

May 16, 1939.

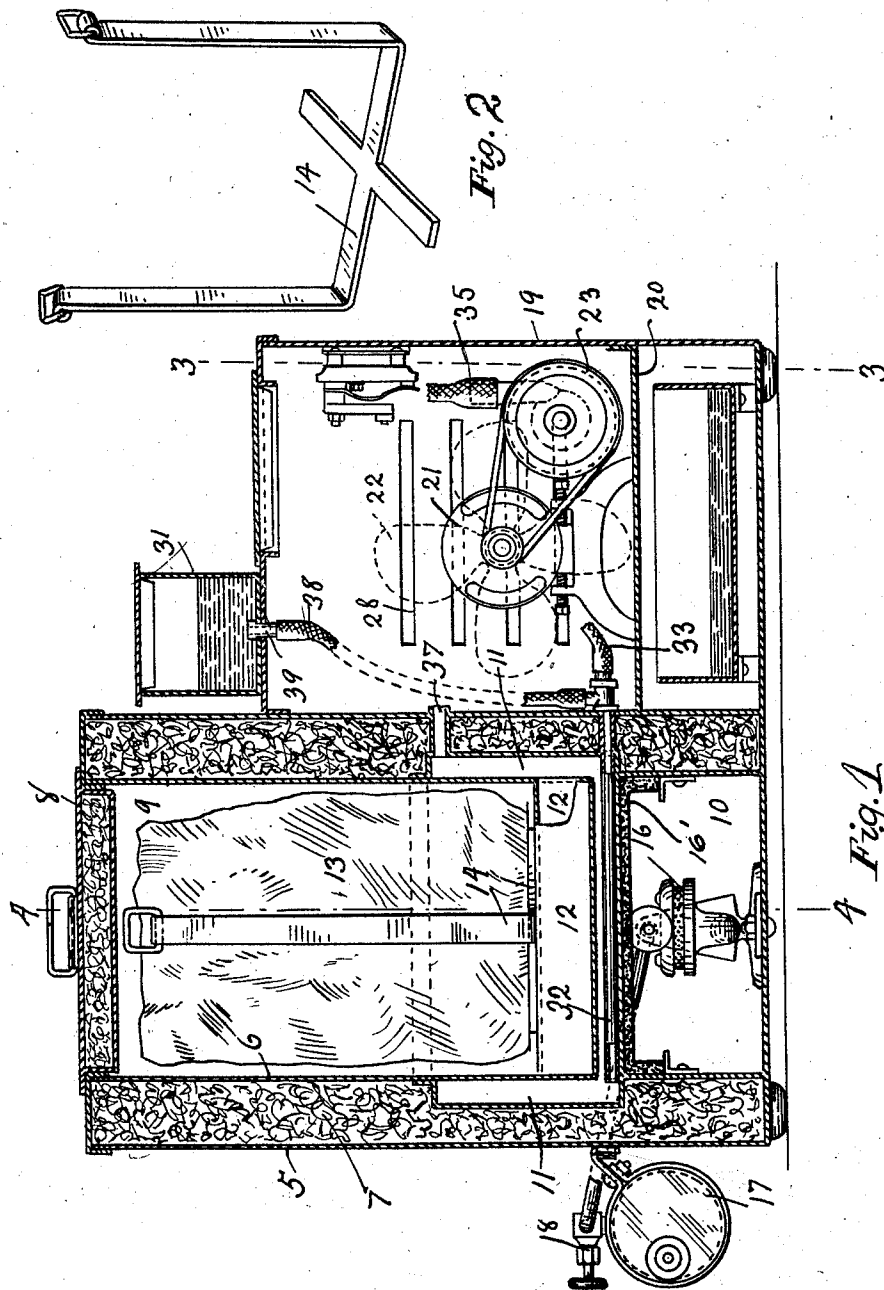
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2,158,707

AIR CONDITIONING DEVICE

Filed Sept. 15, 1937

2 Sheets-Sheet 1



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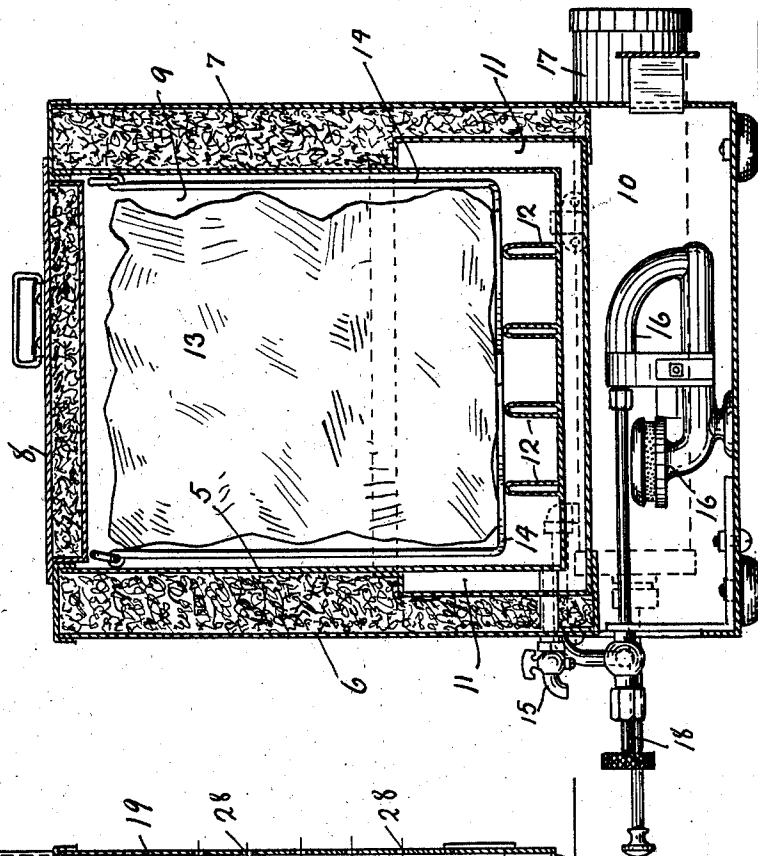


Fig. 4.

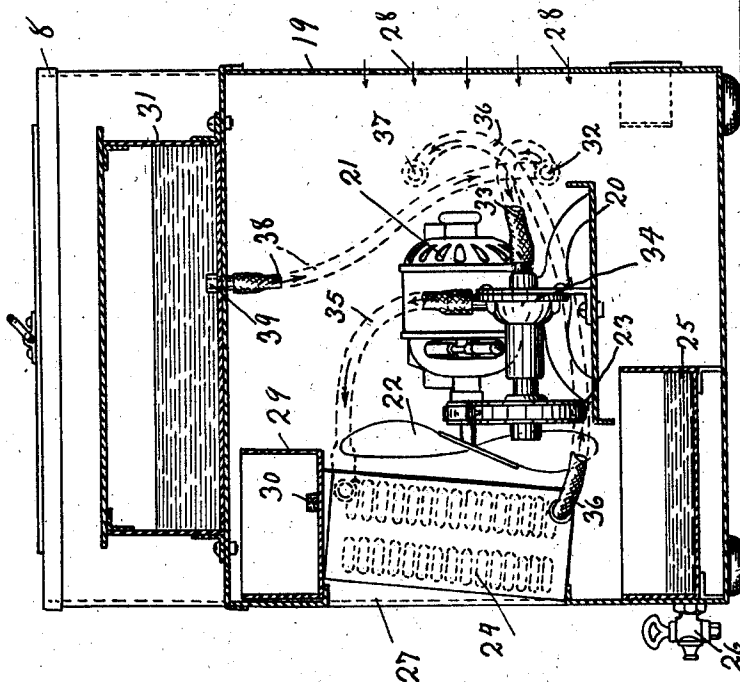


Fig. 3.

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UNITED STATES PATENT OFFICE

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AIR CONDITIONING DEVICE

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2 Claims. (Cl. 62—131)

My present invention provides an extremely simple and highly efficient portable self-contained heat exchange apparatus especially adapted for use in homes, office buildings and the like, operative, at will, either to raise or lower the temperature of the room or compartment.

Generally, stated, the invention consists of the novel devices, combinations of devices, and arrangement of parts hereinafter described and defined in the claims.

This improved device involves a low temperature chamber adapted to contain ice or other means for lowering temperature; a high temperature chamber containing means for raising temperatures, such, for example, as a gas burner; a heat exchange chamber located between the high and low temperature chambers; a radiator with connections to and from said heat exchange chamber, said connections including a pump for producing forced circulation; a fan forcing air through or passed said radiator, and a motor, such as an electric motor, for driving the fan and operating the pump. The invention also involves certain minor important features as will hereinafter appear.

A commercial form of the invention is illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a vertical section taken through the complete apparatus;

Fig. 2 is a perspective showing the ice lifting rack;

Fig. 3 is a transverse section taken approximately on the line 3—3 of Fig. 1; and

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 1.

The major part of the casing of the apparatus is shown as a rectangular structure having outer and inner shells 5 and 6, preferably of sheet metal, between which insulating material 7 is packed. The top of this structure is normally open but is provided with a cover 8. The low temperature chamber 9 is formed in the upper portion of this main body; the high temperature chamber 10 is formed in the bottom portion of this main body; and between the high and low temperature chambers there is formed a heat exchange chamber 11. This heat exchange chamber 11 extends entirely under the bottom of the low temperature chamber 9 and partway up on all four sides thereof.

Formed on the bottom of the inner shell 6 and projecting well up into the interior of said cham-

ber is a plurality of flattened circulating tubes 12 that open at their ends into the sides of the heat exchange chamber 11. In the apparatus illustrated low temperature is produced by melting ice, indicated at 13. This cake of ice is placed on the yoke-like rack 14, is lowered into the chamber 9 and the bottom of the rack is located on the circulating tubes 12, which latter then serve as supporting ribs. The ice 9 will drip to the bottom of the chamber 9 and the exterior of the rib-forming tubes 12 will be submerged therein. The numeral 15 indicates a valve-equipped drain tube extended from the bottom of the compartment 9 out through the sides of the casing for draining the chamber 9 when desired.

For producing high temperature in the chamber 10, there is shown an oil or gas burner 16 which is arranged to receive gasoline under pressure from a tank 17 located outside of the casing. The numeral 18 indicates a valve that controls the flow of the gas or gasoline or other combustible fluid fuel to the burner 16.

Attached to or formed as a part of the main housing or casing is a supplemental casing 19 shown as provided with a shelf 20 located above the bottom. On this shelf 20 is mounted a small electric motor 21 and a fan 22. The fan 22 is shown as directly driven from the shaft of the rotor of the motor 21.

Located in front of the fan 22 is a heat exchange radiator 24 adapted to radiate temperatures either above or below the room temperature according to the manner in which it is coupled up and in the way in which other parts of the apparatus are adjusted, all which will presently more fully appear.

Located just below the radiator 24 is a drip pan 25 adapted to catch the drippings melted or condensed water vapors dripped from the radiator 24. This drip pan 25 is shown as provided with a normally closed drain cock 26. The supplemental casing 19 in front of the radiator 24 has a large air discharge openings 27 and the back of said compartment is shown as provided with a plurality of air intake passages 28 so that air forced from the fan will be drawn into the casing through the openings 28, carried around the motor 21 to keep down the temperature of the casing, will be forced passed or through the elements of the radiator and out into the room through the opening 27. The upper portion of the radiator 24 opens into an expansion tank 29 through a nipple 30 that is adapted to be plugged when the apparatus is used for producing high

temperature and to be opened when the apparatus is used for producing low temperatures.

The circulating pipe 32 is extended through one side of the main casing into the lower portion of the heat exchange chamber 11. The outer end of this pipe 32 is connected by a hose or tube 33 to the intake of the motor-driven rotary pump 34. The outlet of the pump 34 is connected to the top of radiator 24 by a pipe or hose 35. From the outlet of radiator 24 a pipe or hose 36 leads back to the heat exchange compartment 11 where it is connected with the upper portion thereof through a nipple or pipe section 37. From the outer end of pipe 32 a pipe or hose 38 leads upward and is connected to a nipple or tube 39 in the bottom of expansion tank 31. Nipple or tube 39 will be open when the apparatus is used for producing high temperatures and will be closed when the apparatus is being used to produce low temperatures. Otherwise stated, the nipples or tubes 39 will be plugged or closed at different times.

Operation

When the device is to be used as a cooling device for lowering the temperatures of rooms or buildings means for producing low temperatures will be placed in the compartment 9 and this means will usually be ice. The nipple 39 at this time will be plugged or closed and the nipple 30 will be open. The melting ice will produce the low temperature in the compartment 9 and this low temperature will be radiated or conducted to the liquid in the tempering chamber 11. When the pump is in action the cold liquid from the tempering chamber 11 will be drawn out through pipe 32 and tube 33, to pump 34 from thence to radiator 24 through pipe 35 and from thence out through tube or pipe 36 and neck 37 back to the tempering chamber 11. When the pump is in action the fan is also in action. The air of the room will be circulated through or around the radiator 24 and the lowered temperature of the air will be discharged into the room while the warmer air will be constantly drawn by the fan through the openings 28 and to the radiator. The transverse tubes or tubular ribs 12 afford a large amount of metallic surface that is exposed to the cold liquid of compartment 9 for absorbing the low temperature. This function is additional to that of supporting the rack for the ice. In advance, it may be also stated that under high temperatures the tubes 12 are likewise efficient for absorbing heat and conducting the same to the liquid heating medium, that is circulated through the radiator under the action of the pump. The pump, of course, may be of any approved type such as a well-known centrifugal pump.

As far as this invention is concerned, the starting and stopping of the motor may be regulated either manually or under the action of a thermostat.

When the apparatus is to be used as a heating apparatus, neither ice nor any other cold-producing element or device will be placed within

the compartment 9, but heat will be produced in the compartment 10 by starting of the burner 16. Under the action of the burner the entire metallic bottom of the heat exchange compartment 11 will be made hot and the fluid heating medium will, of course, be raised in temperature to the desired extent. The circulation of the heating medium will be substantially as before described, that is, it will be drawn out through the pipe 32 through tube 33 to pump 34 from thence to radiator 24, through pipe 35, and from the radiator through tube 36 to nipple or pipe section 37 and thence back into the compartment 11.

It is important to note that whether it is the relatively cold or relatively hot medium that is being circulated, it will be delivered into the compartment 11 at one side, will be conducted through the flattened tubes 12 and under the bottom of the shell 5 to the opposite side of said compartment 11 and from thence will be drawn out through the pipe 32 and back to the pump. The arrangement of said tubes 12 described is, therefore, important because it facilitates free and rapid circulation of the heating medium as well as rapid transfer of relatively low or relatively high temperatures. At this time, and as already indicated, the nipple 30 will be plugged and the nipple 39 will be unplugged or opened so that the expansion of the heating medium into the tank 31 will be permitted and the circulating system always kept filled with the fluid medium.

When the apparatus is to be used for lowering the temperature of the air, at which time, of course, there will be ice or other cooling means in the compartment 9, it will be advisable to slip a sheet of insulating material 16 into the compartment 10 and immediately under the bottom of the heat exchange compartment 11, as indicated by full lines in Fig. 1.

What I claim is:

1. In a heat exchange apparatus, the combination with a casing formed with a temperature producing chamber and a heat exchange compartment that extends under the bottom of and around the lower portion of said temperature producing chamber, laterally spaced transverse circulating tubes extending from one side to the other of said heat exchange compartment and projecting upward from the bottom of said temperature producing chamber and adapted to serve as a support for an ice cake, a radiator, a fan adjacent said radiator, a pump, a motor with connections for driving said fan and pump, and pump connections for circulating water through said radiator and through said heat exchange compartment.

2. The structure defined in claim 1 in further combination with an equalizing water supply tank located above said radiator and heat exchange compartment, and connected to said pump connections for maintaining a supply of water in said pump connections to an elevation above said heat exchange compartment and radiator.

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