Aug. 21, 1934. I. T. BENNETT ET AL 1,971,173

HEATING AND COOLING APPARATUS

Original Filed May 17, 1929 2 Sheets-Sheet 1

Fig. 1.

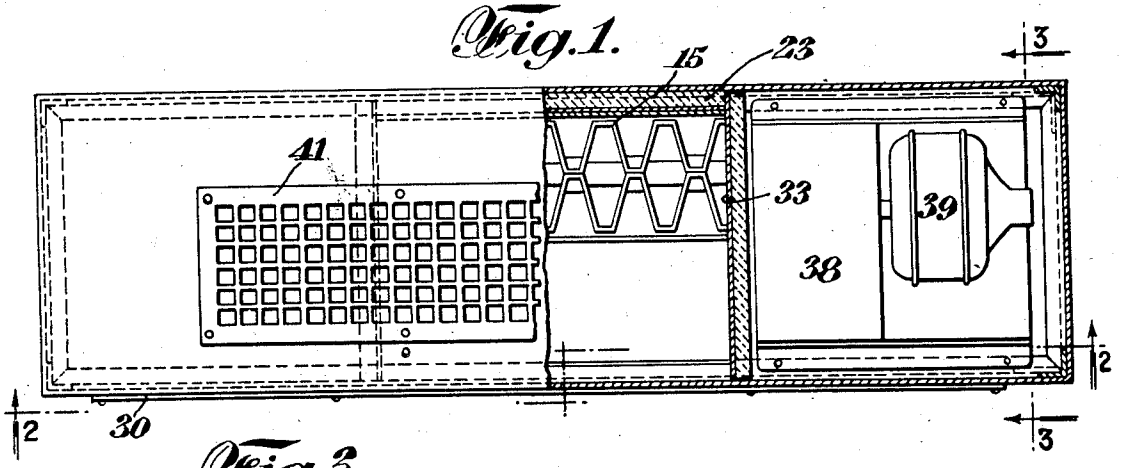

Fig. 3.

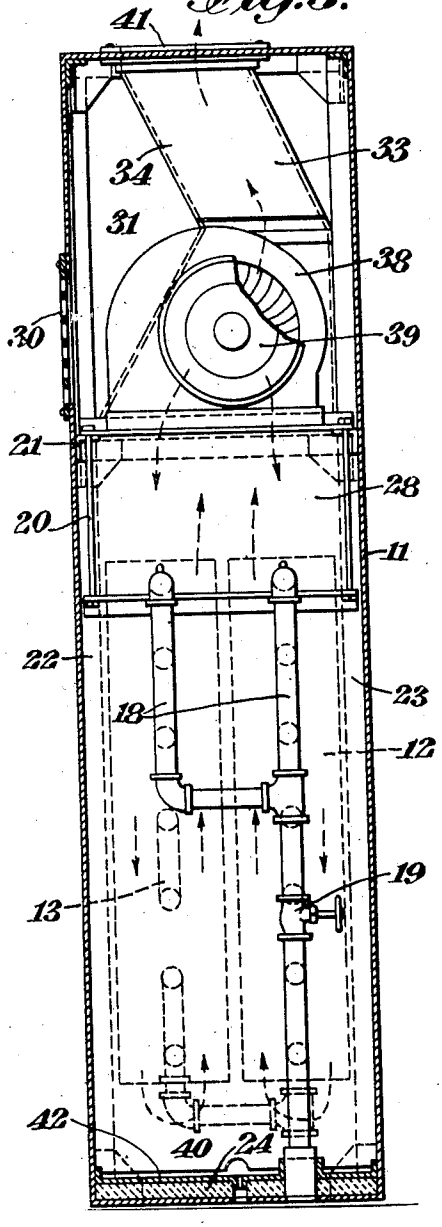

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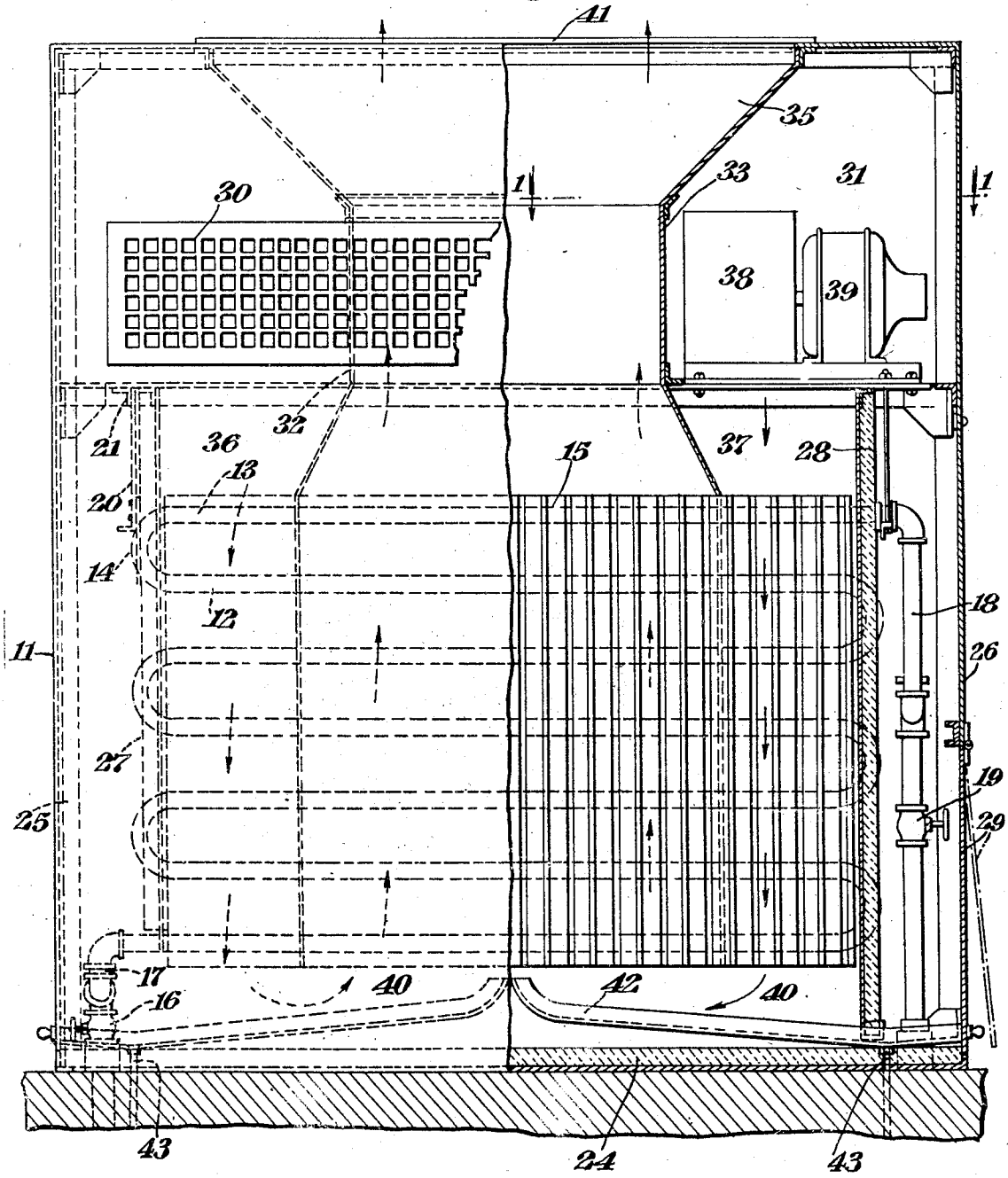
Fig. 2.



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Patented Aug. 21, 1934 1,971,173

UNITED STATES PATENT OFFICE

1,971,173

HEATING AND COOLING APPARATUS

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Continuation of application Serial No. 363,873, May 17, 1929. This application November 21, 1932, Serial No. 643,704

3 Claims. (Cl. 257—9)

This application is a continuation of our Patent No. 1,895,876.

Our invention relates to apparatus for ventilating or circulating and alternatively heating or cooling the air used in ventilating.

Among the objects of the invention are to provide apparatus to heat or cool a space uniformly and effectively to a desired temperature; to provide heat transferring or abstracting means for rapidly and efficiently transferring heat to or from air to be heated or cooled, and to provide cooling means readily adaptable to a variety of applications and conditions of use in a heating or cooling and ventilating system.

With these and other objects in view which will more fully appear from the following description, the invention comprises the methods and apparatus described in the following specification and claims.

The various features of the invention are illustrated in the accompanying drawings in which—

Fig. 1 is a plan view, partly in section on line 1—1 of Fig. 2, of an individual cooling apparatus especially adapted for cooling a single room.

Fig. 2 is an elevation partly in section on line 2—2 of Fig. 1 of the apparatus shown in Fig. 1.

Fig. 3 is a vertical section of the apparatus taken at a right angle to that of Fig. 2 on line 3—3 of Fig. 1.

Referring more particularly to Figs. 1, 2 and 3 of the accompanying drawings, the cooling apparatus comprises a chamber or cabinet 11 of any desired or suitable shape, a rectangular cabinet being shown by way of example in the figure, within which is contained a heat interchanger or radiator 12. The radiator 12 may be of any suitable type but the Murray type of radiator illustrated in Patent No. 1,731,472 and formed of straight lengths of pipe 13 connected at alternate ends by return bends 14 and having transverse radiating vanes or fins 15 is preferred, as it affords a large contact or heat transfer surface for a given weight of metal and thus enables a very rapid and quickly responsive transfer of heat to the surrounding air. Any number of radiators may be used to meet the requirements of any situation, two being shown by way of example in the accompanying drawings.

The cooling medium is admitted to the lowermost of the pipes of the radiators through an inlet valve 16 and pipe 17 and, after passing upwardly through the radiator, is exhausted from the uppermost pipe of the radiator through outlet pipes 18 and an outlet valve 19. Any desired or suitable cooling medium such as cold water or brine or a volatile liquid or condensed or compressed gas may be employed. The radiators are supported within the casing 11 by means of hangers 20 secured to brackets 21 on the side walls of the casing 11. It will be understood that if desired, the cooling medium might be admitted at the top of the radiator.

The chamber or casing 11 may be constructed of any suitable material, but its walls or those of its walls subject to the cooling action of the radiator 12, should be of insulating material or protected by a layer of insulating material to prevent cooling below the dew point of the surrounding atmosphere which would cause the condensation of moisture on the walls.

In the embodiment shown in Figs. 1, 2 and 3, the chamber or cabinet is formed of sheet metal walls, the front walls immediately in front of the radiator being protected by a layer 22 of cork or other heat insulating material. The back wall of the cabinet, which is in contact throughout substantially its entire height with the air cooled by the radiator, and the base are lined with layers 23 and 24 respectively. Instead of lining the side walls 25 and 26, inner lining partitions 27 and 28 are provided through which the inlets and outlets and the return bends 14 project so that they may be accessible through doors such as the door 29 in the side walls. Air to be cooled enters the cabinet through an inlet opening or grille 30 in the front wall of the cabinet at a short distance below its top. The air entering through the grille 30 is received in a chamber 31 formed in the upper part of the cabinet by means of lateral partitions 32 and 33 and a front partition 34 which divide the upper part of the cabinet into a central outlet passageway 35, and into the inlet chamber 31 and a pair of passages 36 and 37 extending downwardly from the inlet chamber 31 to the radiator 12 at each side of the outlet passage 35.

The air from the inlet chamber 31 is drawn into the central part of a fan 38 of the Sirroco type, one for each of the passages 36 and 37 and driven by an electric motor 39. The air is forced downwardly by the fan through the passages 36 and 37 and is thence guided to the bottom of the radiator by vertical channels formed between the radiator vanes or fins 15. If a type of radiator not having fins or equivalent channeling means be used, the partition walls 32 and 33 may be continued to the lower end of the

radiator. When the air reaches the space 40 beneath the radiator it flows inwardly, as indicated by the arrows in Fig. 2, to the central part of the cabinet and thence upwardly to the outlet passageway 35 and through an outlet grille or opening 41. The upper part of the central passage 35 is flared sidewise to the area of the outlet 41 which is positioned centrally of the top of the radiator. The air in its passage over the radiator 12 is frequently chilled below its dew point, with the result that moisture condenses on the pipes 13 and fins 15 and on the adjacent walls of the cabinet. The condensed water thus formed settles to the bottom of the cabinet and is received on a copper trough 42 having a central ridge causing liquid to flow sidewise to outlet drains 43. The troughs 42 are formed with turned up side edges or flanges which may be soldered or otherwise secured in a liquid tight manner to the side walls of the cabinet.

It will be apparent also that in addition to the uniform and expansive contact surfaces between the heating or cooling medium and the air, coupled with the light weight of the radiating elements, the apparatus is quickly responsive and, therefore, easily controlled to attain any desired condition of the air being treated.

What we claim is:

1. Apparatus of the type described which comprises an enclosure having an outlet and an inlet at its upper end, a pair of passages extending downwardly from said inlet, a passage connecting with said downward passages and between said passages and extending to said outlet, heat abstracting means in said downward and upward passages and means to pass a current of air from said inlet through said downward and upward passages to said outlet.

2. Apparatus of the type described which comprises an enclosure having an outlet opening in its top, an inlet chamber below said outlet opening, and an inlet opening in the side of said enclosure to said inlet chamber, passages extending downwardly from said inlet chamber and passages extending upwardly in said enclosure through said inlet chamber to said outlet opening and connecting at the lower part of said enclosure with the said downward passages, means for abstracting heat from air passing through said passages and means for forcing air from said inlet chamber through said passages to said outlet opening.

3. Apparatus of the type described which comprises an enclosure having an upward passage and a pair of downward passages symmetrically arranged on opposite sides of said upward passage and a communicating passage at the lower ends of said downward and upward passages, a heat exchanging means in said downward and upward passages, means to supply cooling or heating means alternatively to said heat exchange means, and means to force a stream of air positively through said downward passages to said communicating passage and upwardly through said upward passage, said downward and upward passages having inlet and outlet openings at their upper end.

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