

Aug. 24, 1948.

M. D. MacMASTER

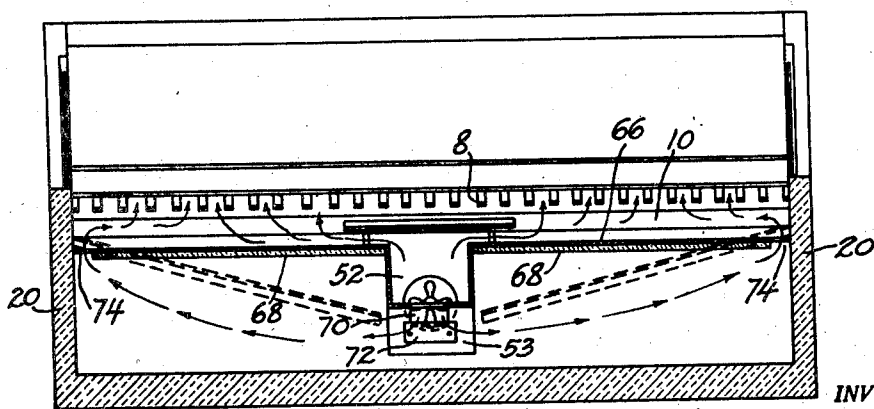
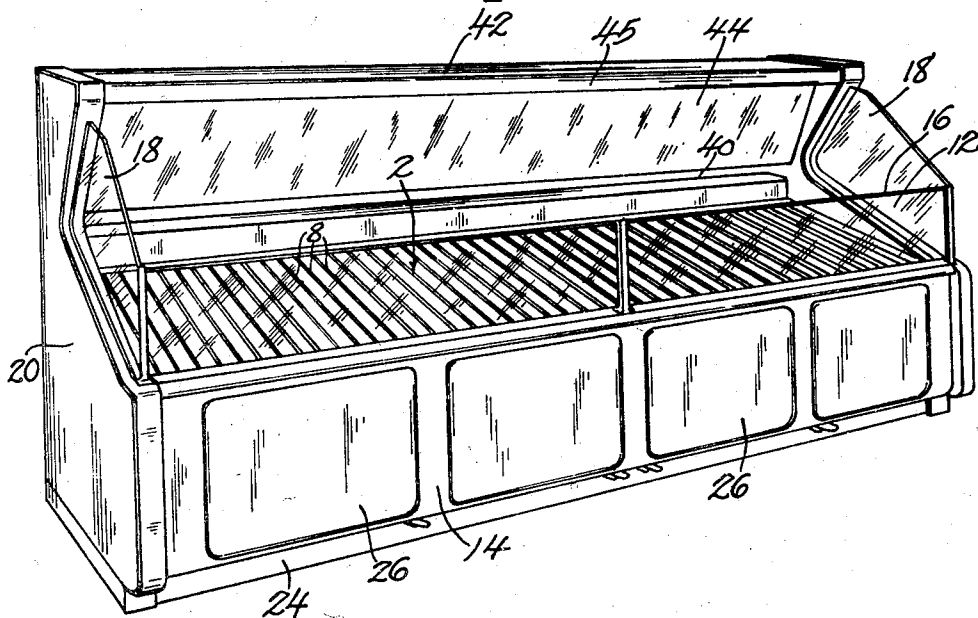
2,447,760

SELF SERVICE DISPLAY AND STORAGE CASE

Filed Dec. 12, 1945

2 Sheets-Sheet 1

FIG. 1.



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FIG. 4.

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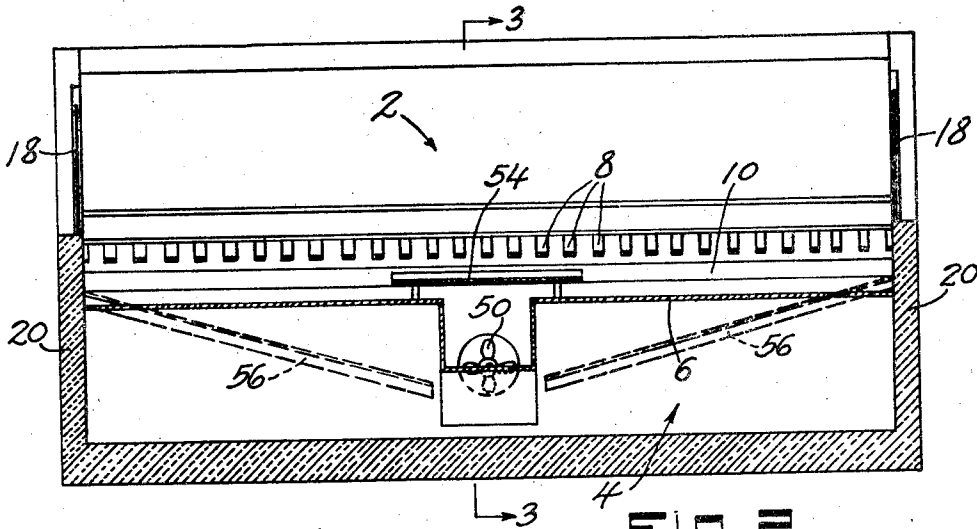


Fig. 2.

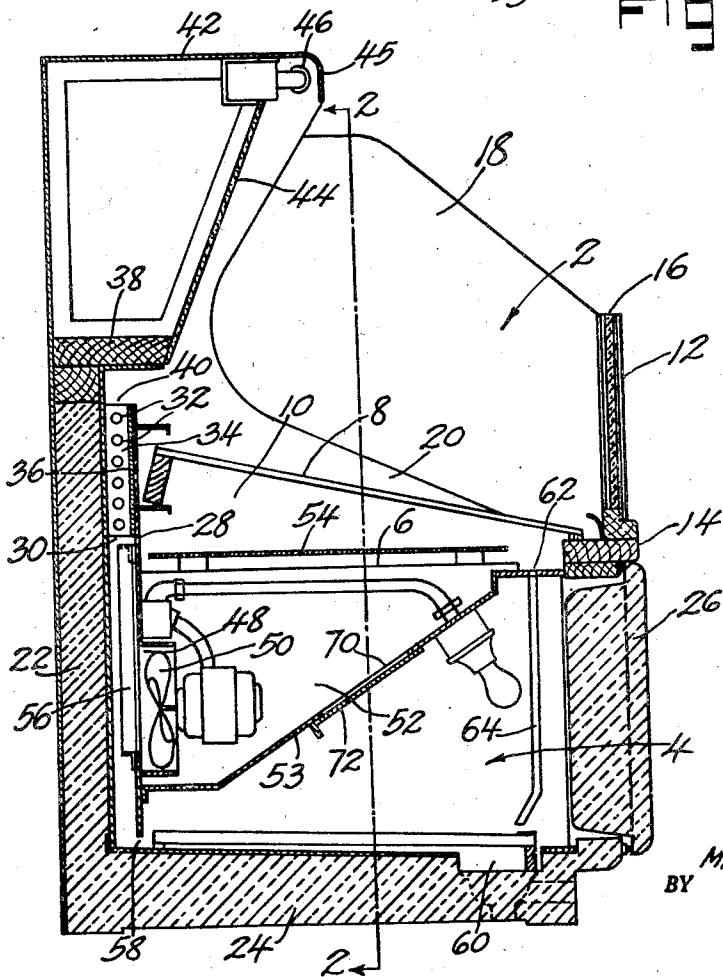


Fig. 3.

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SELF-SERVICE DISPLAY AND
STORAGE CASE

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Application December 12, 1945, Serial No. 634,501

5 Claims. (Cl. 62—89.5)

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This application relates to improvements or modifications in the type of refrigerated cases shown and described in my copending application Serial No. 415,684, filed October 20, 1941, and Serial No. 554,678, filed September 18, 1944, now Patent No. 2,421,896, issued June 10, 1947.

My invention relates to refrigerated self service display and storage cases and particularly to constructions in which there is an upper display space that is open at the top for access to customers and through which cooled and relatively dry air is positively circulated about the goods on display.

Self service display cases which are open at the top for access to the customers are now used extensively for the display of vegetables wherein the condensation of moisture on the refrigerated products serves to maintain them in a moist fresh condition. In some instances open type display cases have been used for the display of meats and dairy products, but the condensation of moisture on such products is most objectionable. In an effort to overcome this difficulty certain open type display cases have been designed to decrease the flow of warm moist air into contact with the articles on display. One very effective construction of this type is shown and described in the patent to Caulk et al. No. 2,382,937. However, the circulation of air within the storage space of such cases is effected by means of a thermo syphon and therefore is relatively slow, irregular and difficult to control. The operation of such cases therefore may be adversely affected by external influences such as varying climatic conditions and by the formation of eddy currents in the corners of the display space or about articles stacked therein. Prior constructions have presented further difficulties because of the limited capacity of the display space and the fluctuations in temperature which occur when additional goods are supplied to the display space.

In accordance with my invention these objections to constructions of the prior art are reduced or eliminated and refrigerated self service cases are provided which are open at the top for access to the customers and yet are cooled substantially uniformly and maintained at a desired temperature even when new products are supplied to the display space. At the same time goods on display are maintained in a dry sanitary condition and the desired consistency of operation and high refrigerating efficiency of the case is maintained.

These advantages are preferably attained by providing the display case with air circulating means including a passage having inlet and out-

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let openings both of which are located below the upper edges of the side walls of the display space together with means arranged to circulate air positively through the display space and upwardly about the articles on display. The structure further includes means for directing cooled air in heat exchanging relation with a storage chamber and for distributing and controlling the flow of air through the display space.

One of the objects of my invention is to provide refrigerated self service display cases with improved means for cooling and circulating the air within the display space.

Another object of my invention is to provide self service display cases with means for controlling the distribution and flow of air within the display space so as to maintain the products in a dry, sanitary condition.

A further object of my invention is to insure consistent operation of self service display cases under all conditions of operation.

Another object of my invention is to provide self service display cases with an upper display space, a lower storage chamber, and common means for cooling the air in both the display space and the storage 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 perspective of a typical self service display case embodying my invention,

Fig. 2 is a longitudinal vertical sectional view of the case illustrated in Fig. 1 taken on the line 2—2 of Fig. 3,

Fig. 3 is a transverse vertical sectional view of the construction illustrated in Fig. 1 taken on the line 3—3 of Fig. 2, and

Fig. 4 is a longitudinal sectional view through an alternative construction embodying my invention.

In that form of my invention chosen for purposes of illustration in the drawings a self service display and storage case is provided with an upper display space 2 and a lower storage chamber 4 separated by an impermeate member 6 formed of sheet metal or other heat conducting material. A member 8 in the form of a slatted or perforate support, preferably made of sheet material, forms the bottom of the display space 2 and cooperates with the member 6 to form an air chamber 10 through which cooled air may be circulated over the member 6 for cooling the storage space 4 and upwardly through the open-

ings in the member 8 to cool the articles in the display space.

The display space 2 has a front wall 12 which preferably is in the form of a glass panel mounted on the insulated lower front wall 14 of the case. The upper edge 16 of the glass panel 12 is located at a convenient height to enable customers to reach into the display space to remove articles therefrom. The ends of the display space 2 are defined in part by the glass panels 18 and in part by the insulating end members 20 of the case which extend downward and cooperate with the lower front wall portion 14 to enclose the lower storage chamber 4 of the case. The rear of the display space is formed by the insulated rear wall 22 of the case which also forms the rear wall of the storage chamber. The base 24 of the case is insulated so that the storage chamber is insulated about the sides and bottom but provided with a heat conducting top 6 over which cooled air is circulated to maintain articles in the storage chamber at a temperature at or below that of articles in the display space. Access to the storage space 4 may be had through doors 26 which, as shown, are arranged in the lower front 14 of the case.

A vertical baffle 28 cooperates with the rear wall 22 of the case to form a vertical air passage 30 within which refrigerating means such as a coil 32 having fins 34 is located. A layer of insulating material 36 is located between the baffle 28 and the coil 32 to prevent over cooling and the condensation of moisture on the exposed face of the baffle. A top piece 38 is mounted on the wall 22 of the case and projects forward therefrom above the upper edge of the baffle 28 to form an upper air inlet 40 to the vertical passage 30. The top piece 38 also serves as a support for a false top 42 provided with a mirror 44 which is inclined at a suitable angle to reflect the articles in the display space and to support a reflector 45 and a light 46 in position for illuminating the articles on display.

The coil 32 and baffle 28 preferably extend throughout substantially the entire length of the case so as to provide an elongated inlet 40 in position to draw off air from the upper portion of the display space throughout the length thereof. Cool air is thus skimmed off from near the top and is recirculated over the refrigerating coil before it has had an opportunity to mix freely with the warm moist air above the display space. Any moist air which might tend to diffuse downward toward the articles on display is therefore deflected by the current of air passing to the inlet 40 and will deposit its excess moisture on the fins of the coil rather than on the refrigerated articles in the display space. The air contacting the articles on display is therefore only the relatively dry cool air flowing upward through the perforate support 8.

The baffle 28 extends downward parallel to the rear wall of the case and is formed with an opening 48 therein located near the center of the case below the imperforate member 6 at the top of the storage chamber. A fan 50 is located adjacent the opening 48 and communicates with an air distributing housing 52 in the form of a well having a forwardly inclined surface 53 for directing air upward through the air distributing housing. The upper side of the well is open at the top and cooperates with a horizontal baffle 54 which is spaced from the member 6 to direct air laterally from the air distributing housing toward the opposite ends of the case and through

the air chamber 10 beneath the perforate member 8 which forms the bottom of the display space. The baffle 54 may itself be perforated as shown to permit limited flow of air upward through that portion of the display space above the air distributing housing. Within the passage 30 there are deflecting members 56 which are inclined from points near the ends of the case to points adjacent the fan opening 48 in the baffle 28 to direct air flowing downward over the coil 32 toward the opening 48 and fan 50. These deflecting members are preferably carried by the baffle 28 and have their opposite edges spaced from the rear wall of the case so that liquid dripping from the coil when defrosting the refrigerating unit can pass downward toward the base of the case. The ends of the deflecting members also are spaced from the opening 48 so that liquid caught thereby will drip down to the base of the case whereas the lower edge of the baffle 28 is spaced a short distance from the upper face of the base of the case as shown at 58 so that liquid may flow forward from the passage 30 to a drain 60 located near the front of the case and within the storage chamber 4. A drain 62 is also located near the front of the member 6 for conducting water to the pipe 64 and drain 60 when washing or cleaning the perforate member 8 or other parts of the display space.

With this construction air is circulated and distributed so that it flows upward through the display space 2 and about the articles therein filling the display space with cool dry air and driving warm moist air from the atmosphere above the open top of the display space upward and away from the cooled articles on display. Moisture from the atmosphere therefore cannot come into contact with or condense on the goods and the air in the upper portion of the display space and containing any moisture which may have diffused thereto is drawn off and passed to the refrigerating means before it is circulated through the display space so that any excess moisture acquired from the atmosphere is condensed on the coils and fins of the refrigerating means and is not brought into contact with the articles on display. Furthermore, by circulating the air positively and upwardly at a velocity of approximately 100 feet per minute or more diffusion or downward circulation of moist air into contact with the goods is prevented. Moreover, the use of baffles or other means for insuring upward flow of air throughout all portions of the display space serves to prevent the formation of eddy currents which might otherwise cause moist air to come into contact with the goods in the corners or other particular areas of the display space. The positive circulation of air also renders it impossible for air from the atmosphere to be drawn down into the case due to back siphoning resulting from the introduction into the display space of frozen foods or other pre-cooled articles at temperatures at or below that at which the coil 32 is operated. Interruption or variations in the rate of flow of the air in the display space and the tendency for moisture to deposit on the goods are thus eliminated altogether and the products are maintained in a dry sanitary condition indefinitely.

The flow of cooled air from the coil 32 through the housing 52 and over the member 6 also serves to cool the air within the storage space 4 so that the temperature of the goods awaiting transfer to the display space is reduced to approximately the same temperature as the articles on display. Then, when it is desired to replenish the supply of

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articles in the display space, the new goods taken from the storage chamber will already be cooled to a temperature substantially the same as that of the air in the display space so that rapid and severe fluctuation in the refrigerating load and in the temperature of the air circulating about the goods on display does not occur. This further serves to reduce the formation of eddy currents and prevents fluctuations in temperature of air within the display space.

In some instances it is desirable to provide positive circulation of air through the storage chamber also and it also may be preferable to rely upon this air circulation rather than conduction through the member 6 which forms the top of the storage chamber.

In the construction shown in Fig. 4 this is accomplished by insulating the top member 66 of the storage chamber as shown at 68 and by forming air channels for the flow of air from the centrally located air distributing housing 52 toward the opposite ends of the storage chamber. For this purpose the inclined wall 53 of the housing 52 is provided with an opening 70 having an adjustable closure 72. The ends of the top member 66 are spaced from the insulating end members 20 to form air outlets 74 through which air from the storage chamber may pass upward into the air chamber 10 beneath the perforate support 8.

With this construction a portion of the air cooled by passage over the coil 32 is caused to flow from the air distributing housing 52 directly to the air chamber 10 beneath the perforate support 8, whereas another portion of the cooled air passes from the housing 52 through the opening 70 and thence flows lengthwise of the case to the air outlets 74 through which the air passes to the chamber 10. The amount of air flowing through each path may be varied by changing the position of the adjustable closure 72 and when operating as described with reference to the construction illustrated in Fig. 2 the closure 72 may completely cover the opening 70 as shown in Fig. 3.

In each of the forms of my invention illustrated the air is positively circulated and so distributed that uniformity of flow is assured and the deposition of moisture on the articles in the display space is prevented. Moreover, fluctuations in temperature and variations in operation due to external atmospheric conditions are eliminated.

While I have shown and described preferred embodiments of my invention it will be understood that numerous changes and modifications may be made in the form, construction and arrangement of the elements, and in view thereof it should be understood that the embodiments of my invention herein shown and described is intended to be illustrative only and is not intended to limit the scope of my invention.

I claim:

1. A refrigerated display case having means forming a display space which is open at the top for access to customers and closed about the sides and bottom, a perforate support spaced from said bottom and cooperating therewith to form an air chamber, a baffle spaced from one side of said display space and extending from a point below the upper edges of the other sides of said space to a point below said perforate support to form an air circulating passage, a cooling coil located in said passage, means for positively circulating air downward through said passage, over said coil and into said air chamber, and means for directing the air laterally in said air chamber to pro-

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duce substantially uniform upward flow of air, through said perforate support and display space.

2. A refrigerated display case comprising an elongated display space which is open at the top for access to customers and closed at the bottom and about the front, back and end walls of said space, a perforate support spaced from the bottom of said space and cooperating therewith to form an air chamber, a baffle extending substantially the full length of the back wall of said space and spaced from said back wall to form an elongated air passage presenting an elongated upper inlet opening located below the upper edges of the walls of said space, the lower end of said passage communicating with said air chamber, a refrigerating coil located in said passage, a blower located near the center of said air chamber for drawing air through said inlet opening and over said coil to said chamber, and means for directing air from said blower toward the opposite ends of said case to produce substantially uniform upward flow of air through said perforate support and display space.

3. A refrigerated display case having an upper display space which is open at the top for access to customers and a lower storage space which is closed about the sides and provided with a door to permit access thereto, heat conducting means separating the top of the storage space from said display space, a perforate support spaced from said heat conducting means and cooperating therewith to form an air chamber, said display space having side walls extending above the perforate support, means forming an air passage located adjacent one of said side walls and having an inlet located adjacent to but below the level of the upper edges of said side walls and having an outlet located below said perforate support and communicating with said air chamber, refrigerating means located in said passage for cooling air passing therethrough, thermal insulating means positioned between said refrigerating means and the side wall of the display space adjacent to said air passage, and means for positively circulating air from the display space through said air passage from said inlet to said outlet and through said air chamber in heat exchanging relation with said heat conducting means and thence through said perforate support back to said display space.

4. A refrigerated display case having an upper display space which is open at the top for access to customers and a lower storage space which is closed about the front and ends of the case and provided with a door in said front to permit access to the storage space, heat conducting means extending over the top of the storage space and separating the storage space from the display space, a perforate support spaced from said heat conducting means and cooperating therewith to form an air chamber extending throughout substantially the entire top of said storage space, said display space having front and end walls extending above said perforate support, a vertical baffle member forming the rear wall of the display space and having a heat conducting portion extending downward below the top of the storage space and forming the rear wall of the storage space, said case having an insulated rear wall spaced from the baffle member and cooperating therewith to form an air passage having an inlet positioned adjacent to but below the level of the upper edges of the front and end walls of the display space, said baffle member having an opening therein adjacent the storage space forming

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an outlet for said air passage, a housing adjacent said opening and communicating with said air chamber, a blower in said housing for causing air from the display space to flow downward through said air passage and upward through said air chamber to the display space and refrigerating means located in said air passage for cooling the air thus circulated.

5. A refrigerated display space of the character defined in claim 4 wherein the housing has an opening therein communicating with the storage space and other means spaced from the latter opening providing communication between the storage space and the air chamber to provide for

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the circulation of cooled air through the storage space and back to the display space.

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