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AIR RETURN GRILLE FOR AN AIR CURTAIN TYPE REFRIGERATED DISPLAY CASE

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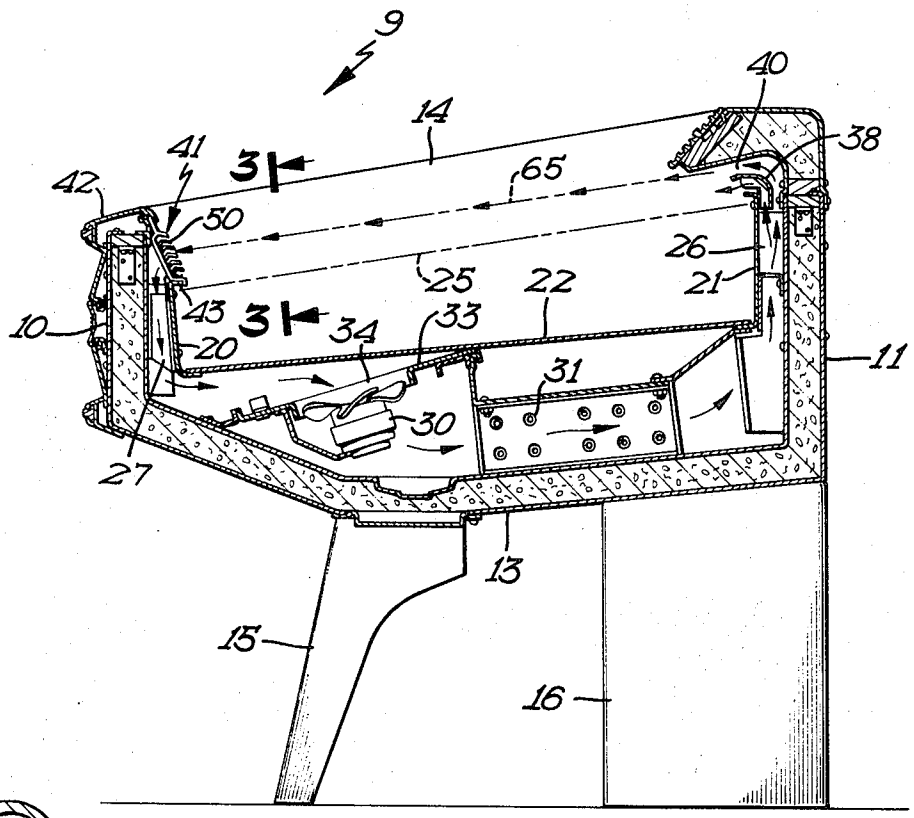


FIG 1

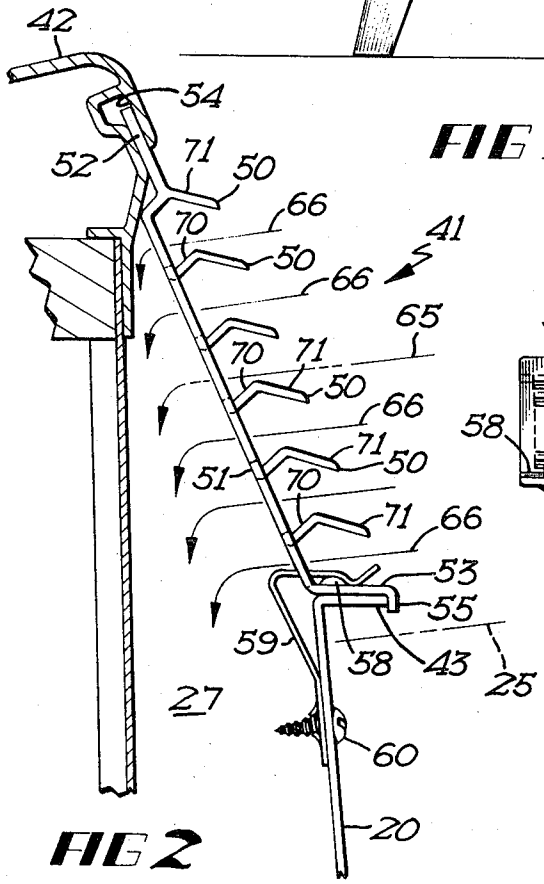


FIG 2

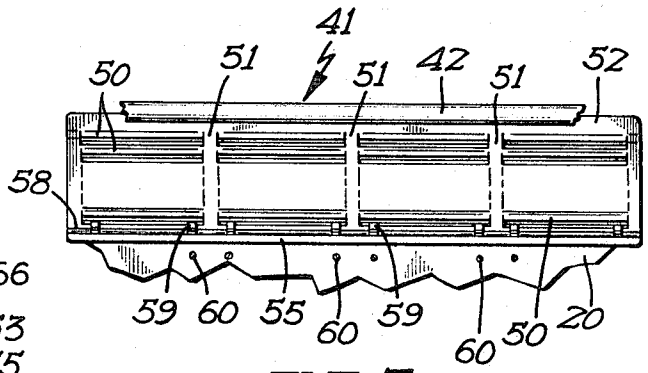


FIG 3

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AIR RETURN GRILLE FOR AN AIR CURTAIN TYPE REFRIGERATED DISPLAY CASE

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U.S. Cl. 62—256 2 Claims

ABSTRACT OF THE DISCLOSURE

The invention relates to an air return grille for an air curtain type of refrigerated display case. The grille has a louvre design which facilitates an efficient air current flow and prevents or minimizes the tendency of liquids to enter the air return flue through the grille.

The invention relates to a new and improved air return grille for an air curtain type refrigerated display case.

Air return grilles of the type referred to have not been the subject of intensive development in the refrigerated display case industry because it apparently has not been previously recognized that the return grille has a significant effect on the operating efficiency of air curtain type apparatus.

A main object of the invention is to proivde new and improved air return grille means for refrigerated display cases of the air curtain type.

Other objects and advantages of the invention will become apparent from the following specification, drawings and appended claims.

FIG. 1 is a transverse sectional view of an air curtain type of refrigerated display case embodying a return air grille in accordance with the invention;

FIG. 2 is an enlarged fragmentary transverse sectional view showing only the return air grille portion of FIG. 1; and

FIG. 3 is a front view of the return air grille as it would be viewed from line 3—3 of FIG. 1.

Referring to the drawing, FIG. 1 is a sectional view of a more or less typical air curtain type of refrigerated display case **9** which is normally used for refrigerating meat, produce and dairy products, including milk and various kinds of juices. This type of case is commonly found in super markets and the operating temperature is normally in the range of 32 to 34 degrees Fahrenheit. The display case of the illustrated embodiment of the invention is generally tub-like in appearance with two insulated, longitudinally extending front and rear wall portions **10** and **11** and an insulated, longitudinally extending bottom portion **13**. The display case has insulated wall portions at opposite ends thereof with only end wall portion **14** being visible in FIG. 1. The display case **9** is suitably supported as with legs **15** and **16**.

Internally of display case **9** are partitions which are in generally parallel and spaced relation to the insulated walls which define a food bin having front and rear walls **20** and **21** and a floor **22**. The upper ends of walls **20** and **21** define the food load line, which is indicated by the imaginary broken line **25**, above which food products should not protrude if interference with the normal operation of the cooling system is to be avoided.

The space between bin wall **21** and outer wall **11** is termed an air supply flue **26** and the space between the bin wall **20** and the outer wall **10** is termed an air exhaust flue **27**. The space between bin floor **22** and the case bottom portion **13** connects and provides fluid communication between flues **26** and **27** and houses a fan and motor unit **30** and an evaporator or cooling coil **31**. A

partition **33** extends longitudinally the length of the display case between walls **22** and **13** and has an opening **34** through which the fan unit **30** draws air from the return flue **27**, passes the air over the cooling coil **31**, and delivers the air to the supply flue **26**.

The upper part of wall portion **11**, above load line **25** is curved inwardly and overhangs the rear part of the food bin. A vertical extension **38** of the bin wall **21** is also curved inwardly and, in cooperation with the inside surface of the upper part of wall portion **11**, forms a cooling air discharge outlet **40** which directs the cooling air to the forward side of the display case.

Extending vertically above the bin wall **20** is a louvered return air grille **41** which is inclined relative to bin wall **20** and is connected indirectly to the upper part of wall portion **10**. A frame for the grille **41** comprises a longitudinally extending rail member **42** mounted on the top of wall portion **10** and a longitudinally extending flange **43** on the top of bin wall **20** which extends longitudinally and inwardly relative to the bin wall **20**.

Grille **41** may economically be a one piece unitary aluminum extrusion. The grille comprises a plurality of longitudinally extending louvres **50** supported in spaced relation to each other by a plurality of transversely extending support bars **51**. For attachment purposes, grille **41** has a vertically extending flange portion **52** extending from the upper end thereof and a horizontally extending flange portion **53** extending from the lower end thereof.

Rail member **42** has an inclined, longitudinally extending, downwardly open slot **54** for receiving grille flange **52** therein. Grille **41** is installed by inserting flange **52** thereof into slot **54** and moving the grille inwardly until grille flange **53** is in abutting engagement with frame flange **43**. Grille flange **53** has a downwardly extending lip **55** which abuts flange **43**.

Grille flange **53** has a longitudinally extending, upwardly extending protrusion **58**. A plurality of clips **59** made of spring sheet metal are attached at spaced intervals along the outer side of the upper end of bin wall **20** with screws **60**. Clips **59** are formed and bent so that the grille protrusion **58** can be removably hooked by the clips to facilitate the holding of the grille in its illustrated installed position and to facilitate the easy removal of the grille for the purpose of cleaning the grille and the walls of the return flue **27**.

In operation, cold air is discharged from the cold air outlet **40**. This air flows towards the return grille **41** in the form of a several inches thick blanket or curtain, the direction of flow being in generally parallel relation to an imaginary reference line **65** which in turn is generally parallel to the food load line **25**. Reference line **65** extends from approximately the middle of the air outlet **40** to approximately the middle of the grille.

The longitudinal length of grille **41** is largely optional and may be four feet in length, for example. A display case having a nominal length would accommodate two such grille members and a case having a nominal length of twelve feet would accommodate three such grille members.

The grille louvres **50** are generally roof shaped in section with two oppositely inclined portions **70** and **71** meeting to form an apex. The louvres **50** are in vertically spaced relation to each other so that parallel planes, such as the plane represented by the reference line **65**, and the reference lines **66** as indicated in FIG. 1, pass between the louvres without intersecting the louvre portions **70** and **71**. With this spacing of the louvres, the impedance to the flow of the blanket or curtain of air is not only minimized but the maintenance of parallel streams of air on opposite sides of the reference plane or line **65** minimizes air turbulence in the moving air

curtain. It is desirable to minimize air turbulence because it contributes to inefficiency by creating holes or rifts in the moving curtain of air which ideally functions to thermally isolate or insulate the air in the food bin from the ambient air.

The louvre portions **70** are in parallel relation to each other and are inclined at approximately a 45 degree angle to the vertical to effect a bending or curving of the layers of air entering the grille from their generally horizontal planes to generally vertical planes in the return flue **27**. It is not important in itself that the air moving downwardly in return flue **27** be in orderly layers except that air disturbances or turbulence in the return flue is transmitted back upstream into the curtain of air flowing between the discharge outlet **40** and the grille **41**.

The louvre portions **71** are in parallel relation to each other and are oppositely inclined, relative to the louvre portions **70**, at approximately a 45 degree angle to the vertical. The inclining of the louvre portions **71** as illustrated is effective to prevent liquids from being splashed into the return flue **27**. In the operation of a refrigerated display case of the type referred to herein there occurs a certain amount of undesired spillage of food products such as milk. Liquids are caused to splash by such spillage and it is not unusual for these liquids to undesirably find their way into the return flues either directly by splashing or by running off food products which are improperly loadedin a manner such that they project above the load line **65**. The inclination of the louvre portions **71** prevent or minimize the splashing or running of liquids into the return flue **27** and this is conducive to clearer and more sanitary conditions because the accumulation of food in the return flue provides a breeding place for harmful basteria.

What we claim is:

1. An air curtain type refrigerated display case comprising, elongated tub-like structure having insulated side and end wall portions and an insulated bottom portion, a food bin in said tub-like structure having side wall sections in spaced relation to said side wall portions to form air supply and air return flues, an imaginary load line plane extending between the top edges of said side wall sections, said bin having a floor section in spaced relation to said bottom portion, fan and motor means and cooling coil means between said floor section and said bottom portion, an air discharge outlet connected to said air supply flue for directing a curtain of air transversely across said bin and generally parallel to said plane, a grille at the entrance of said return flue between said wall portion and wall section which form said return flue, said grille having longitudinally extending louvres vertically spaced apart to stratify said curtain of air so that parallel layers of said air curtain having substantial thicknesses pass linearly and unobstructedly through said grille between said louvres, said louvres have upstream and downstream oppositely inclined portions meeting to form an apex, said upstream louvre portions being downwardly inclined from the horizontal to provide a run-off for liquids to prevent the entry of liquids into said air return flue.

2. An air curtain type refrigerated display case according to claim **1** wherein said upstream and downstream louvre portions are inclined at substantially a 45 degree angle to the linear path of said air curtain to smoothly bend said layers of air entering said grille from said air curtain to said return flue.

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WILLIAM J. WYE, Primary Examiner

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