

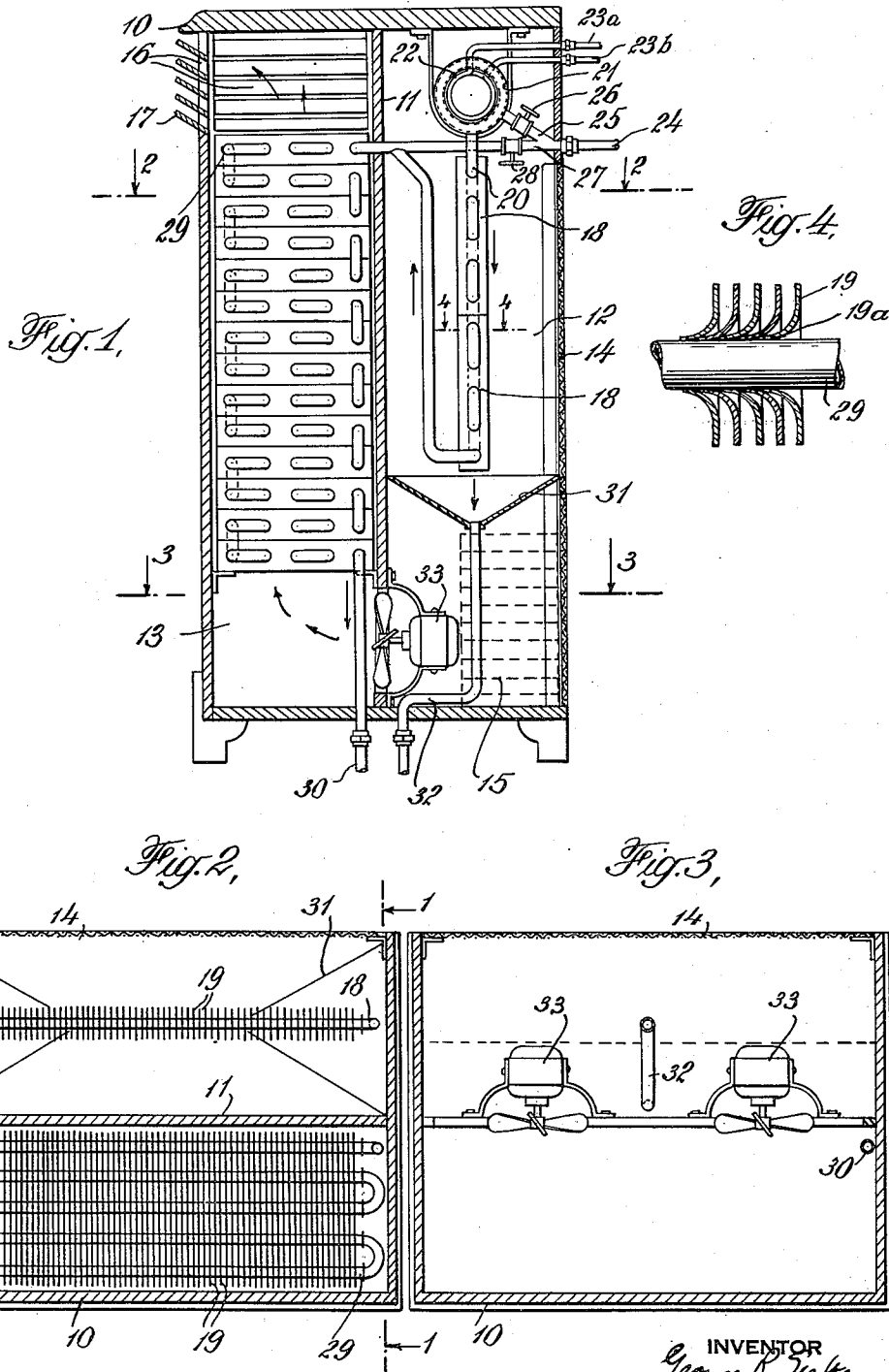
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COOLING AND DEHUMIDIFYING APPARATUS

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COOLING AND DEHUMIDIFYING
APPARATUS

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3 Claims. (Cl. 62—140)

This invention relates to apparatus for air conditioning and is concerned more particularly with a novel apparatus by which the air within a room may be cooled, dehumidified, and circulated. The apparatus of the invention is of simple relatively inexpensive construction and may be maintained and operated at low cost. Also, it is compact and may, therefore, be advantageously installed in offices and other rooms where floor space is valuable.

The new apparatus comprises a cabinet having air inlet and outlet openings connected by a passage through which a stream of air is caused to flow by a fan. Outside the passage is a compartment open to the room and within the passage and compartment are cooling units connected together and supplied with a cooling medium which flows first through the compartment unit and then through the passage unit. The unit in the compartment is, accordingly, maintained at a lower temperature than the unit in the passage and, since the air circulates through the compartment at a relatively low speed, the compartment unit is effective to dehumidify the air while the air is cooled without substantial dehumidification in the passage.

Because of the condensation of moisture on the unit in the compartment, it is desirable to make that unit of a non-corrodible material, such as aluminum, or else to provide the unit with a non-corrodible coating. The unit in the passage is preferably made of copper, which is of high heat conductivity, and the use of copper in this unit is not objectionable because there is little or no condensation thereon and thus little corrosion occurs.

For a better understanding of the invention, reference may be had to the accompanying drawing in which:

Fig. 1 is a sectional view, taken on the line 1—1 of Fig. 2, of one form of apparatus of the invention;

Figs. 2 and 3 are sectional views on the lines 2—2 and 3—3, respectively, of Fig. 1; and

Fig. 4 is a fragmentary view on an enlarged scale showing the construction of portions of the cooling units.

The apparatus illustrated in Fig. 1 comprises a cabinet 10, made of any suitable material and ordinarily of a rectangular horizontal section, and within the cabinet is a vertical partition 11 dividing the cabinet into a rear compartment 12 and a passage 13. The rear wall 14 of the cabinet is of screen material so that the compartment is open to the room and, if desired, the side walls

of the compartment may be provided with inlet openings 15. The rear and front walls of the cabinet are provided with air outlet openings 16 leading from the passage 13 at the top of the cabinet and deflector vanes 17 may be mounted on the outer wall of the cabinet to deflect the air issuing from the outlets in an upward direction.

Within the compartment is a cooling unit 10 which, in the construction shown, comprises two coils 18, each coil consisting of lengths of piping connected by return bends and those pipes which form a coil passing through fins 19. The fins are metal plates having openings punched therein for the passage of the pipes and in the punching operation, a flange 19a is struck out of the metal around each opening. The fins are assembled on the pipes so that the flanges of one fin bears against the adjacent surface of the next fin and the flanges thus insure contact of their fins with the pipes over an extended area and also serve as a means by which the fins are properly spaced.

The upper coil 18 is connected by a pipe 20 to a container 21 within which is mounted a helical coil 22 having inlet and outlet pipes 23a, 23b. A cooling medium is supplied to the vessel 21 through a pipe 24 and its branch 25 containing a valve 26 and the pipe 24 is also connected by a branch 27 containing a valve 28 to the uppermost coil 29 of a series of coils mounted within the passage 13 and connected together. The coils 29 are similar in construction to coils 18 and the lowermost coil in the passage is provided with a discharge pipe 30. Below the coils 18 in the compartment is a collecting pan 31 leading from which is a discharge pipe 32, the pan forming the lower wall of the compartment. With the arrangement described, the cooling medium may be directed into the vessel 21 to flow therethrough and thence through coils 18 and 29, successively, or, if desired, the valves 26 and 28 may be operated so that the cooling medium is supplied only to coils 29.

At the bottom of the cabinet is mounted a pair of fans 33 of any suitable construction, these fans drawing air through openings 15 and the screen at the rear of the compartment into the lower end of the cabinet below the pan 31 and forcing the air upward through the passage in contact with coils 29 and out through the outlet openings 16.

In the operation of the apparatus, the fans cause a continual flow of air through the passage, and the action of the fans causes the air

to circulate in the room, so that the air flows through the compartment and comes into contact with the coils 18 therein. The coils 18 first receive the cooling medium and are thus at a lower temperature than the coils 29. Because of their lower temperature and of the relatively low velocity of the air through the compartment, coils 18 are effective to produce dehumidification of the air and the moisture removed condenses upon the coils and is collected in the pan 31. Because of the condensation formed thereon, the coils 18 and their fins are preferably made of aluminum, although they may be formed of copper and provided with a non-corrodible coating, such as tin. The cooling coils 29 are at a relatively higher temperature than units 18 and the air travels faster therethrough so that little or no condensation of moisture occurs. The units 29 are, therefore, preferably made of copper, because of its high heat conductivity, and the use of copper is not objectionable for the purpose, since little corrosion occurs.

For most purposes, the cooling medium employed is ordinary city water which, in most localities, is of sufficiently low temperature to provide the desired cooling and dehumidifying effects. If the temperature of the water is not sufficiently low, it may be lowered by passing a refrigerant produced by conventional equipment through the coil 22 of vessel 21. In some cases where dehumidification is not important, the cooling medium may be passed directly into the coils 29 so that a greater cooling effect is provided thereby.

I claim:

1. Apparatus for conditioning the air in a room, which comprises a cabinet, the interior of which is subdivided by a partition into a compartment and a passage, the passage having an inlet and an outlet at opposite ends and the compartment being open to the room, cooling units lying in the compartment and passage, respectively, and connected together, means for supplying a relatively cool medium to the compart-

ment unit to flow therethrough and then through the unit in the passage, and a fan for drawing air from the room and passing it through the passage only, the arrangement being such that air circulating within the room has only convection circulation through the compartment.

2. Apparatus for conditioning the air in a room, which comprises a cabinet, the interior of which is subdivided by a partition into a compartment and a passage, the passage having an inlet and an outlet at opposite ends and the compartment being open to the room, cooling units lying in the compartment and passage, respectively, and connected together, means for supplying a relatively cool medium to the compartment unit to flow therethrough and then through the unit in the passage, a fan for drawing air from the room and passing it through the passage only, the arrangement being such that air circulating within the room has only convection circulation through the compartment, and means at the bottom of the compartment for collecting condensed moisture dropping from the compartment coil.

3. Apparatus for conditioning the air in a room, which comprises a cabinet, the interior of which is subdivided by a partition into a compartment and a passage, the passage having an inlet and an outlet at opposite ends and the compartment being open to the room, cooling units lying in the compartment and passage, respectively, and connected together, means for supplying a relatively cool medium to the compartment unit to flow therethrough and then through the unit in the passage, means for cooling the medium on its way to the compartment unit, said means including a vessel through which the medium flows and means for cooling the contents of the vessel, and a fan for drawing air from the room and passing it through the passage only, the arrangement being such that air circulating within the room has only convection circulation through the compartment.

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