United States Patent [19]

Kenyon

[11] **3,759,059**

[45] **Sept. 18, 1973**

[54] **REFRIGERATED DISPLAY CABINET**

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[73] Assignee: **Schaefer Corporation,** Minneapolis, Minn.

[22] Filed: **Dec. 30, 1971**

[21] Appl. No.: **214,355**

[52] **U.S. Cl.** **62/246,** 62/285, 62/255, 62/455, 62/456

[51] **Int. Cl.** **A47f 3/04**

[58] **Field of Search** 62/506, 507, 508, 62/454, 455, 456, 81, 256, 246, 255

[56] **References Cited**

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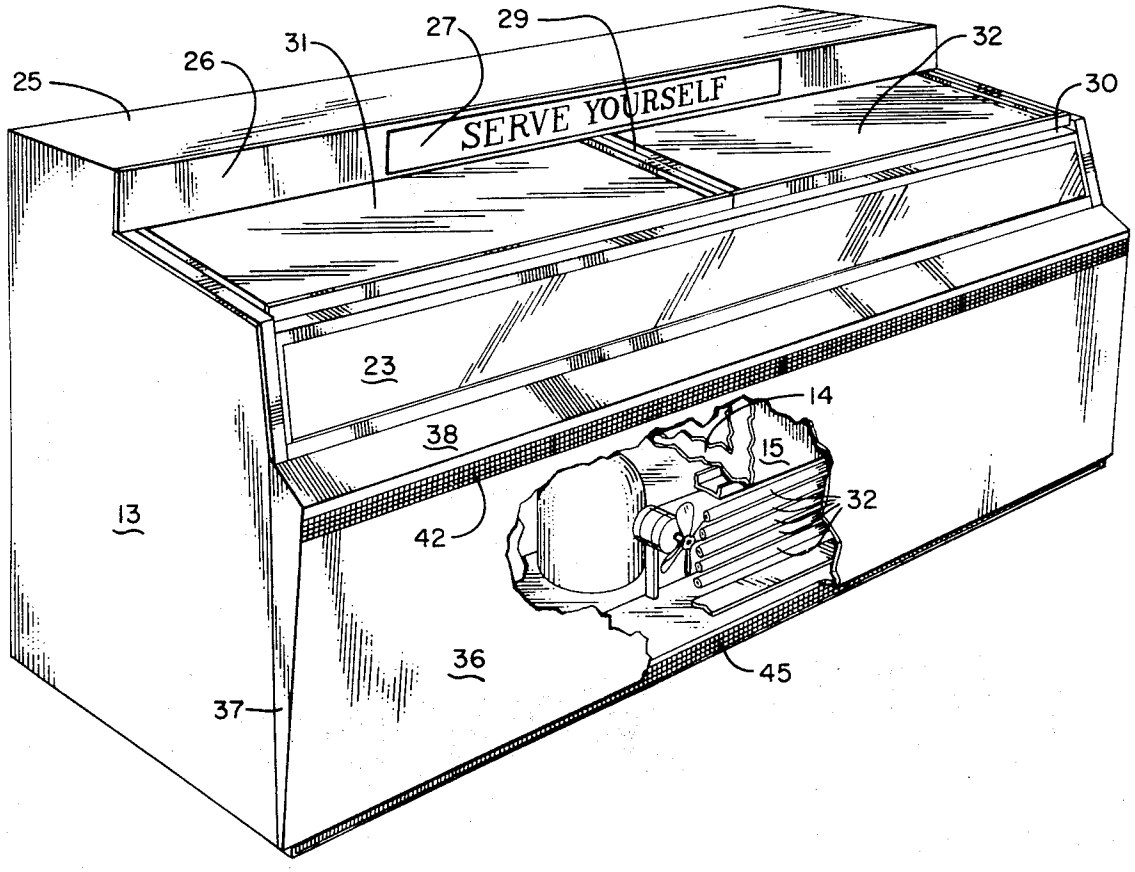
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Primary Examiner—William J. Wye
Attorney—Frederick E. Lange et al.

[57] **ABSTRACT**

A cooling arrangement for the condenser of a refrigerated display cabinet, in which there is an upper refrigerated display chamber and a lower nonrefrigerated chamber with the condenser being located in the lower chamber, the cooling arrangement involving drawing in the ambient air through the front of the cabinet well above the floor and after it is used to cool the condenser, discharging it into the toe space of the cabinet adjacent the floor. The cabinet has a sloping front panel spaced from the insulated front wall of the cabinet and the cooling air is drawn in adjacent the top of this front panel. A portion of the air, after passing over the condenser, is directed over the condensate drain passage in the rear of the cabinet.

8 Claims, 2 Drawing Figures



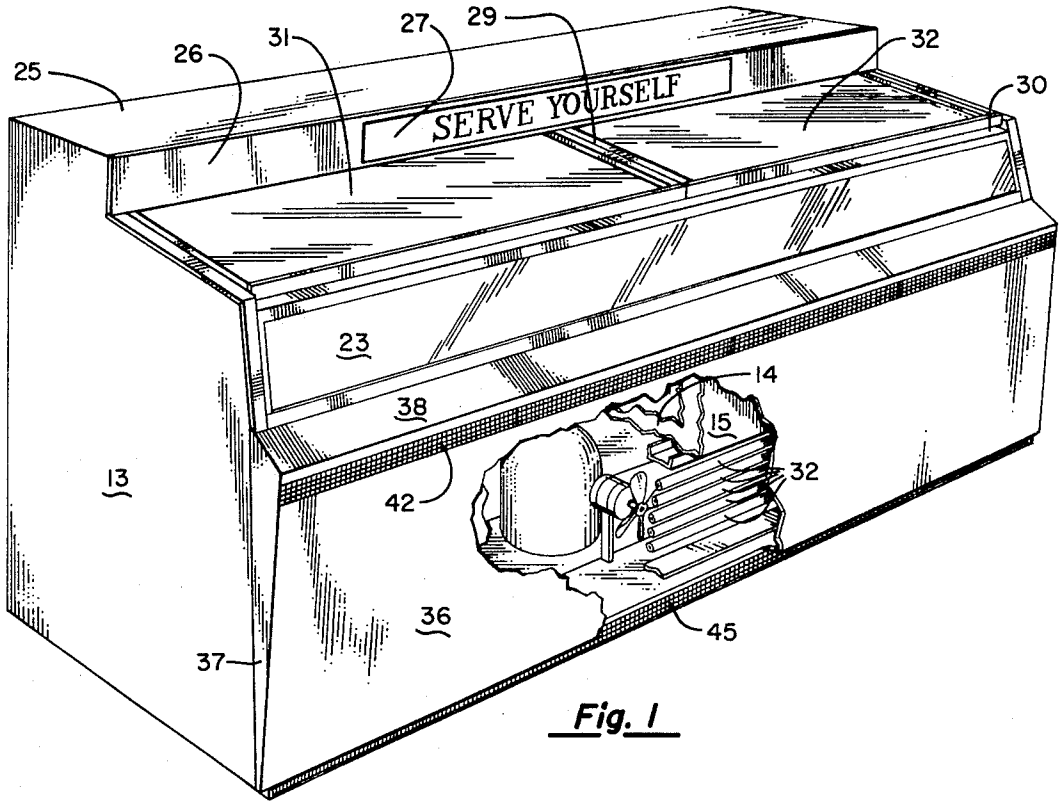

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Fig. 1

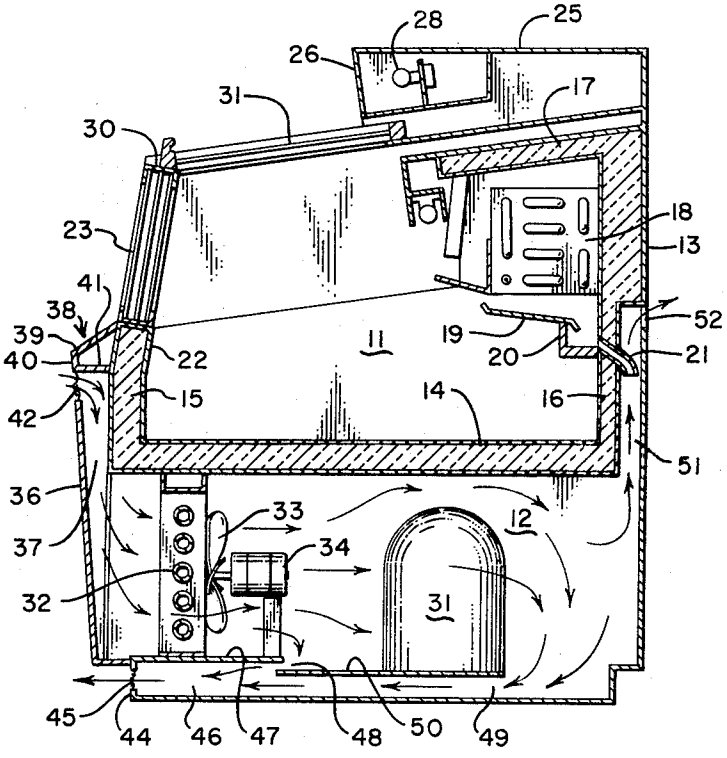

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Fig. 2

REFRIGERATED DISPLAY CABINET

BACKGROUND OF THE INVENTION

It is common practice in the art of refrigerated display cabinets to provide an upper refrigerated display chamber and a lower nonrefrigerated chamber, the condenser being located in the lower chamber and the evaporator in heat exchange relation with the upper refrigerated chamber. In order to cool the condenser, it is quite common to provide some means for circulating air over the condenser. One common method of doing this is to bring the air in through the front of the cabinet adjacent the bottom of the cabinet and after it has been circulated over the condenser, it is discharged to the rear of the cabinet. This type of arrangement has several drawbacks. In the first place, the air is drawn in adjacent to the floor and a certain amount of dust is picked up. This dust tends to be deposited on the compressor, the condenser and other elements within the lower chamber. Furthermore, it is often desirable to place these cabinets directly against a wall and when this is done, there is a tendency for the outlet for the heated air to be somewhat restricted. In other instances, the display cabinet may be so placed that the back of the cabinet is facing a cashier or other employee. The continuous discharge of warm air through the back of the cabinet can result in considerable discomfort to such person exposed to the discharge. Again, if two of these cabinets are placed back to back, the discharge of the heated air is impeded.

SUMMARY OF THE INVENTION

The present invention is concerned with a refrigerated display cabinet of the type just discussed in which the air for cooling the condenser is drawn in through the front of the cabinet at a point substantially above the floor and, after being used to cool the condenser, is discharged through the front of the cabinet adjacent the floor. This arrangement has the advantage of insuring that relatively clean air is drawn into the cabinet. Furthermore, the air that is discharged adjacent the bottom front portion of the cabinet tends to blow away any dust immediately in front of the cabinet at the floor level. It is quite common in such cabinets to have a recessed portion adjacent the floor to provide a "toe space". This area is easily overlooked during cleaning and tends to accumulate dust. The accumulation of this dust is materailly reduced with my arrangement.

The air inlet for the condenser cooling air is provided by an auxiliary front wall which extends upwardly from the bottom of the cabinet and is spaced from the front of the cabinet. The air inlet is adjacent the top of this auxiliary front wall. Preferably, a panel extends across and above the space between the front wall and the top of the auxiliary wall and a substantially vertical grill is disposed between the forward portion of this panel and the upper edge of the auxiliary wall to cover the air inlet. The inner wall is preferably an insulated wall forming a wall of the upper refrigerated chamber and the outer auxiliary wall is preferably a decorative wall which extends downwardly to substantially the bottom of the cabinet.

As is quite common with such cabinets, there is preferably a transparent heat insulating, wall disposed above the front insulated wall, which transparent wall forms a part of the enclosure of the upper refrigerated chamber. The panel extending between the front wall and the outer auxiliary wall preferably extends forward from the bottom of this transparent wall.

A portion of the heated air which is passed over the condenser may be diverted over a drain passage from below the evaporator to make sure that no freezing of this drain passage occurs.

Various other features and objects of the invention will be apparent from a consideration of the accompanying specification, claims and drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of my improved refrigerated display cabinet with portions broken away to show the condenser and compressor and the fan for circulating air over the condenser and compressor; and

FIG. 2 is a transverse sectional view, somewhat schematic, showing the path of the air relative to the condenser, the compressor and other elements of the refrigerated cabinet.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, the cabinet comprises an upper refrigerated compartment **11** and a lower nonrefrigerated compartment **12**. The upper refrigerated compartment **11** is suitably secured within a cabinet shell **13** with its bottom insulated wall **14** supported above the base of the cabinet by any suitable means (not shown). The upper cabinet has a front insulated wall **15** and a rear insulated wall **16** terminating at its upper end in an overhanging upper wall **17** which extends forwardly sufficiently to cover an evaporator unit **18** which is suitably supported in the upper chamber **11** in heat exchange relationship with the upper chamber **11**. Disposed beneath the evaporator **18** is a drip pan **19** which communicates with a condensate chamber **20** which, in turn, communicates with a condensate drain tube **21** extending downwardly and outwardly through the rear insulated wall **16** of the upper refrigerated chamber. The lower end of the drain tube **21** discharges down-wardly and is preferably so disposed that the condensate will flow into any suitable collection means (not shown).

The upper portion of the front insulated wall **15** of the refrigerated chamber **11** slants to the rear as shown at **22** and communicating with this upper slanting portion **22** of wall **15** is a transparent front wall **23** which may be formed of a plurality of panes of glass suitably spaced and sealed with respect to each other to provide air chambers therebetween and thus reduce the heat loss therethrough. The transparent front wall **23**, as is apparent from FIG. **1**, forms a continuation of the upper slanting portion **22** of front wall **15** and provides a means for assisting in viewing the contents of the cabinet. The shell **13** of the cabinet is provided with an upper chamber **25** closed in the front by a panel **26** in which is located a translucent sign **27** illuminated by suitable illuminating means **28**.

A center bar **29** extends between the upper chamber **25** and a bar **30** is disposed across the upper front of the cabinet. Disposed on each side of the center bar **29** are two slidable transparent covers **31** and **32**. These covers are slidably supported in the bar **29** and guides at the opposite ends of the cabinet. The details of these supports are of no importance as far as the present invention is concerned.

Located in the lower nonrefrigerated compartment 12 are various elements of the refrigeration system other than the evaporator 18. As is usual, the refrigeration system comprises a compressor 31 which is shown as a sealed unit. As is customary, gaseous refrigerant is compressed by the compressor and is then passed through a condenser 32 in which the compressed gaseous refrigerant is cooled and condensed to become a liquid. The condenser, as best shown in FIG. 1, comprises a pipe which extends back and forth in a series of loops across the front of the cabinet. Air is drawn over this condenser by a blower 33 in the form of a fan operated by a motor 34. The invention of the present application is concerned with the manner in which this air is introduced into the lower compartment 12 and is discharged therefrom.

Located at the front of the cabinet is a panel 36 constituting the outer front wall of the cabinet. It will be noted that this panel 36 merges at its bottom with the front edge of the lower compartment 12 and diverges outwardly as it extends upwardly, the upper portion being spaced from the front wall 15 of the upper refrigerated compartment. The panel 36 has side walls 37, one of which is shown in FIG. 1, which joins with the main cabinet 13 and encloses at its sides the passage formed between wall 36 and the insulated wall 15.

Disposed above the upper edge of the panel 36 is a hollow beam 38, shown in cross-section in FIG. 2. This beam includes a sloping upward wall 39 which extends forwardly and downwardly from and adjacent the edge of the glass wall 23 to a point above the upper edge of the front panel 36. The beam also has a substantially vertical front wall 40 and a substantially horizontal bottom wall 41. Disposed between the bottom of front wall 40 of the beam 38 and the top of the front panel 36 is a screen 42, as best shown in FIG. 1. This screen serves to cover the inlet for air to cool the condenser, as will be presently described.

As indicated by the arrows in FIGS. 1 and 2, the blower 33 is effective to draw air through the screen 42 and down through the passage formed by the panel 36 and the front wall 15. The air flows across the condenser coil 32 and then across the compressor 31.

As is customary with such cabinets, there is a lower supporting base 44 for the cabinet which does not project outwardly completely to the front of the cabinet. The space between the front of the base member 44 and the front of the cabinet is commonly referred to as the "toe space" in that it provides space for the toes of the customer examining the goods in the cabinet. The base 44 has an opening 45 in the front thereof covered by a screen. It is to be understood that this opening may be either in the form of a continuous opening covered by a screen, as shown, or in the form of a series of small openings spaced longitudinally along the base. The base 44 has a hollow passage or duct communicating with the opening 45, there being a forward passage 46 beneath a base member 47 which supports the condenser 32 and the blower 33 and which forms the top wall of passage 46 to prevent air entering the lower compartment from passing immediately into the passage 46. At a point behind the blower, there is a second base member 50 which supports the compressor 31. This is spaced above the bottom to form a passage or duct 49 communicating with passage 46 and acting as a rear extension thereof. Base member 50 is slightly lower than base member 17 and its front edge is spaced from the rear edge of base member 47 to provide a restricted opening 48 to permit air that has passed over the condenser 32 to enter the passage 46. Some of the air, however, passes over the compressor 31 and enters the passage 49 extending beneath the compressor. Thus, a portion of the heated air passing over condenser 32 passes through opening 48 and out through the opening 45 in the front wall of the base 44. Other of the air passes over the compressor 31 entering the passage 49 and flows through the passage 46 out through the opening 45. In addition, a further passage 51 is formed in the back wall 16 of the upper cabinet, this passage extending upwardly over the drain tube 21 and terminating in an opening 52. Thus, a portion of the air passing over the condenser 32 and the compressor 31 passes upwardly through passage 51, over the end of drain tube 21 and out through passage 52. Since this air is heated to a substantial extent by the condenser and compressor, it will be sufficiently warm to prevent the condensate drain tube from freezing. With the exception of the air passing through the rear passage 51, however, all of the air that is used for cooling the condenser and the compressor 31 passes out through an opening 45 in front of the cabinet. This air has sufficient velocity that any dust in the toe space tends to be blown away with the result that the toe space is kept relatively clean. Furthermore, the heat of the air passing out through this toe space is not particularly objectionable since the air issuing from this toe space tends to assume approximately room temperature before it has risen sufficiently to contact the upper portions of the body of a customer or of an employee servicing the cabinet. Furthermore, warm air contacting the feet and lower legs of a person tends to create a pleasant sensation, particularly since the temperature adjacent the floor is usually cooler than that at upper levels.

Because of the fact that the air is introduced through screen 42 which is at a relatively high level, the air introduced is relatively clean as compared with air taken in adjacent a floor. Furthermore, the chances of there being any obstruction at this level in front of the cabinet are very slight. Thus, by providing the air intake in the front of the cabinet, well above the floor, it is assumed that the air drawn in for cooling the condenser will normally be clean and relatively unobstructed. Furthermore, by discharging the air adjacent the floor and the front of the cabinet, any tendency of dust to collect at this point is minimized since it is blown away as it tends to collect. In addition, a portion of the heated air is also utilized for guarding against freezing of the condensate drain tube.

It will be seen that I have provided a refrigerated display cabinet in which provision is made for always bringing in clean air to cool the condenser and in which the heated air is discharged at the front of the cabinet adjacent the floor to keep this area clean and to discharge it at a point where the heat of the air tends to have a pleasant effect rather than an unpleasant effect upon people close to the cabinet. While I have shown a specific embodiment of the cabinet for purposes of illustration only, it is to be understood that the invention is to be limited solely by the scope of the appended claims.

I claim as my invention:

1. A refrigerated display cabinet having an upper refrigerated display chamber and a lower nonrefrigerated

chamber; a refrigerating system enclosing a condenser and an evaporator; said condenser being located in said lower chamber and said evaporator in heat exchange relationship with said upper refrigerated chamber; said cabinet having an air inlet in front thereof substantially above the bottom of said cabinet, an air duct beneath said condenser adjacent the bottom of said cabinet and having a rear opening adjacent the bottom and rear of the space in which said condenser is located, and an outlet in front of the cabinet adjacent the bottom thereof and communicating with the front of said air duct; and air circulating means in said cabinet for drawing air through said air inlet, through a portion of said lower cabinet, over said condenser for cooling the same, and out through said air duct and said air outlet, so that the air for cooling the condenser is drawn in through the front of the cabinet at an area substantially above the floor and is forced outwardly through the front of the cabinet adjacent the floor.

2. The display cabinet of claim **1** in which the lower portion of the front of the cabinet has two spaced walls, the outer of which terminates at its upper edge at a level substantially above the top of the lower chamber, in which an imperforate panel extends across and above the space between the walls, in which said air inlet extends substantially vertically below said panel adjacent the upper edge of the outer of said spaced walls, and in which the space between said walls forms an air passage leading to said lower chamber and through which the air for cooling the condenser is drawn after entering said inlet.

3. The display cabinet of claim **2** in which the inner of said spaced walls is an insulated wall and extends downwardly to the bottom of said upper refrigerated chamber and the outer of which is a decorative wall which extends downwardly to substantially the bottom of said cabinet.

4. The display cabinet of claim **3** in which a transparent wall is disposed above said insulated wall and forms part of the enclosure of said upper refrigerated chamber, said panel extending forwardly from the bottom of said transparent wall across and above said space between said walls, and in which there is a substantially vertical grill between the forward portion of said panel and the upper edge of said outer wall and covering said air inlet.

5. The display cabinet of claim **1** in which there is a recessed portion adjacent the bottom of the cabinet to provide a "toe space", which recessed portion extends substantially the entire length of the cabinet and in which said air outlet opens into said toe space so that the discharge air is discharged into the toe space.

6. The display cabinet of claim **1** in which there is a drain passage extending from below said evaporator to conduct condensate from said evaporator to a point of collection for said condensate and means for conveying a portion of the air passing over said condenser in heat transfer relation with said drain passage so as to minimize the danger of freezing in said drain passage.

7. The display cabinet of claim **1** in which there is a base member spaced above the bottom of the cabinet and supporting the condenser and in which the air duct is bounded by said base member and the bottom of the cabinet.

8. The display cabinet of claim **7** in which the refrigerating system includes a compressor and in which there is a further base member spaced above the bottom of the cabinet to the rear of said previously named base member and spaced therefrom, said further base member acting to support said compressor and to form an upper wall of a rear extension of said air duct so that some of the air passing over said condenser passes between said base members forwardly through said duct and other of the air passing over the condenser also passes over the compressor and is forced forwardly through said rear extension of said air duct.

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