

June 29, 1943.

C. M. ASHLEY

2,323,176

COLD DIFFUSER

Filed Aug. 21, 1941

3 Sheets-Sheet 1

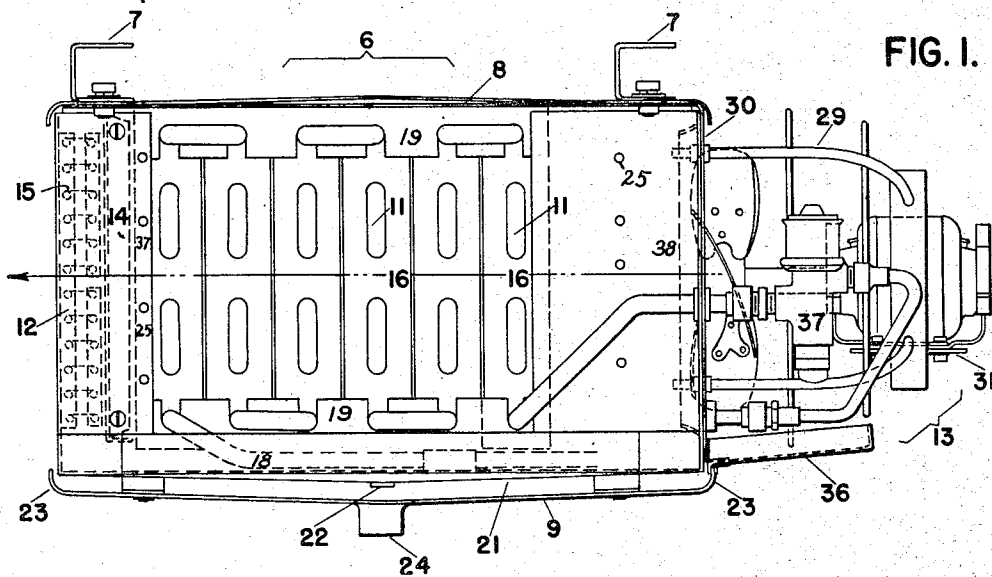
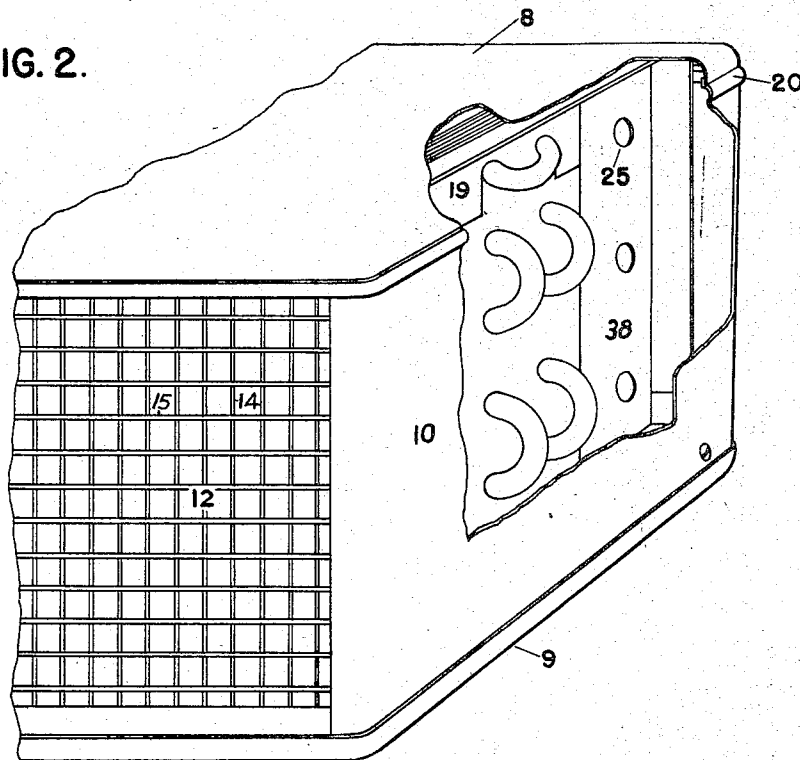


FIG. 2.



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3 Sheets-Sheet 2

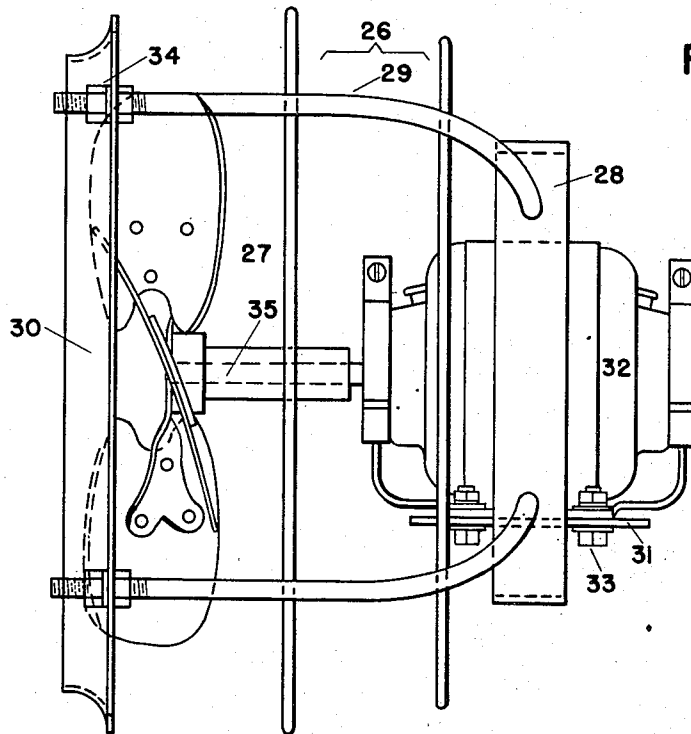


FIG. 3.

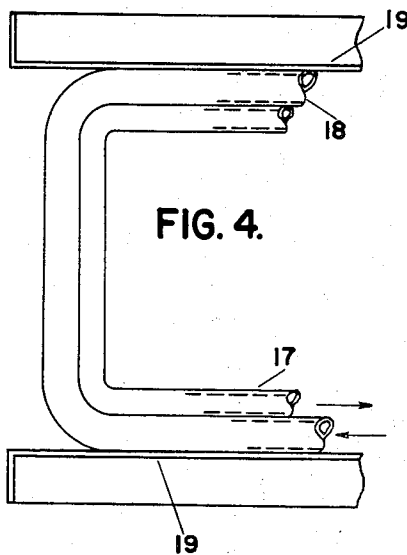


FIG. 4.

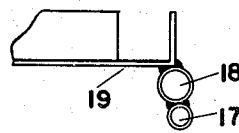


FIG. 5.

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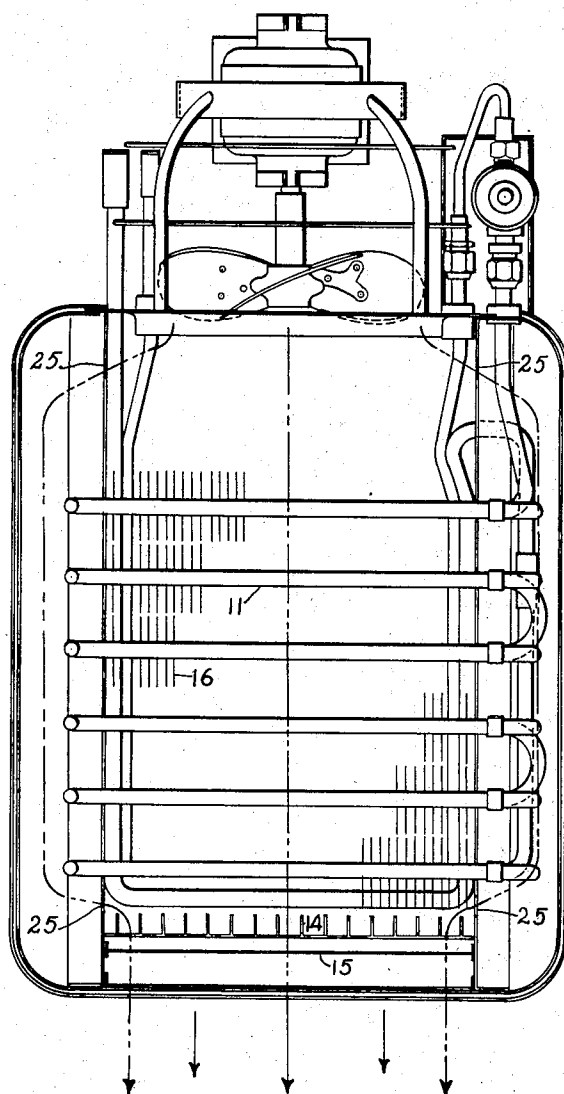
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COLD DIFFUSER

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3 Sheets-Sheet 3

FIG. 6.



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UNITED STATES PATENT OFFICE

2,323,176

COLD DIFFUSER

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Application August 21, 1941, Serial No. 407,819

6 Claims. (Cl. 62—129)

This invention relates to cold diffuser units.

A general object of the invention is to provide a cold diffuser unit which will be superior in performance, less expensive in first cost and cost of operation, afford better air distribution, provide greater adjustability, guard against the formation of condensation on outer surfaces, mitigate frosting, and otherwise provide advantages in flexibility, construction and appearance.

A feature of the invention resides in the provision of a novel method of mounting a fan motor within a cold diffuser unit whereby the motor may easily be levelled and the structure also provide a suitable guard about the fan.

Another feature covers the provision of top and bottom sheets formed substantially identically and positioned in combination with a casing member so arranged that all of the elements may easily be assembled and the bottom sheet serve as a collecting pan desirably spaced from the casing member.

Another feature covers the use of an inner drain pan in combination with a casing member, a bottom sheet being spaced from the inner drain pan to collect such drip as may accumulate on the outside walls of the casing member.

Another feature provides for positioning an outside casing member from an inside tube sheet whereby air may pass from inside the unit through perforations in the tube sheet in a course between the tube sheet and outside casing, thus bypassing the coils within the unit and serving to insulate the outer casing to prevent the formation of condensation thereon.

Another feature provides for positioning refrigerant supply and discharge lines in heat interchange relationship and in contact with tube sheets, thus to mitigate against frosting by furthering an increase in heat exchange through greater conduction.

Other features will be more apparent from the following detailed description of one form of applicant's invention to be read in connection with the accompanying drawings in which:

Fig. 1 is a sectional view of applicant's cold diffuser in assembled form, adapted to be hung from the ceiling or a supporting structure at the upper level of an enclosure.

Fig. 2 is an enlarged fragmentary view, partly broken away, showing the relation of a tube sheet with respect to the outer casing.

Fig. 3 is an enlarged fragmentary view, showing the manner of mounting the motor, as well as housing the motor and fan.

Fig. 4 is a fragmentary view illustrating, in plan, the relationship of refrigerant supply and return lines and their positioning with respect to the tube sheets; and

Fig. 5 is another fragmentary view, in section, showing the interpositioning and interchange arrangement of Fig. 4.

Fig. 6 is a view in plan with the top sheet of the casing removed, indicating the courses of air flow through and bypassing the evaporator coils of applicant's cold diffuser.

Considering the drawings, similar designations referring to similar parts, numeral 6 generally designates a cold diffuser unit equipped with brackets or hangers 7 for attaching the unit to the ceiling or structure at the ceiling level of the room or enclosure wherein the unit is to be employed.

The body of the unit comprises top casing sheet or member 8, bottom member 9, intermediate side members 10, coils 11, of plate fin construction or equivalent, outlet 12, all assembled together as shown in Fig. 1. Attached to the rear of the body is motor and fan assembly generally designated by the numeral 13.

In practice, the fan delivers air from the room to the interior of the unit where it is reduced in temperature by contact with the evaporator coils 11, thereupon being discharged from the unit with desired directional effect, depending upon the position of vertical and horizontal vanes 14 and 15 of outlet 12. With this type of outlet, having both horizontal and vertical adjustability as shown for example in U. S. Patent No. 2,206,995, the air may be directed so that it will not strike the product. Instead, it may be directed toward the top of the box or enclosure wherein the unit is positioned and spread out sideways, with the result that a gentle return stream will pass over the product. On the other hand, where quick chilling is desired, the air may be concentrated directly upon the product to be chilled or frozen, thus accelerating the chilling action and, in the case of carcass chilling, serving to reduce the shrinkage due to moisture loss. With this type of distribution, assuring proper directional effect, the room may be blanketed with the supply stream, thereby serving to promote the absorption of heat at its source.

The coil surfaces 11 are preferably equipped with plate fins 16 to provide maximum heat dissipation. The coils may be suitably positioned and connected to a source of refrigerant supply. Referring to Figs. 4 and 5, refrigerant

supply line 17 is positioned in contact with refrigerant discharge line 18, which, in turn, is in contact at opposite sides of the casing with the bottom ones of bottom and top tube support sheets 19. As may be noted in Fig. 1, the points of entrance and discharge to and from the unit are located at the bottom ends of the tube support sheets and due to the positioning of the lines in contact with each other and with the tube sheets, building up of frost at said points of contact is retarded and often entirely prevented because of the dissipation which takes place due to such interchange positioning. The added conduction through the great area of the tube sheets and fins in contact with the tube sheets thus affords an effective means for the mitigation of frosting.

Considering the construction of the casing, top and bottom sheets 8 and 9 may be formed from the same die, thus making for economy in fabrication. The intermediate side members 10 are formed with a bead 20 against which top sheet 8 may rest. Intermediate side members 10, which constitute the opposite sides of the casing, are connected to inner drain pan 21 which has a drain opening 22. Bottom sheet 9 is spaced from collecting pan 21 and also projects beyond the side members 10, as is indicated at 23. Thus, if any condensation occurs on the outside of the unit, the drip will be collected in bottom casing sheet 9 and drain through opening 24 which also receives the drip from opening 22.

Condensation on the outside of the unit is substantially effectively prevented by spacing the outer side members 10 from front and rear extension baffle plates 37 and 38, and providing said plates with perforations 25. The baffle plates 37 and 38 are in alignment with and attached to tube support sheets 19; and are also in alignment with the outer-most plate fins 16. As a result, the equivalent of a partition is substantially formed at both sides of the coil section and extending beyond the coil section at each end thereof. While the outer-most plate fins in combination with the tube support sheets provide a solid partition, the extensions consisting of baffle plates 37 and 38, containing perforations 25, permit a relatively small volume of air supplied by the fan to pass through the rear perforations and flow in the space between the partition and side members 10 to and through the front perforations and then from the unit through the outlet 12. Such spacing arrangement provides a bypass around most of the coil area and the air flowing through this bypass serves as an insulating blanket to prevent condensation on the outer sides 10. The course of air flow through coils 11 and bypassing the coils is shown by the dash-dot lines in Fig. 6. Due to the spacing between fins and top of casing, some of the air flows over the top of the coil area between the coil assembly and top sheet 8, thus preventing condensation on the top. The space between the drain pan 21 and bottom casing sheet 9 serves as a spaced area to provide in the nature of an insulating blanket of air for the prevention of condensation on the bottom of the unit.

The motor and fan assembly, best illustrated in Fig. 3, includes a guard cage 26 positioned about fan 27. The guard cage also serves as a mounting for the motor and fan. Ring 28 is connected by arms 29 to rear member 30 of the unit. Within the ring is suitably positioned motor platform 31 to which is fastened motor 32 by 75

bolts and cushion mounting means 33. The extremities of arms 29 are suitably threaded so that by means of adjusting nuts 34, the platform 31 may be adjusted and levelled as desired.

5 The fan is suitably driven by the motor through a shaft and coupling arrangement 35. A suitable drip pan 36, (Fig. 1) positioned beneath the expansion valve assembly 37 may serve to drain into bottom casing sheet 9.

10 The term "by-pass partition" when used in the claims is intended to indicate the combination of upper and lower tube support sheets 19, extension baffle plates 37 and 38, plus outer-most plate fins, such combination of elements forming a barrier or partition at opposite sides of unit, as hereinbefore described.

Since many changes may be made in the invention without departing from its scope, it is intended that all matter set forth in the above description or shown in the accompanying drawings be regarded as illustrative and not in a limiting sense.

I claim:

1. A unit of the character described including a top casing member, a bottom casing member, a series of coils within the unit, by-pass partitions on opposite sides of said series of coils, side casing members, said by-pass partitions being positioned in spaced relation to said side casing members, means for permitting air to pass from one side of a by-pass partition to the other side thereof, and means for routing air through the unit so that some of the air will pass in contact with the coils and another portion by-pass the coils by entering the space between the by-pass partitions and the side casing members.

2. In a cold diffusing unit, a pair of casing members similarly formed, one of said casing members forming the top sheet of the unit and the other of said members forming the bottom sheet thereof, an intermediate side member having a bead formed adjacent the top edge thereof, the top sheet being adapted to rest against said bead, plate finned coils positioned within the unit between said sheets, tube support sheets positioned in contact with the outer most plate fins serving said coils, extension baffle plates positioned in alignment with said outer most fins and tube support sheets and attached to said tube support sheets, said extension baffle plates being formed with one flat portion thereof positioned substantially against the top sheet, and means for fastening together said flat portion and top sheet.

3. In a cold diffuser unit having a top sheet, bottom sheet, and side members, a coil formation within the unit, tube sheets, the coils of said formation being supported by and passing through said tube sheets, by-pass partitions, said by-pass partitions being in alignment with said tube sheets, said tube sheets and partitions being spaced from the side members, the top and bottom of said coil formation being spaced respectively from said top sheet and bottom sheet, perforations in said tube sheets, and means for supplying air to the unit in such manner that some of it passes through in a course bypassing the coil formation to prevent the formation of condensation on the outer surfaces of the unit.

4. In a cold diffuser unit of the character described a casing, a coil formation within the casing, a tube supporting sheet arrangement serving the coils of said coil formation, a refrigerant supply line and a refrigerant suction line arranged to supply refrigerant to and withdraw refriger-

ant from said coil formation, said lines being arranged in thermal contact with one another throughout an appreciable length of each line, one of said lines being positioned in contact with and running along the surface of the tube supporting sheet arrangement.

5. In a refrigerant circuit arrangement for a cold diffuser having a coil arrangement therein, a refrigerant supply line, a refrigerant suction line, said lines being positioned in contact with one another in heat interchange relationship, a plurality of tube supporting sheets, said lines being positioned adjacent to and running lengthwise of said tube supporting sheets, at least one of said lines being in contact with the tube supporting sheets, whereby increased conduction from the lines will take place to prevent frost formation thereon.

6. A cold diffuser structure comprising a casing, coils within the casing, means for supplying refrigerant to and withdrawing refrigerant from the coils, a fan and motor assembly mounted at the rear end of the casing, an outlet arrangement at the front end of the casing, said assembly including a ring, a platform positioned within and secured to the ring, a motor removably mounted upon the platform, a plurality of arms, more than two in number, attached to the ring and to a rear member of the casing, adjusting devices on each of the arms for varying the effective length of each arm in such manner that the position of the ring may be shifted and the level of the platform varied.

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