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W. R. LYMAN

2,930,208

DEHUMIDIFICATION APPARATUS

Filed March 14, 1958

FIG. 1.

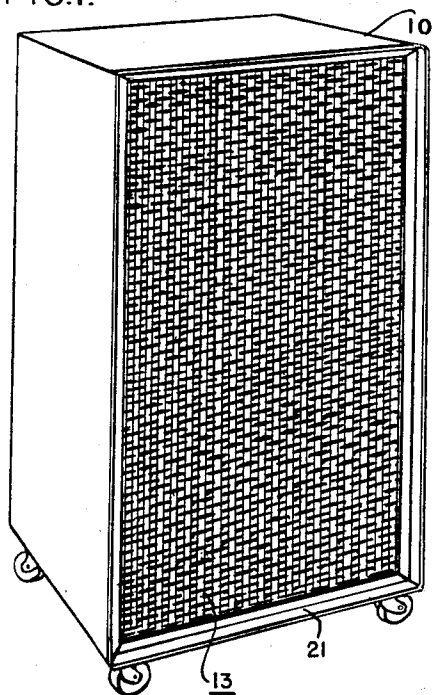


FIG. 2.

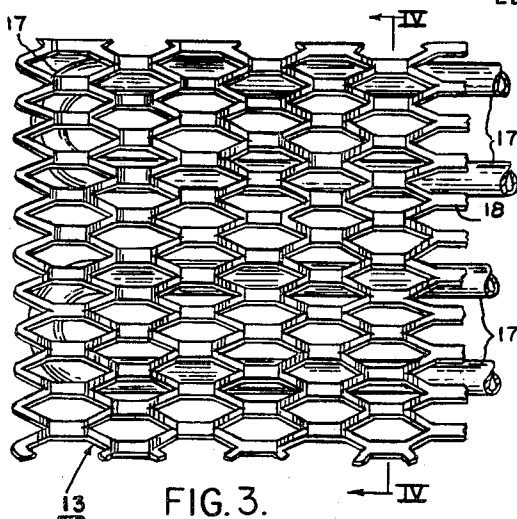
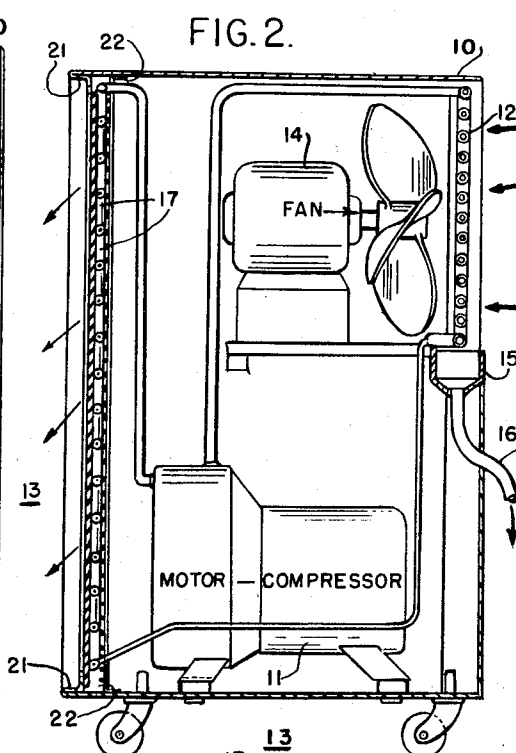


FIG. 3.

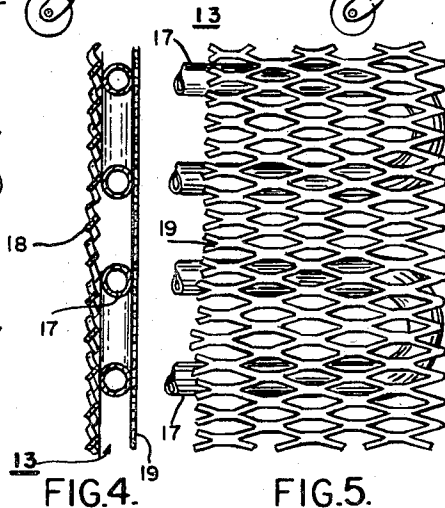


FIG. 4.

FIG. 5.

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DEHUMIDIFICATION APPARATUS

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1 Claim. (Cl. 62—428)

This invention relates to air conditioning apparatus, and more particularly to a heat exchanger for the refrigeration circuit of a dehumidifier.

The heat exchangers of conventional dehumidifiers or similar apparatus usually present an unattractive appearance, and are mounted interiorly of a cabinet having a decorative front grille. A grille adds to the overall manufacturing cost of the apparatus and serves no other useful purpose than to improve the appearance of the unit, by veiling the usually unsightly heat exchanger and other components of the refrigeration circuit.

In accordance with the present invention, there is provided a condenser comprising a perforated plate or sheet, such as expanded metal, and a tube for conducting refrigerant joined to one side of said plate or sheet in good heat conducting relation thereto. The condenser is placed in a front opening of a cabinet so that the perforated plate serves as a grille for the opening as well as providing extended heat transfer surface for the condenser tubing. It has been found that a sheet, of the type commonly known as "expanded metal," is well suited for this purpose and provides a very pleasing appearance. By this arrangement, a condenser of unitary construction serves as a heat exchanger and a decorative front grille, thereby reducing the overall manufacturing cost of the apparatus.

The various objects, features and advantages will appear more fully from the detailed description which follows, taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a front perspective view of a dehumidifier embodying a heat exchanger constructed and arranged in accordance with the invention;

Fig. 2 is a side view of the dehumidifier of Fig. 1, having a side wall of the cabinet removed to show its internal components in elevation;

Fig. 3 is an enlarged, fragmentary, front view of the heat exchanger of Fig. 1;

Fig. 4 is an enlarged, vertical sectional view of the heat exchanger of this invention, taken along the line IV—IV of Fig. 3; and

Fig. 5 is a rear view of the heat exchanger fragment shown in Fig. 3.

The cabinet of a dehumidifier embodying the invention is indicated generally by the numeral 10 and houses a motor-compressor 11, an evaporator 12, a condenser 13, a fan 14 and the usual tubing and parts comprising a conventional refrigeration circuit. All of the parts of the refrigeration circuit, shown in Fig. 2, are housed within the cabinet and suitably supported, as by brackets and angle irons. The evaporator 12 is disposed at the rear of the cabinet 10 and, since it is cooled, serves to condense moisture from humid air drawn into and through the cabinet 10 by the fan 14. Moisture condensed from the air is collected in a trough 15 which is attached to the cabinet 10 in a position beneath the evaporator 12. A hose 16 conducts the condensate from the trough 15 to a bucket (not shown). The dehumidified air is propelled over the warm housings of the motor compressor 11 and

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fan 14 and then through the hot condenser 13, whereby it is reheated and returned to the room at slightly above intake air temperature.

Although serpentine or coiled tubing alone has been found to operate satisfactorily as a refrigerant-conducting, heat transfer medium for the evaporator 12, additional heat transfer surfaces are ordinarily required for the tubing 17 of the condenser 13. Conventionally, thin fins are stacked along the length of the condenser tubing 17 to provide additional heat transfer surfaces, but in accordance with the present invention, expanded metal sheets 18 and 19 are brazed on front and rear sides, respectively, of a flat bank of zigzagged, or serpentine, condenser tubing 17, in a flat sandwich arrangement. This construction technique not only lends itself well to oven brazing of the condenser components but also produces an efficiently functioning heat exchanger.

The condenser 13 spans i.e. covers the front opening of the cabinet 10 and is secured in position by means of a generally U-shaped channel which extends around the cabinet opening and clamps the margin of condenser 13. The channel is defined by an outer frame 21, formed integrally with the cabinet 10, and an inner frame 22 which is preferably welded to the cabinet 10 in spaced relation to the outer frame 21. (See Fig. 2.) This arrangement facilitates the assembly of the apparatus and also enables the condenser 13 to add structural rigidity to the cabinet 10.

The construction and arrangement of the condenser 13 is designed to reduce the visibility of the interior of cabinet 10 from the front side thereof. This is accomplished by means of an expanded metal, heat transfer sheet 18 of the type which has many horizontal rows of closely spaced apertures or openings over its entire area, each of the apertures being defined by portions of the sheet 18 lying in planes oblique with the vertical, so as to present a "Venetian blind" effect to the viewer. This type of expanded metal sheet 18 is also described as having its openings on a bias. Preferably, the sheet 18 has its openings extending upwardly, from front to rear, at an angle of about 45 degrees with the horizontal, so that only a small amount of light from an overhead source is admitted to the interior of the cabinet 10, thereby restricting visibility. Thus, the condenser 13 not only partially obstructs the view into the cabinet 10, but also reduces visibility by admitting only a small amount of light. Since the dehumidifier is an appliance that usually rests on the floor, and is below eye level, the oblique sections of the expanded metal sheet 18 are particularly effective in obscuring the condenser 17 and the interior of the cabinet from view.

The rear heat transfer sheet 19 is preferably of the flat-tened expanded metal variety resembling a honeycomb-like mesh, to obtain maximum heat conducting contact with the condenser tubing 17. The flat bank of condenser tubing 17 presents a preferably flat surface, which when secured to the apertured metal sheets 18 and 19—as by brazing—provides a rigid structure.

From the foregoing, it can be seen that the condenser 13 of this invention has been constructed to provide an efficient heat exchanger which restricts visibility, but not the passage of air, through the front opening, and also serves as a decorative grille for the front of the cabinet 10.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

The combination with a self-contained dehumidifier adapted to rest on the floor of the space in which it is used and including a cabinet having an opening in a vertical wall thereof, a refrigeration circuit including an

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evaporator for cooling and dehumidifying air, and air translating apparatus for moving air over said evaporator and discharging air from said cabinet through said opening, of an expanded metal sheet carried by said cabinet and closing said opening, said sheet being composed of numerous obliquely disposed, interconnected strips defining openings extending upwardly from the exterior to the interior of the cabinet, and a tubular refrigerant condenser for heating air being discharged from said cabinet, said condenser being carried on the cabinet interior sur-

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face of said sheet and joined in good heat transfer relationship therewith, whereby said sheet provides extended heat transfer surface for said condenser and restricts the visibility of the interior of said cabinet.

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