooling coils between the chambers but such constructions are expensive to produce and are neither compact nor easy to maintain in a clean sanitary condition.

In accordance with my invention these objections to constructions of the prior art are overcome and means provided whereby air is circulated through a refrigerating chamber and over a refrigerating coil and then is directed so that a portion of the air so cooled flows in one path through the storage chamber and another portion of the cooled air flows in a different path through the display chamber. In this way both the storage chamber and the display chamber are maintained at the desired temperature without the use of supplementary coils or complicated or expensive constructions.

One of the objects of my invention is to provide a refrigerated display case with a novel type of air circulating system.

Another object of my invention is to insure substantial uniformity in cooling of the display and storage chambers in a display case.

A further object of my invention is to provide a simple, economical construction for display cases wherein the parts may be readily kept in a clean sanitary condition.

A particular object of my invention is to provide a display case having display and storage chambers with a refrigerating chamber and means for circulation of air from the refrigerat-

ing chamber in different paths through the display and storage chambers.

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

In the drawings:

Fig. 1 is a vertical sectional view of a preferred type of refrigerated 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.

Fig. 3 is a vertical sectional view of an alternative construction embodying my invention, and

Fig. 4 is a longitudinal sectional view of the construction illustrated in Fig. 3 taken on the line 4—4 thereof.

In each of the forms of my invention illustrated the display chamber is separated from the storage chamber by perforate article supporting means extending in a generally horizontal direction. Air which has been cooled by passage over a refrigerating coil in a refrigerating chamber is passed upward through the article supporting means and is withdrawn from the top of the display chamber through an air duct which returns the air to the refrigerating chamber where it is again cooled for recirculation. At the same time a portion of the air which is cooled in the refrigerating chamber is circulated through the storage chamber.

The paths through which air circulates through the display and storage chamber converge and coincide in part so that the two currents of air mingle and the initial humidity and temperature of the air circulated in each chamber is the same. In this way it is possible to prevent over cooling or drying out of air in either chamber.

In the construction shown in Figs. 1 and 2 the paths of the air coincide in that portion of each circuit adjacent the outlet from the refrigerating chamber whereas in the construction of Figs. 3 and 4 the paths coincide further during circulation of the air over the cooling coil and through the refrigeration chamber.

The display case shown in Figs. 1 and 2 is typical of those in which my invention may be embodied and is formed with an upper display chamber 2 and a lower storage chamber 4. The display chamber is separated from the storage chamber by suitable article supporting means having air passages therethrough such as the spaced slats or racks 6 upon which platters or other re-

ceptacles may be located in spaced relation to insure circulation of air upward through the racks to the display chamber.

The front of the case is provided with conventional multiple glass panes 8 through which articles in the display chamber may be viewed, while the rear of the case is provided with sliding doors 10 for access to the upper display chamber and pivotally mounted doors 12 to provide access to the lower storage chamber.

Within the storage chamber and adjacent the front wall thereof is located a cooling coil 14. A housing member 16 separates the coil from the storage chamber and forms a refrigerating chamber 18 through which air is circulated over the coil and between the fins carried by the coil. The air is preferably circulated upward through the refrigerating chamber and is directed rearwardly beneath the article supporting means or rack. In the construction shown in Figs. 1 and 2 the bottom of the refrigerating chamber is closed by an inclined member 20 which serves to direct the air longitudinally through the refrigerating chamber and insure substantially uniform flow thereof upward over the coil 14. The upper edge of the housing member 18 is spaced from the lower surface of the article supporting racks 6 and a deflector member 22 is located above the coil so as to cooperate with the member 16 in providing a rearwardly directed outlet opening 24 at the top of the refrigerating chamber.

Air is forced through the refrigerating chamber and over the coil therein by means such as a blower 26 driven by a motor 28. The cooled air flows from the refrigerating chamber through the outlet 24 and is directed rearwardly through the upper portion of the storage chamber below the article supporting means 6. Thereafter a portion of the cooled air circulates downward through the storage chamber in the form of an eddy current as indicated by the arrows 30. This air travels in a generally circular path flowing downward near the rear doors 12, forward near the bottom of the storage chamber and upward adjacent the rear surface of the housing member 16. The air of this eddy current in flowing upward adjacent the member 16 returns and mingles with the cooled air flowing rearwardly from the outlet opening 24 near the top of the refrigerating chamber.

While a portion of the cooled air from the refrigerating chamber is circulating as an eddy current through the storage chamber, as described, another portion of the cooled air, which may include part of that previously circulated as an eddy current, flows rearwardly at the top of the storage chamber and passes upward between the slats of rack 6 and through the display chamber, as indicated by the arrows 32.

The upper portion of the display chamber is provided with a return air duct 34 formed with a tapering slot or other air inlet passage 36 for drawing off warmed air from the upper portions of the case. The duct 34 preferably extends the length of the top of the case and then extends downward at 38 adjacent one end of the case to the intake side of the blower 26. The blower discharges air into the lower portion of the refrigerating chamber 18 where it is directed longitudinally of the inclined member 20 and caused to flow upward over the cooling coil 14 so as to emerge through the outlet 24 and mingle with the air circulated through the storage chamber.

In that form of my invention illustrated in Figs. 3 and 4 the display case is provided with an upper

display chamber 40 and a lower storage chamber 42 in which is located the refrigerating chamber 44. This chamber is substantially the same as that of Fig. 1. However, the space beneath the inclined member 46 serves as a return air duct 48 for the air circulated through the storage chamber. For this purpose the housing member 50 which forms the rear wall of the refrigerating chamber extends downward at 52 below the coil 54 and below the inclined member 46 for the full length of the case. An air inlet slot 56 is formed in the lower portion 52 of the housing member and preferably is spaced from the bottom of the case to prevent dirt from passing into the duct. The air passing into the duct 48 flows to the left, as seen in Fig. 4, to the plenum chamber 58 where it mingles with the air from the return duct 60 communicating with the display chamber 40. The air then passes to the blower 62 and is directed lengthwise of the refrigerating chamber 44 so as to pass upward over the cooling coil 54 to the outlet opening 64. In this way both that portion of the air circulated through the storage chamber and that portion circulated through the display chamber are caused to flow over the cooling coils in each cycle thereof. Moreover, the air returned from the different chambers is mingled more effectively and for a longer period of time, than in the case illustrated in Figs. 1 and 2.

Both forms of my invention illustrated provide for positive circulation of different portions of the air through the upper and lower chambers of the case and render it possible to maintain the desired temperature conditions therein without resorting to the use of auxiliary cooling coils.

The cooling coils and blower are so arranged and enclosed that food or other material cannot come into contact therewith or fall into the refrigerating chamber and the racks or other article supporting means may be removed so that the whole construction may be readily cleaned and maintained in a sanitary condition. Furthermore, the air is circulated through the display chamber in such a manner that there is no tendency to fog the glass panes in the front of the display chamber. While the refrigerating chamber and cooling coils are preferably arranged in the front of the storage chamber so as to have the rear portion thereof unobstructed for storage purposes, it will be evident that it may be otherwise arranged or located and that the form, construction and style of the display case, and the location of the article supporting racks and air ducts may be varied considerably without departing from the spirit of my invention. In view thereof it should be understood that the embodiments of my invention shown in the drawings are only intended to be illustrative thereof and are not intended to limit the scope of the following claims.

I claim:

1. A refrigerated display case having an upper display chamber and a lower storage chamber, article supporting means separating said chambers and formed with openings through which air may pass from one chamber to the other, a refrigerating chamber having a cooling coil therein, means forming an outlet for directing air from the refrigerating chamber in a generally horizontal direction across said case adjacent said article supporting means, and means forming air channels communicating with said refrigerating chamber and having inlets above and below said outlet whereby a portion of the horizontally directed air from the refrigerating

chamber is caused to flow upward through the display chamber and another portion of said horizontally directed air is caused to flow downward through the storage chamber.

2. 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 the front wall thereof and beneath a portion of said article supporting means, a housing for said coil having a horizontally extending outlet opening located near the top of the housing and beneath said portion of the article supporting means, said opening being defined in part by means arranged to direct substantially all of the air which has been cooled by passage over said coil rearwardly beneath said article supporting means and across the upper portion of the storage chamber whereby a portion of the cooled air is caused to circulate downward into the lower 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 and to direct air upward therethrough over the cooling coil.

3. A refrigerated display case having a lower storage chamber and an upper display chamber with article supporting means separating said chambers and formed with openings through which air may pass from one of said chambers to another, a cooling coil located adjacent the front wall of said storage chamber, a housing member located beneath a portion of the article supporting means and extending generally parallel to said front wall and cooperating therewith to form a refrigerating chamber containing the cooling coil, a blower connected to one end of said refrigerating chamber near the bottom thereof for forcing air longitudinally and upward therethrough over said coil, means located adjacent the top of said refrigerating chamber and beneath said portion of the article supporting means for directing substantially all of the air passing over the coil rearwardly across the top of said storage chamber, and a return air duct communicating with the top of said display chamber and with said blower for drawing air from the storage chamber upward through the article supporting means and through said display chamber and returning it to the blower.

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 refrigerating 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 and directed substantially

horizontally across the upper portion of the storage chamber, a blower arranged to direct air upward over said coil and through the air channel beneath said article supporting means whereby a portion of the air cooled by said coil is circulated within the storage space of the storage chamber and another portion of said air will flow upward through the air channels in said article supporting means to the display chamber, means forming a duct communicating with the storage chamber for returning air therefrom to said blower 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. In a refrigerated display case having an upper display chamber and a lower storage chamber, perforate means separating the storage chamber from the display chamber, a refrigerating chamber having a refrigerating coil therein, a blower for circulating air through the refrigerating chamber and over said coil, means for directing air from the upper portion of said refrigerating chamber rearwardly beneath said perforate means, means for drawing a portion of said air upwardly through said perforate means to said display chamber and serving to return said air to the lower portion of said refrigerating chamber, and means for directing another portion of said air downwardly through said storage chamber to the lower portion of said refrigerating chamber.

6. In a refrigerated display case having an upper display chamber and a lower storage chamber, article supporting means separating the display chamber from the storage chamber and formed with passages therethrough for the flow of air from the storage chamber to the display chamber, a refrigerating chamber having a refrigerating coil therein and formed with an outlet opening near the top thereof and beneath said article supporting means, means for forcing air through the refrigerating chamber, over said coil whereby all of the air cooled thereby is passed into the upper portion of the storage chamber, means forming a passage for the return of air from the storage chamber to the refrigerating chamber and a duct communicating with the upper portion of the display chamber for conducting air to the refrigerating chamber.

7. In a refrigerated display case having an upper display chamber and a lower storage chamber, article supporting means separating the display chamber from the storage chamber and formed with passages therethrough for the flow of air from the storage chamber to the display chamber, a refrigerating chamber having a refrigerating coil therein, and provided with outlet near the top thereof communicating with the storage chamber only, means for blowing air through said refrigerating chamber and over said coil into the storage chamber, means forming a return air duct for withdrawing air from the storage chamber and returning it to the refrigerating chamber and other means forming a return duct for withdrawing air from the display chamber and returning it to said refrigerating chamber.

MALCOLM D. MACMASTER.