

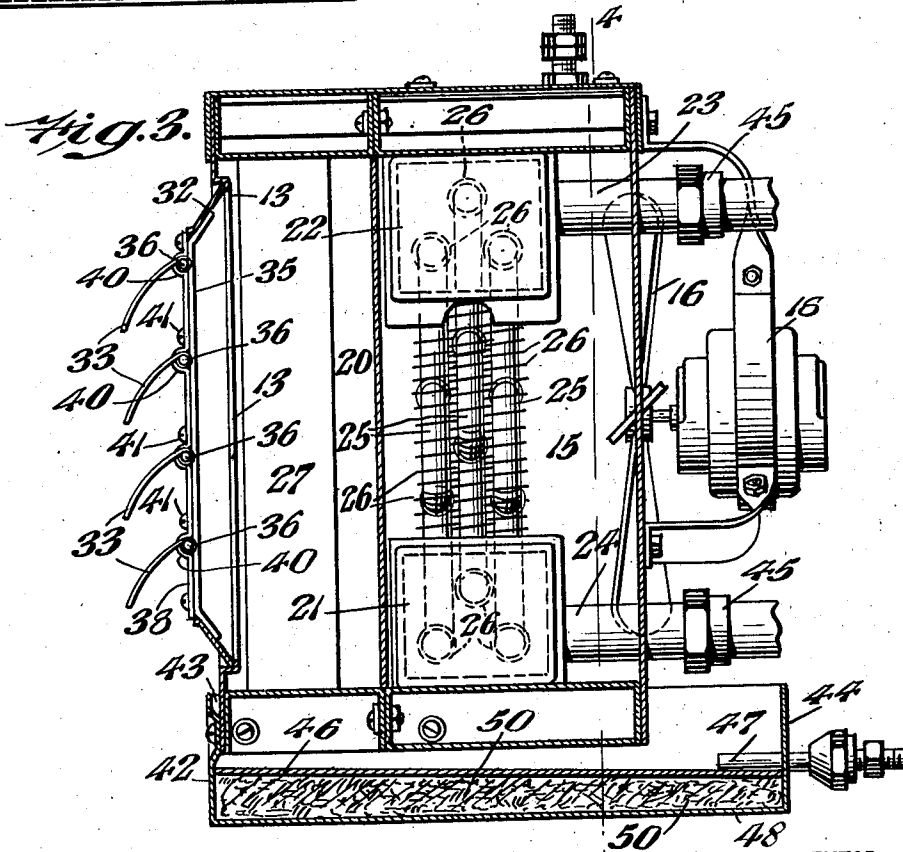
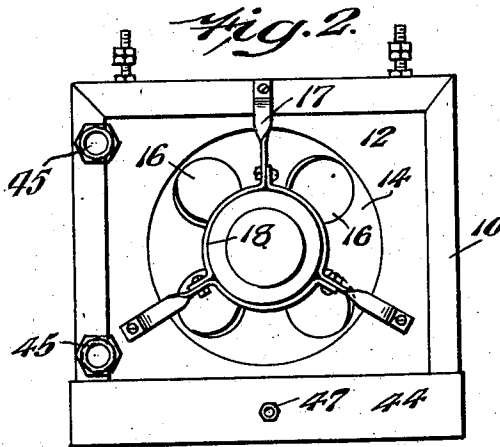
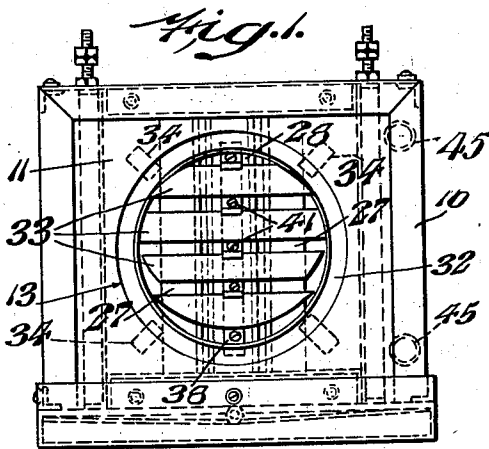
July 4, 1933.

T. LEWIS
COOLING UNIT

1,917,043

Filed July 28, 1930

2 Sheets-Sheet 1



INVENTOR.

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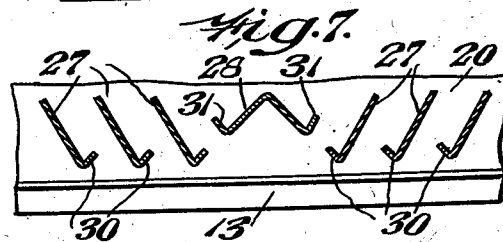
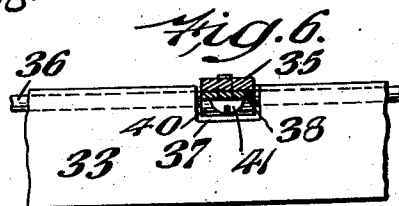
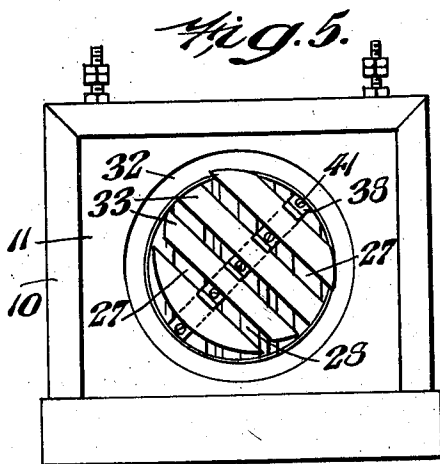
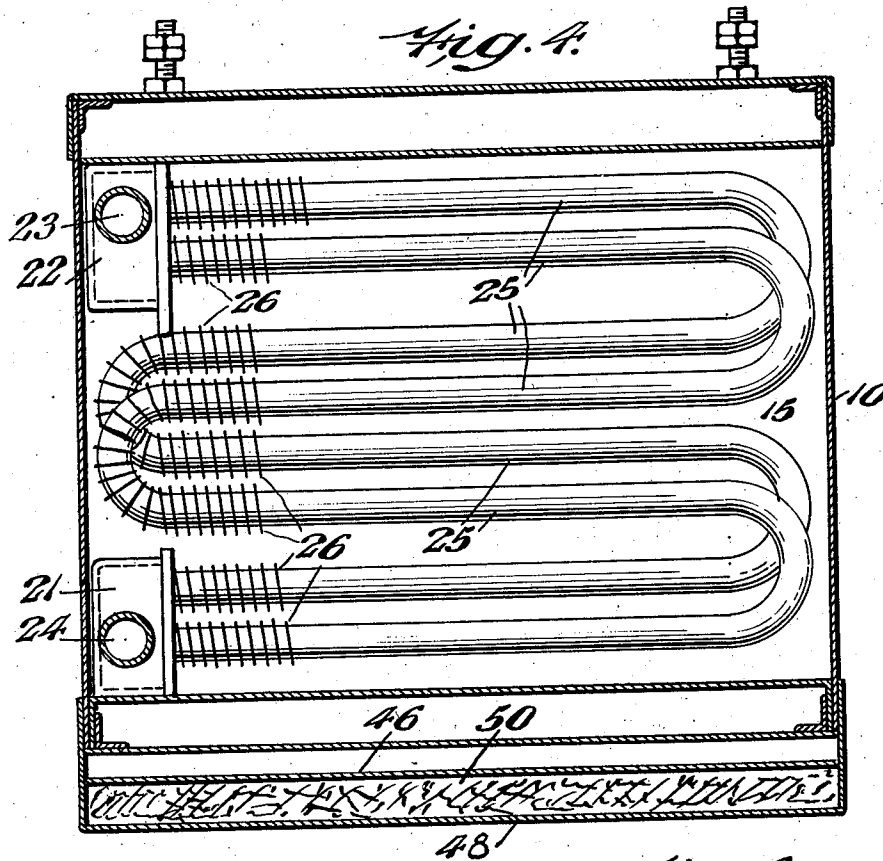
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2 Sheets-Sheet 2



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COOLING UNIT

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The present invention relates to heat exchange apparatus and more particularly to a unit for cooling air to be used in living rooms, offices and the like to counteract an outside summer temperature.

Some of the objects of the present invention are to provide an improved air cooling unit; to provide an air cooling unit of compact, unobtrusive form capable of operating under all normal conditions to give a maximum cooling effect; to provide an air cooling unit having a greater heat transfer capacity per unit of surface than any unit heretofore devised; to provide an air cooling unit wherein greater capacity is obtained with the same volume of refrigerant used in other units; to provide an air cooling unit wherein capacities equal to other cooling units are obtained with less volume of refrigerant; to provide means for preventing the discharge of entrained water in the cooled air; to provide means for the collection of exterior condensation to prevent such condensation dripping into the room where the unit is operating; to provide a drip pan having means for maintaining it at substantially the temperature of the surrounding air; to provide a directional control for the outlet of an exchange unit whereby the treated air can be aimed and delivered to a particular location; to provide an improved heat exchange unit; and to provide other improvements as will hereinafter appear.

In the accompanying drawings Fig. 1 represents a front elevation of a heat exchange unit embodying one form of the present invention; Fig. 2 represents a rear elevation of the same; Fig. 3 represents a side elevation with the casing broken away to show the interior thereof; Fig. 4 represents a section on line 4—4 of Fig. 3; Fig. 5 represents a front elevation showing the delivery shutters arranged at an angle; Fig. 6 is a detail of the shutter pivot construction; and Fig. 7 represents a sectional detail showing the eliminator arrangement.

Referring to the drawings one form of the present invention consists of a casing 10 closed at the top, bottom and ends but apertured in front and rear to receive panels 11

and 12 respectively. The front panel 11 is provided with a circular opening 13 located in co-axial relation with an opening 14 in the rear panel 12 so that air has free passage through the opening 14, the chamber 15 of the casing 10, and the opening 13. It is to be understood, however, that the invention is not to be specifically restricted to this panelled construction and that it is so shown only as a preferred arrangement.

In order to blow air through the opening 14 and the chamber 15 to discharge through the opening 13, a motor driven fan 16 is mounted on brackets 17 in co-axial alignment with the opening 14. Preferably the motor 18 of this fan unit is of the multi-speed type so that a relatively wide range of use is possible, though in general operation a minimum motor speed will have sufficient capacity to maintain the desired room conditions. The higher speeds are useful when it is desired to cool a room down quickly as in first starting the apparatus.

While the present apparatus is broadly a heat exchange unit its present use is for cooling purposes and to the end that the circulated air can be reduced in temperature a cooling unit 20 is interposed between the air inlet opening 14 and the air discharge opening 13 within the chamber 15. As here shown and with a view to giving maximum efficiency this unit 20 consists of two headers 21 and 22 located at different levels and respectively having projecting pipes 23 and 24 for connecting to the refrigerant circulating means, which may be of any well known type. The headers 21 and 22 are interconnected by a plurality of coiled pipes 25, each of which leaves the header 21, extends substantially horizontally across the chamber 15, then makes a reverse bend to return substantially horizontally across the chamber 15 and so continues until its end enters the header 22. Preferably there are three pipes 25 to a unit, two of which lie opposite to each other throughout the length thereof but spaced apart to receive between them the third pipe which travels from one header to the other with its coils staggered with respect to the other two coils. These

pipes 25 are steel pipes in order to resist corrosion and attacks by different refrigerants, and are provided with fins 26 to give the maximum exchange effect. As a protection against moisture condensed from the air, the entire coil is galvanized after fabrication.

To avoid the discharge of water entrained in the moving column of air, a plurality of eliminators or separator blades 27 are located to intercept the path of the travelling air and change its course in such a manner as to remove any water contained therein.

The preferred arrangement of the eliminators 27 is to locate them in two converging sets at opposite sides of a central eliminator 28 of V-shape having its legs diverging in the direction of air flow. Thus the present construction shows three vertical eliminators 27 parallel to each other and converging to throw all of the air at one side of the chamber 15 towards the opening 13, and three other eliminators 27 similarly arranged at the other side of the chamber 15 to direct the air at that side also towards the opening 13. The outer end of each eliminator 27 is provided with a reversely turned lip 30 which catches entrained moisture and carries it to the bottom of the chamber where it is discharged out of the path of the air. The eliminator 28 also has reversely turned lips 31 upon its ends for the same purpose.

For directional discharge of the air from the casing 10 the opening 13 is provided with a ring 32 of frustro-conical form arranged to converge the air streams axially to pass outwardly between a plurality of parallel shutters 33. The ring 32 seats snugly within the opening 13 of the casing 10 where it is frictionally held against displacement by spring clips 34 which are riveted or otherwise fastened to the casing 10 to project over and clamp the ring 32 in place. This construction allows the ring 32 to be turned about its axis relative to the casing 10 to vary the transverse position of the shutters 33 so that the air can be discharged in any predetermined direction. The shutters 33 have arcuate ends to conform generally to the circular shape of the discharge opening and are each pivotally mounted upon a common support bar 35, which extends diametrically across the ring 32 and is fastened at its ends thereto. The pivot construction for the shutters 33 consists in each instance of a pivot pin 36 fast to the roller rear edge of the shutter 33 and transversing a slot 37 in this rear edge where it is clamped by a strip 38 having a bearing socket 40 which interfits with the aforesaid slot 37 to partially encircle the pin 36. As here shown the strip 38 is common to all of the shutters 33 and is clamped to the bar 35 by screws 41 which correspond to the number of shutters and enter the bar 35 adjacent the respective pivot points. Thus the loosening of any

screw 41 will result in releasing the holding means for the pivot pin 36 so that the shutters 33 are all adjustable about the respective pin axes and can be set at any selected angle. In general, however, all of the shutters will be set at the same angle whether the ring 32 is in position to hold them all horizontal or turned to hold them at an angle to the horizontal.

In order to prevent drip from condensed moisture falling into the room where the unit is used, a novel form of drip collecting device is employed consisting, in the preferred construction, of a receptacle 42 bolted or otherwise made fast to receive the bottom of the casing 10 therein in such a manner as to leave a peripheral slot 43 between the parts so that collected water will drop from the casing 10 directly into the receptacle 42. This receptacle 42 is longer than the overall depth of the casing 10 so as to provide an extension 44 projecting below the unions 45 which join the compressor pipes to the pipes 23 and 24. Drip from these outside connections is thus caught in the projecting open top of the receptacle extension 44. A false bottom 46 is provided in the receptacle 42 and inclines to cause the collected liquid to flow towards a drain pipe 47 leading away from the unit. Between the false bottom 46 and the real bottom 48 of the receptacle 42 there is a compartment filled with cork 50 or other insulating material which acts as a barrier to the convection of cooler temperature to the receptacle 42. Hence the receptacle 42 is held at substantially the temperature of the surrounding air and as a result is not subjected to sweating and the collection of moisture which would drip into the room.

It will now be apparent that a complete unitary cooling unit has been devised embodying a compact, efficient means of tempering air for use in rooms and embodying as a self-contained unit a heat exchanger with air circulating means for passing air there-through, changing its temperature and discharging it to the room in combination with an eliminator structure for removing moisture from the air and preventing the discharge of such moisture into the room to which the air is discharged. Furthermore provision is made for preventing condensed moisture from dripping into the room where the unit is located and including also a means whereby the moisture cooling device has its exterior walls maintained at substantially the surrounding atmospheric temperature so that condensation thereon is prevented.

While but one form of the present invention has been shown it is to be understood that this is merely illustrative of one way of carrying out the invention and the structure as specifically described herein is not to be limited to these precise details. For example, the circulating pipes for the refriger-

ant are herein referred to as steel pipes but obviously they may be of any suitable material for the purpose and the invention is not to be restricted to the particular metal described.

Having thus described my invention, I claim:

1. In a heat exchanger, the combination of a casing, a cooling coil in said casing, means to circulate air through said coil and casing, a receptacle for collecting drip from said casing and said coil, and means to insulate the bottom of said receptacle from temperature conditions in said casing, including a false bottom in said receptacle whereby said receptacle is maintained at substantially the temperature of the air surrounding said casing and condensation on the exterior thereof thereby prevented.

2. In a heat exchange unit, the combination of a casing having an air inlet and an air outlet, a cooling coil between said inlet and said outlet, means for circulating air about said coil, means for separating moisture from said air comprising a series of eliminator plates arranged to direct the air toward the center of said outlet and a plurality of shutters in said outlet, said shutters being mounted for individual horizontal and vertical adjustment whereby a plurality of streams of air may be discharged from the unit in a plurality of directions.

3. In a heat exchange unit, the combination of a casing having an air inlet and an air outlet, a cooling coil between said inlet and said outlet, a plurality of individually adjustable shutters within said outlet, said shutters being mounted on a ring capable of rotatable adjustment, and a plurality of eliminator plates interposed in the path of air traversing said casing for separating moisture from said air and directing said moisture to the bottom of said casing, said plates including a series on each side of the vertical center line of the outlet, the plates of

each series converging toward the center line.

4. In a heat exchange unit, the combination of a casing having an air inlet and an air outlet, a cooling arrangement between said inlet and said outlet comprising spaced headers connected by refrigerant circulating pipes, a driven fan for causing air to pass over said pipes to said outlet, a plurality of individually adjustable shutters mounted on a ring, said shutters and ring being rotatably mounted in said air outlet, and a plurality of plates disposed to collect and deliver moisture from said air to the bottom of said casing, said plates comprising a center plate having lips for catching entrained moisture and a series of plates on opposite sides of the center plate for directing air on each side of the center plate toward the center of the outlet.

5. In a heat exchanger, the combination of a casing, a cooling coil in said casing, means to circulate air through said coil and casing, a receptacle for collecting drip from said casing and said coil, a false bottom in said receptacle, and an insulating material between said false bottom and the real bottom thereof.

6. In a heat exchanger, the combination of a casing, a cooling coil in said casing having ends arranged for exterior connection to a refrigerant supply and return, means to circulate air through said coil and casing, a receptacle integral with and providing a bottom for said casing, one element thereof constituting a false bottom having an extension whereby drip may be received from within said casing and from said exterior connections, and a real bottom spaced from the false bottom and insulated therefrom to prevent condensation forming on the exterior of the receptacle.

Signed at Philadelphia, county of Philadelphia, State of Pennsylvania, this 23rd day of July, 1930.

THORNTON LEWIS.