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Maudlin

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[54] **EVAPORATOR AND CONDENSATE COLLECTOR ARRANGEMENT FOR REFRIGERATION APPARATUS**

[75] Inventor: **Wendell E. Maudlin**, York, Pa.

[73] Assignee: **Borg-Warner Corporation**, Chicago, Ill.

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[52] **U.S. Cl.** **62/290**, 165/181, 62/285

[51] **Int. Cl.** **F25d 21/14**

[58] **Field of Search** 62/290, 291, 285, 62/289, 288; 165/181

[56] **References Cited**

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Primary Examiner—William J. Wye

Attorney—Donald W. Banner et al.

[57] **ABSTRACT**

A fin and coil type evaporator positionable in a vertically-flowing air stream and including a horizontally disposed plate fin construction with V-shaped fins providing a path for the flow of moisture, condensed from the air stream, to collectors extending beneath the fins and being of such narrow width as to underlie only the pointed lower ends of the fins to minimize interference with the flow of air through the evaporator.

1 Claim, 3 Drawing Figures

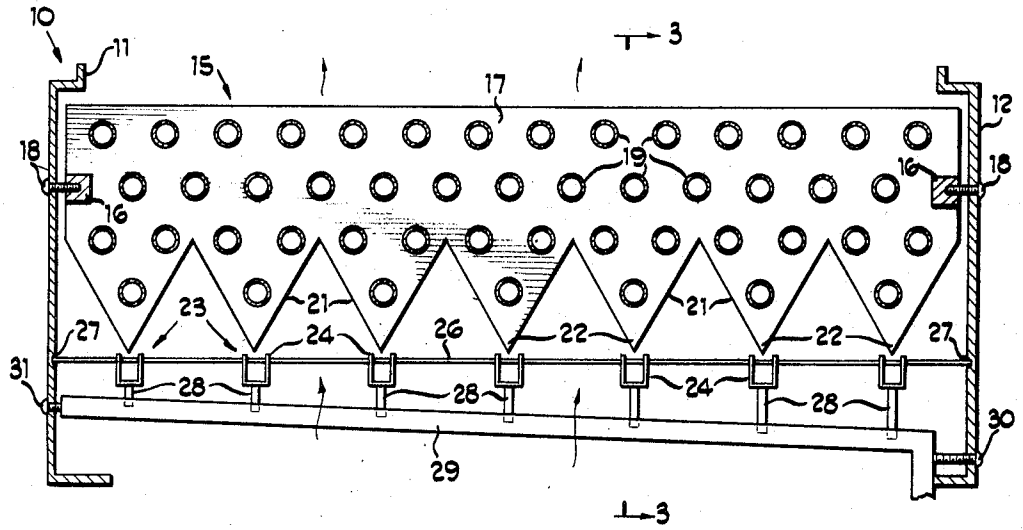
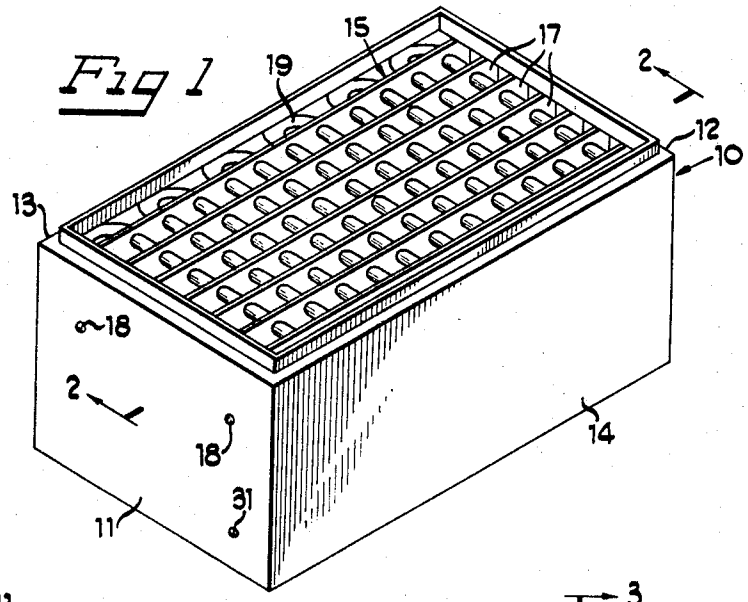


Fig 1



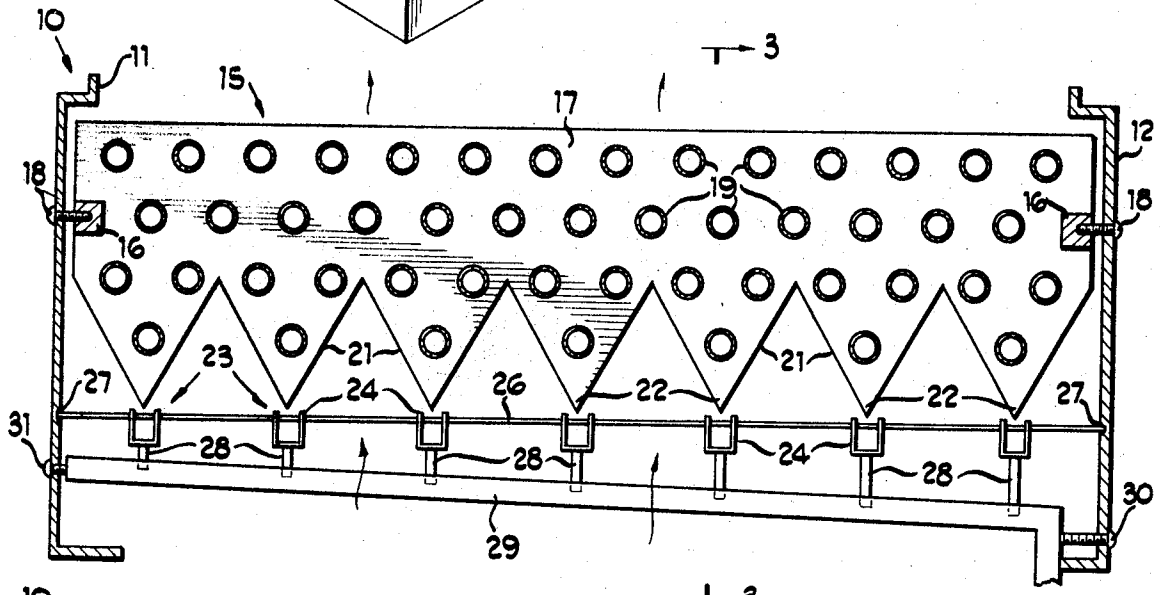


Fig 2

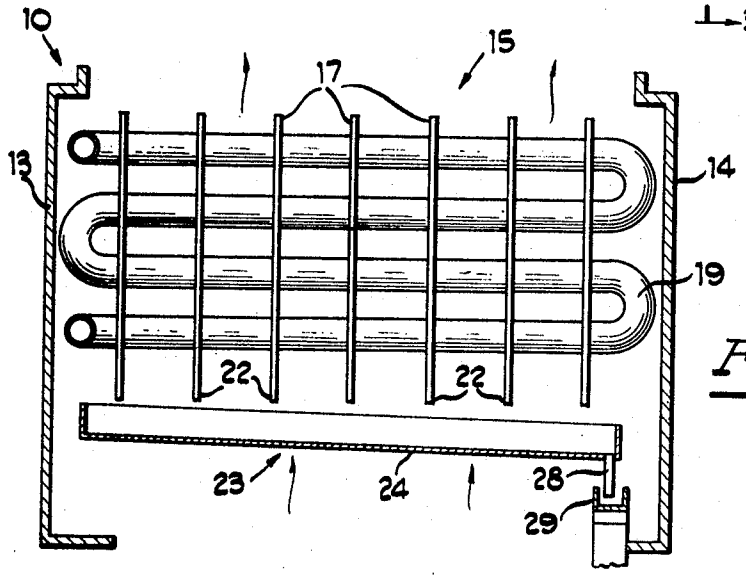


Fig 3

EVAPORATOR AND CONDENSATE COLLECTOR ARRANGEMENT FOR REFRIGERATION APPARATUS

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to an improved evaporator and condensate collector arrangement for refrigeration apparatus.

Conventional commercially-available evaporator and condensate collector arrangements may employ two evaporator fin and coil slabs assembled into an A-shape, or a single fin and coil slab which is slanted, for exposure to vertically-flowing air and to position the same so that condensate flows down the lower edges of the fins into underlying collector troughs or pans. A third type of evaporator and condensate collector arrangement contemplates a horizontal fin and coil slab with a considerable number of inclined hook-section condensate-collecting troughs so spaced apart with respect to each other and having such widths that one inclined trough extends beneath, and thus overlaps in a vertical relation, adjacent troughs to provide a louver-like assembly disposed in the path of a vertically-flowing air stream. In these arrangements, the trough or troughs have considerable width to insure satisfactory collection of the condensate flowing from the overlying fin and coil slab or slabs. It has been found such evaporator and condensate collector arrangements have many disadvantages since a dead air space exists between the trough or troughs and the overlying evaporator slab or slabs because the trough or troughs act to block or restrict, and thereby seriously impair, the circulation of air around and vertically through the slab or slabs thereby substantially reducing the efficiency of heat transfer.

The evaporator and condensate collector arrangement of the present invention is characterized by an evaporator of the fin and coil type having an improved fin construction provided by each fin extending vertically and formed with a serrated bottom edge to provide a series of V-shaped tapered portions so that the pointed ends of each tapered portion are located at the lowermost condensate discharge point of the fin, the condensed moisture converging downwardly along the tapered portions of the fin to the lowermost points of the fin for flow from the point and collection in narrow troughs disposed directly beneath the points, the troughs being manifolded together for drainage of the moisture into a single drain pan.

It is therefore a principal object of the invention to provide an improved evaporator and condensate collector arrangement for refrigeration apparatus.

Another object of the invention is to provide an improved evaporator and condensate collector arrangement including an evaporator slab of the fin and coil type having a fin structure designed to collect condensed moisture for flow into relatively narrow troughs providing minimum restriction to the vertical flow of air around and through the evaporator slab.

Additional objects and advantages will be apparent from the following detailed description taken in conjunction with the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a refrigeration compartment having the improved evaporator and condensate collector arrangement.

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1 showing the fin and coil structure and condensate-collector and drain troughs; and

FIG. 3 is a sectional view taken along line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, the duct or plenum **10**, which forms a portion of the warm air heating and air conditioning system, has side walls **11** and **12** and end walls **13** and **14**. A finned evaporator coil structure **15** in the form of a bank or slab is horizontally positioned in the plenum and extends substantially the entire length and width of the compartment. The slab is supported on the plenum side walls **11** and **12** by a plurality of spaced brackets **16**, connected to the thin sheet metal plate-like fins **17** of the bank, and by bolts **18** extending through the walls **11** and **12** and into threaded openings in brackets **16**.

The evaporator structure **15** comprises a tube or pipe bent back and forth upon itself to provide its coil **19** acting as a refrigerant expansion chamber and absorbing heat from the air to thus provide cooling of the air. Associated with the coil are a plurality of the fins **17** mounted on the coil convolutions at right angles to the axes of the parallel coil portions and through which the coil passes. The evaporator structure **15** is horizontally mounted in the compartment **10** in the path of the air streams flowing vertically, as indicated by the arrows in FIGS. **2** and **3**, to expose a maximum area to the air entering the lower open end of the compartment, flowing through the evaporator structure, and discharged from the upper open end of the compartment.

As shown in FIG. **2**, each fin **17** has a serrated bottom edge providing a series of V-shaped portions **21** having both sides tapered angularly toward a point **22** at the lowermost extremity of the fin. This shape of the fins insures that moisture, formed by condensation of the surfaces of each fin, will be in the form of a thin continuous film of condensate on the fin and will flow, by gravity, to the lowermost discharge point **22** of the fin.

A condensate collector assembly **23** is disposed in the plenum **10**, and relative to the evaporator structure **15**, to cooperate with the coil structure **15** in a manner to insure that moisture, condensed on and flowing downwardly of the fins, is collected while providing minimum resistance and restriction to air flowing through the compartment and into the coil structure. More particularly, the collector assembly **23** comprises a plurality of U-shaped troughs **24** respectively disposed directly beneath the lowermost points of the fins, namely, tips **22** of the V-shaped portions **21** of the fins. The troughs **24** may be formed of thin metal or lightweight plastic and of such width as to be aligned with and underlie only the tips **22** so that maximum air flow through the collector assembly **23** is assured. The troughs are connected together by two spaced thin rods **26** extending through the side walls of the troughs and having their ends seated in pockets **27** in the side walls **11** and **12** of the compartment. Each trough **24** is angularly inclined to the end walls **13** and **14** of the plenum

(FIG. 3) so that condensate moisture in the troughs will flow downwardly from wall **13** to wall **14** and, at its lower closed end near the wall **14**, will enter spouts **28** and flow into a drain trough **29** inclined angularly from the side wall **11** to the side wall **12** of the plenum. In FIG. **2**, the drain trough **29** is shown to be held in position by bolts **30** and **31** extending through the walls **11** and **12** and threaded into the trough ends to support the trough beneath the spouts **28** of the troughs **24**.

From the foregoing description, it will be apparent that my improved evaporator and condensate collector arrangement provides a finned evaporator coil structure which can be mounted in a horizontal position in relation to vertically flowing air to provide maximum heat exchange fin and tube area while being of low height; and, when upflow of air is desirable, the cabinet does not require insulation since entering air is against the plenum's inside walls. The condensate collector assembly, including the troughs **24** and trough **29**, provide a very small area minimizing impedance or restriction of air flow through the collector assembly while cooperating with the finned evaporator coil structure to insure satisfactory collection and removal of condensed moisture. Also, when the cabinet is placed on a furnace, air circulation is not blocked around the heat exchanger.

What is claimed is:

1. An evaporator coil assembly for use in an air conditioning system of the type in which the evaporator coil assembly is located within a plenum through which air to be conditioned is forced under positive pressure through said coil assembly comprising: an evaporator coil including a plurality of tube sections extending in at least two planes perpendicular to the direction of air flow; a plurality of substantially vertically arranged plate-like fins each lying in a plane parallel to the direction of air flow and being in heat exchange contact with substantially all the tube sections traversing said plane, each said fin having a straight upper edge perpendicular to the air flow and a lower edge providing V-shaped tapered portions with the apex thereof arranged at the lowermost condensate discharge point of each fin; a plurality of spaced parallel condensate-collecting troughs supported on said cabinet in said passage and extending substantially the length of said coil portions of said evaporator, said troughs underlying said V-shaped tapered portions of said fins and each trough having a width to underlie only the condensate discharge points of the adjacent fins to collect condensate gravitating from the fins while reducing interference with the flow of air through said passage to a minimum.

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