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REFRIGERATED DISPLAY AND STORAGE FIXTURE

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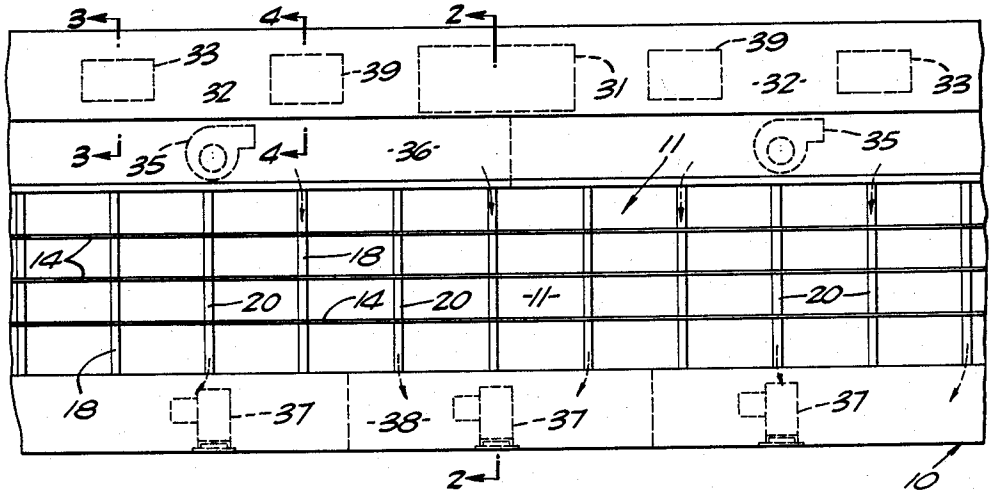


FIG. 1.

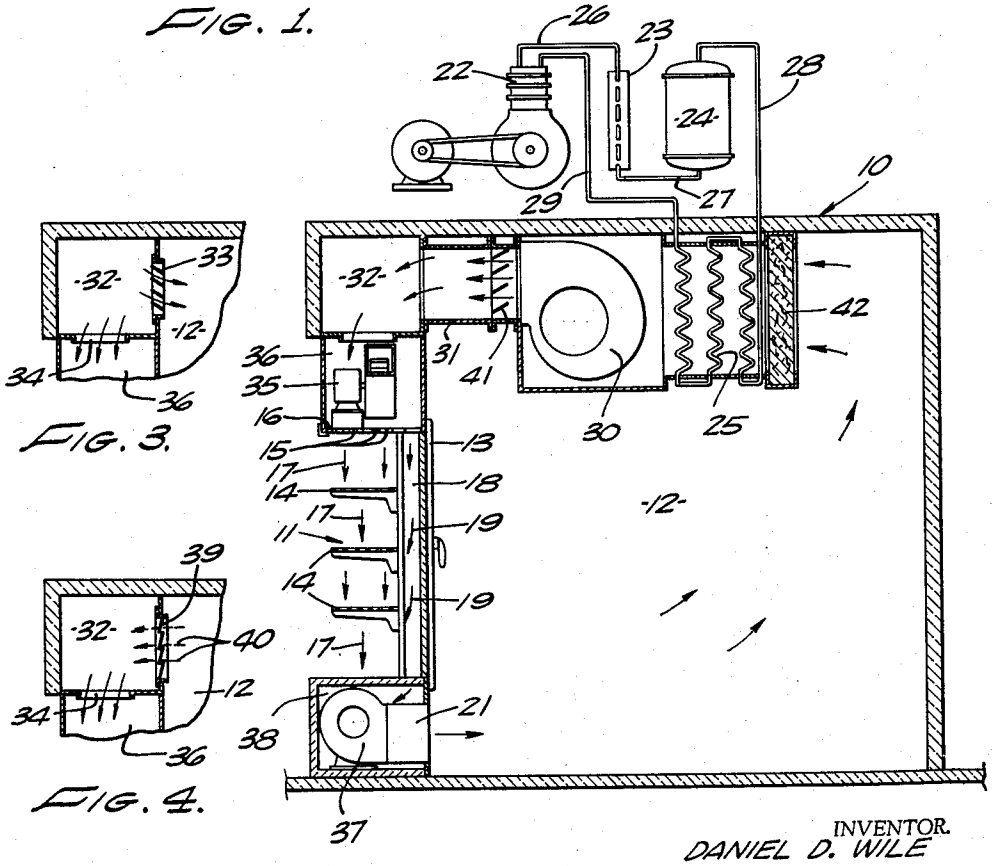


FIG. 3.

FIG. 4.

FIG. 2.

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3,119,241 REFRIGERATED DISPLAY AND STORAGE FIXTURE

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This invention relates to an improved form of refrigerated fixture having both a display case and a storage chamber and, in particular, is directed to such a fixture wherein the display case has an open front without doors to allow ready access to the display case.

It has become conventional in numerous installations such as supermarkets and the like to provide refrigerated display cases of the upright or shelf type with a refrigerated storage space immediately behind the display case and to refrigerate both the display case and the storage space as a single unit. The display cases of this type of installation usually have a plurality of shelves and the front of the display case may be open for unimpeded access by customers or closed with doors. The open front type of display case has been found to have many advantages from the standpoint of customer appeal and sales promotion. Open front display cases are generally provided with access doors from the refrigerated storage space to permit loading and unloading of the shelves of the display case from the attached storage space.

Various difficulties and disadvantages have been encountered with conventional refrigerated fixtures having an open front display case and a storage space. Certain of these refrigerated fixtures are arranged so that the refrigerating unit discharges cooled air into the storage space and blowers draw air from the storage space and discharge that air through the display case for cooling of the display case. With such an arrangement the air becomes warmed in the storage space before being passed through the display case and thus may result in inadequate cooling of the display case and the products contained therein. Conversely, if the refrigerating unit is arranged to discharge all of the cooled air through the display case, then an inadequate cooling of the storage space may result.

Conventional refrigeration systems employ a compressor, a condenser and an evaporator, and periodic defrosting of the evaporator coils is generally considered essential to the proper operation of the system. During the defrosting of the evaporator coil, the temperature of the coil is increased and therefore it is conventional and advantageous not to circulate air past the evaporator coil and into the refrigerated space during the defrosting. However, with open front display cases if cooled air is not continually circulated through the case, the cold air within the case will spill out of the open front and temperature within the case will increase rapidly. Such a wide variation in the temperature of the air within the display case can have many adverse effects such as a wide temperature variance of the displayed products and the formation of an objectionable amount of frost on the displayed products and the case itself.

Accordingly, it is a principal object of this invention to provide a novel refrigerated fixture having an open front display case and a storage space wherein proper cooling of the display case is continually maintained.

Another object of this invention is to provide a refrigerated fixture having a display case and a storage chamber wherein novel means are provided for accomplishing the proper cooling of both the display case and the storage chamber through the use of a single refrigerating unit.

A further object of this invention is to provide novel and inexpensive means for accomplishing continual circulation of cold air through an open front display case even

during the defrosting of the evaporator coil of the refrigerating unit used to cool the refrigerated fixture comprised of the display case and a storage space.

Other and more detailed objects and advantages of this invention will appear from the following description and the accompanying drawings.

In the drawings:

FIGURE 1 is a front elevation view of the refrigerated fixture employing this invention.

FIGURE 2 is a sectional elevation view taken substantially on the line 2—2 as shown in FIGURE 1, and also includes a diagrammatic illustration of a refrigerating unit used in the fixture of this invention.

FIGURE 3 is a fragmentary sectional elevation view taken substantially on the line 3—3 as shown in FIGURE 1.

FIGURE 4 is a fragmentary sectional elevation view taken substantially on the line 4—4 as shown in FIGURE 1.

Referring now to the drawings the refrigerated fixture of this invention, generally designated 10, includes an open front display case, generally designated 11, and a refrigerated storage chamber 12. As is conventional, a door (not shown) is provided for allowing entrance into the refrigerated chamber 12 and a plurality of doors 13 may be provided on the back wall of the display case 11 for permitting employees to load or unload the display case 11 from the refrigerated chamber 12.

The open front display case 11 may be basically of any conventional design which employs the circulation of cold air to accomplish the cooling of the case and may have any desired number of shelves 14. The cooling of upright case 11 may be accomplished by employing a cold air curtain wherein cold air is forced under pressure to flow from openings 15 to duct 38. The case 11 may also be maintained at the proper temperature as follows: cold air is circulated downwardly through openings 15 provided in the upper wall 16 of the display case, as shown by arrows 17, and cold air is circulated downwardly through a plurality of ducts 18 and outwardly through the shelves 14, as shown by arrows 19. The ducts 18 are laterally spaced along the display case 11 as shown in FIGURE 1. The cold air circulated downwardly through the display case to maintain the proper temperature is drawn through portions of the shelves 14 into a second plurality of vertical ducts 20, downwardly through ducts 20, and discharged into the storage chamber 12 through openings 21. In conventional refrigerated fixtures having an open front display case and a storage chamber, this circulation of cold air through the open front display case is generally accomplished by the blower associated with the refrigerating unit and one or more additional blowers. It should be noted that the access doors 13 between the display case 11 and the storage chamber 12 are generally positioned between the ducts 18 and 20.

Means are provided for cooling the refrigerated fixture 10, and, as shown in FIGURE 2, these means may include a compressor 22, a condenser 23, a receiver 24, and an evaporator coil 25. As is conventional, the compressor 22 comprises a gaseous refrigerant and delivers same through conduit 26 to the condenser 23 where the refrigerant is condensed to a liquid and delivered through conduit 27 to receiver 24. The liquid refrigerant passes from receiver 24 through conduit 28 to evaporator coil 25 where the refrigerant evaporates to cool coil 25 and is returned through conduit 29 to the suction side of compressor 22 to complete the refrigeration cycle. A blower 30 is provided for drawing air from the storage chamber 12 through a filter 42 and over the coils of the evaporator 25 to cool the air. The cooled air is discharged by blower 30 through duct 31 into a plenum 32 associated with display case 11 or through individual ducts (not shown) to

desired portions of the display case. The plenum **32** preferably extends laterally the full width of the fixture **10** although it will readily be seen from the following description that plenum **32** may be somewhat shorter than the width of the fixture. Plenum **32** may be an integral part of the display case **11** or the plenum may be an individual component, as shown.

Means are provided for allowing and controlling the discharge of some of the cooled air from the blower **30** into the storage chamber **12** and, as shown in FIGURES 1 and 3, these means may include adjustable dampers **33** provided in plenum **32**. This discharge of cooled air may also be accomplished by providing dampers, similar to dampers **33**, in the duct **31** (not shown) or by providing separate ducts from the blower to the storage chamber **12** (not shown). One or more openings **34** are provided in the lower wall of plenum **32** for discharging cold air into the display case **11** for circulation therethrough. One or more blowers **35** are provided in a duct **36** in the upper portion of the display case **11** for drawing cold air through openings **34** and discharging the air downwardly through apertures **15** and ducts **18** as heretofore described. One or more blowers **37** are provided in a duct **38** in the lower portion of display case **11** for drawing the air through vertical ducts **20** and discharging such air into the storage space **12** through openings **21** as heretofore described. The relative capacities of blowers **30**, **25** and **37** are such that a positive pressure is maintained in plenum **32** by blower **30**, that it is to say, the air pressure within plenum **32** exceeds the air pressure within storage space **12**. Thus, a certain quantity of cooled air is continually passed from plenum **32** through dampers **33** into storage chamber **12** for maintaining the proper temperature within the storage chamber. Moreover, the air circulated through the display case **11** is the coldest air available since it passes from the refrigerating unit through display case **11** before being discharged into storage chamber **12**.

As heretofore mentioned, it is conventional to periodically defrost the evaporator coils of a refrigerating unit and not to circulate air over the evaporator coils and into the refrigerated space during such defrosting. The evaporator coil **25** may be defrosted by any conventional means such as hot gas defrosting where hot compressed refrigerant is passed through the evaporator coil to melt the accumulated frost. During the periodic defrosting of evaporator coil **25**, the operation of blower **30** is discontinued so that air is not delivered through duct **31** to plenum **32**. Blowers **35** and **37** continue to run during the defrosting of coil **25** for maintaining circulation of cold air through display case **11**. During defrosting, cold air is drawn from storage chamber **12** in a reverse direction through dampers **33** by blowers **35** and then passed through display case **11**. If it is desirable to permit additional cold air to be drawn from storage chamber **12** during defrosting, then means may be provided for allowing this additional cold air to be drawn into and through display case **11** and these means may include relief dampers **39** mounted in plenum **32** as shown in FIGURES 1 and 4 or mounted in duct **31** (not shown). Relief dampers **39** are closed, as shown in FIGURE 4, during the normal refrigerating operation of evaporator coil **25** and the dampers **39** open automatically upon the reduction of the air pressure within plenum **32** by blower **35** to allow air to pass into plenum **32** in the direction of arrows **40**. A damper assembly **41** may be provided in duct **31** to further insure against air being circulated over the evaporator coil **25** during the defrosting of the coil. The damper assembly **41** is operative by any convenient means, such as appropriately weighting the dampers, so that the dampers present little or no obstruction to air discharged from blower **30**, but close when blower **30** is not running.

Thus, it may be seen that this invention provides a refrigerated fixture having an open front display case and a storage chamber wherein both the display case and the storage chamber are adequately cooled with the coldest air discharged by the refrigerating unit, and the circulation of cold air through the display case is not interrupted during the defrosting of the refrigerating unit although the refrigerating unit blower is not operated.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth or to the details illustrated in the drawings, but my invention is of the full scope of the appended claims.

I claim:

1. A refrigerated fixture having a refrigerated storage chamber, a refrigerated open front display case and a plenum; refrigeration means for cooling air and discharging that cooled air into said plenum; air circulating means for drawing air from said plenum, through said display case and discharging that air into said storage chamber; and damper means provided in said plenum for drawing air into said plenum from said storage chamber by said air circulating means for circulating that air through said display case when the supply of air discharged to said plenum by said refrigeration means is shut off.

2. A refrigerated fixture having a refrigerated storage chamber, a refrigerated open front display case and a plenum; refrigeration means for drawing air from said storage chamber, cooling that air and discharging that air into said plenum; air circulating means for drawing air from said plenum, through said display case and discharging that air into said storage chamber; and damper means provided in said plenum for passing some of the air discharged into said plenum directly into said storage chamber from said plenum.

3. A refrigerated fixture having a refrigerated storage chamber, a refrigerated open front display case and a plenum; refrigeration means for drawing air from said storage chamber, cooling that air and discharging that air into said plenum; air circulating means for drawing air from said plenum, through said display case and discharging that air into said storage chamber; and damper means provided in said plenum for passing some of the air discharged into said plenum directly into said storage chamber, second damper means provided in said plenum for drawing air into said plenum from said storage chamber by said air circulating means for circulating that air through said display case only when the supply of air discharged to said plenum by said refrigeration means is shut off.

4. A refrigerated fixture having a refrigerated storage chamber, a refrigerated open front display case and a plenum; refrigeration means for drawing air from said storage chamber, cooling that air and discharging that air into said plenum; air circulating means for drawing air from said plenum, through said display case and discharging that air into said storage chamber; and damper means provided in said plenum for passing some of the air discharged into said plenum directly into said storage chamber, second damper means provided in said plenum for drawing air into said plenum from said storage chamber by said air circulating means for circulating that air through said display case when the supply of air discharged to said plenum by said refrigeration means is shut off, and third damper means provided for stopping the flow of air through said refrigeration means when the supply of air discharged to said plenum by said refrigeration means is shut off.

5. A refrigerated fixture having a refrigerated storage chamber, a refrigerated open front display case and a plenum; refrigeration means for drawing air from said storage chamber, cooling that air and discharging that air into said plenum; air circulating means for drawing air from said plenum, through said display case and discharging that air into said storage chamber; said refrigeration means discharging a quantity of cooled air into said plenum in excess of the quantity of air being drawn from said plenum by said air circulating means and damper means provided in said plenum for passing such

excess air directly into said storage chamber; and second damper means provided in said plenum for drawing air into said plenum from said storage chamber by said air circulating means for circulating that air through said display case when the supply of air discharged to said plenum by said refrigeration means is shut off.

6. A refrigerated fixture having a refrigerated storage chamber and a refrigerated open front display case, refrigeration means for cooling air and discharging that cooled air, enclosed means for conducting the discharged cooled air to said display case, means for passing some of the discharged cooled air into said storage chamber, air circulating means for passing the cooled air discharged to said display case through said display case and into said storage chamber, said air circulating means drawing air from said storage chamber and passing that air through said display case and back into said storage chamber when the supply of cooled air discharged to said display by said refrigeration means is shut off.

7. A refrigerated fixture having a refrigerated storage

chamber and a refrigerated open front display case, refrigeration means for cooling air and discharging that cooled air, enclosed means for conducting the discharged cooled air to said display case, air circulating means for passing the cooled air discharged to said display case through said display case and into said storage chamber, adjustable damper means for passing some of the cooled air discharged by said refrigeration means into said storage chamber and for drawing air from said storage space and passing that air through the display case by said air circulating means when the supply of cooled air discharged to said display by said refrigeration means is shut off.

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