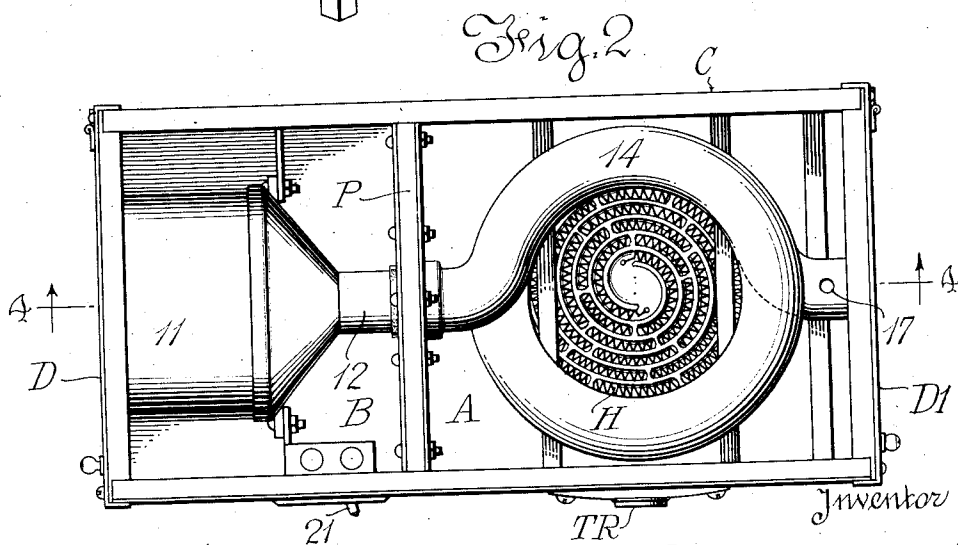
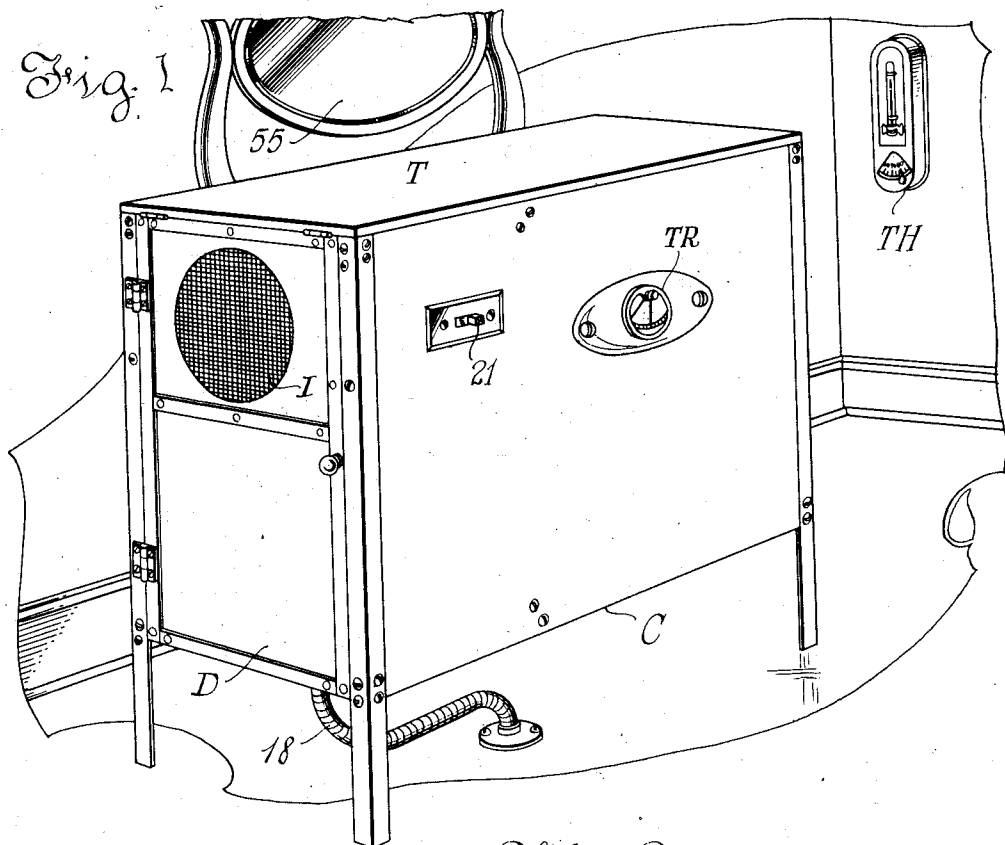


Sept. 6, 1932.

J. C. MONTERO
AIR HEAT GENERATOR
Filed Oct. 14, 1926

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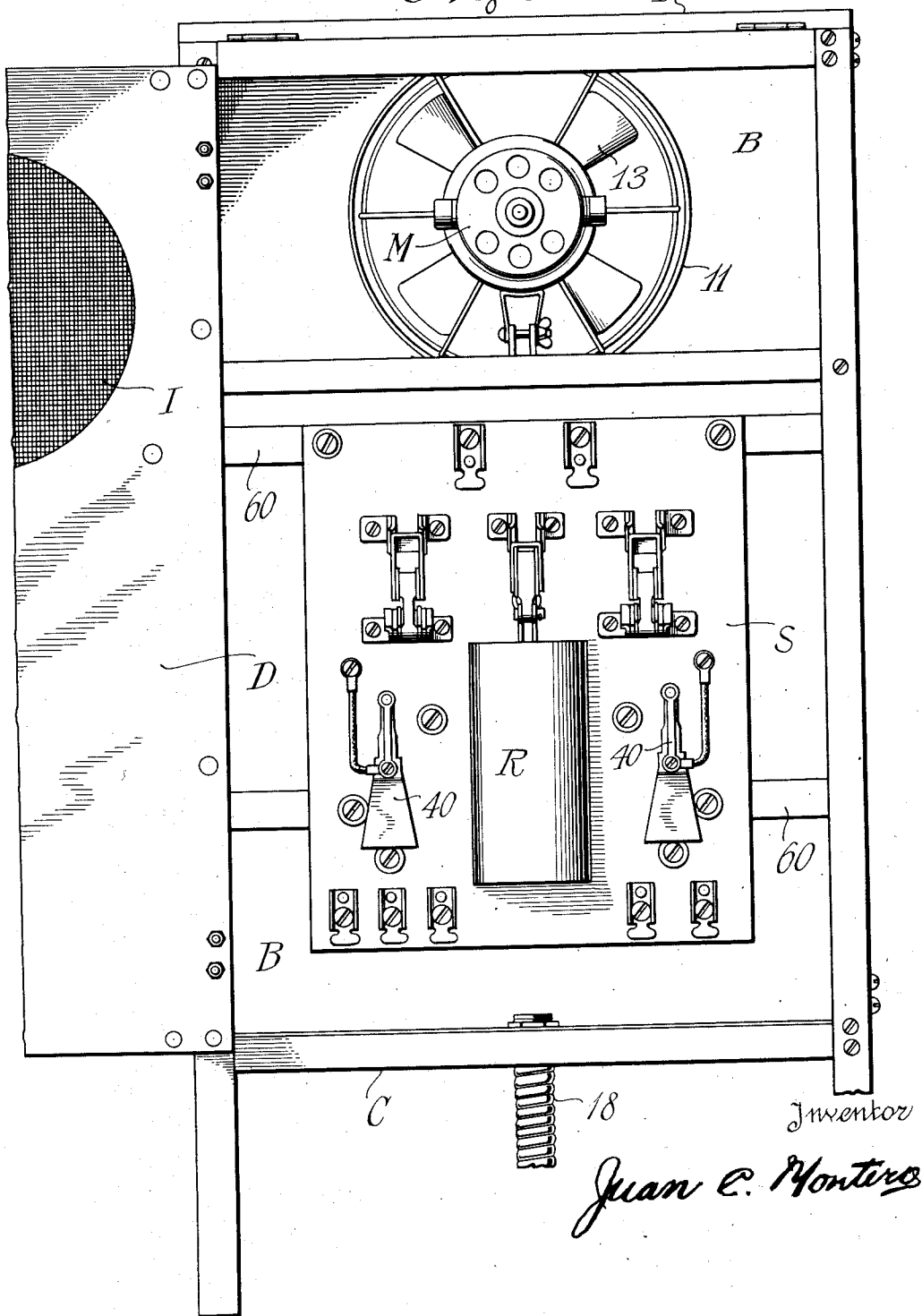
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Fig. 3

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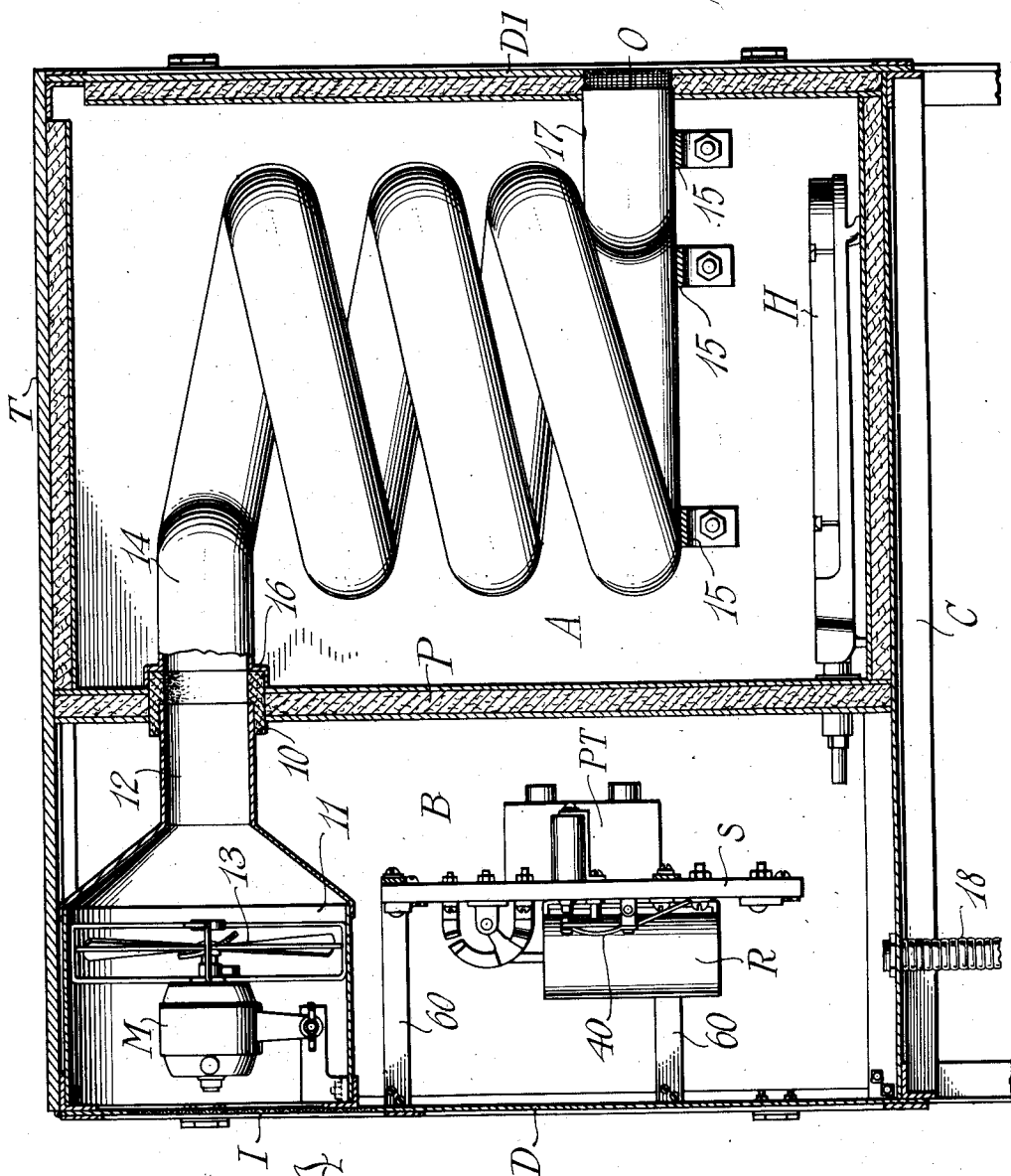


Fig. 4

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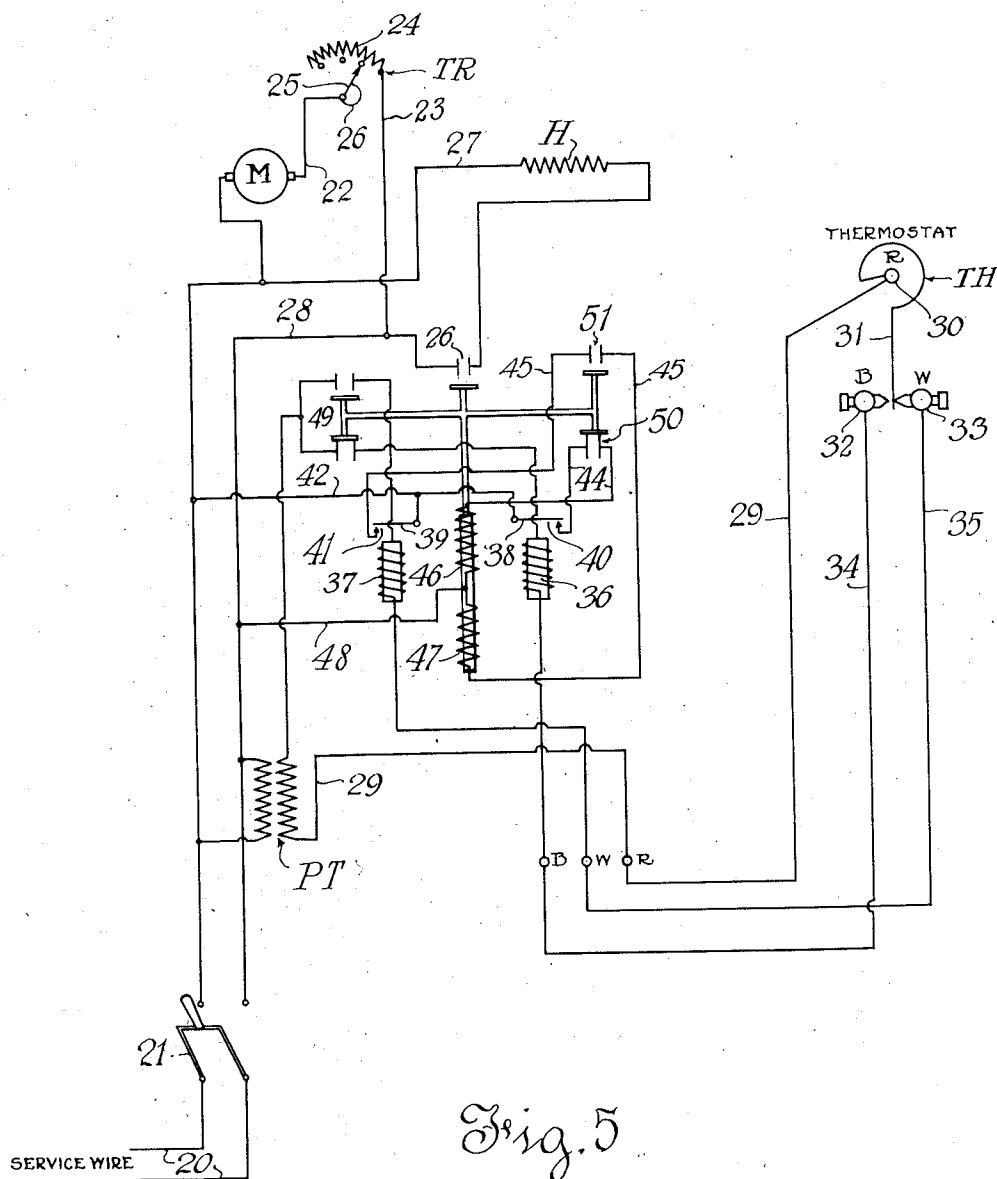


Fig. 5

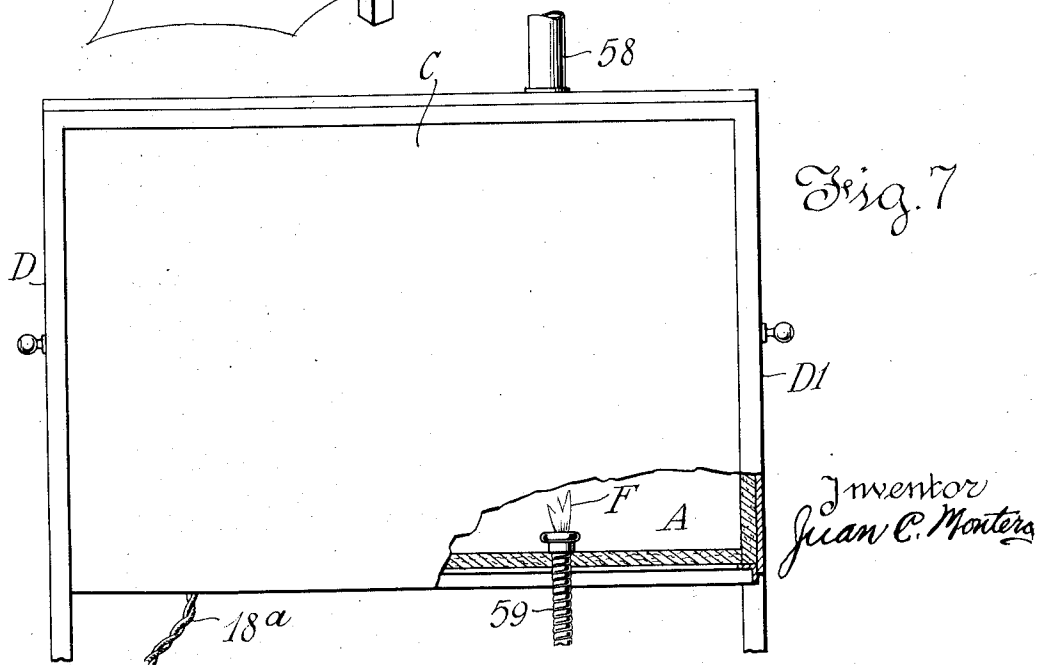
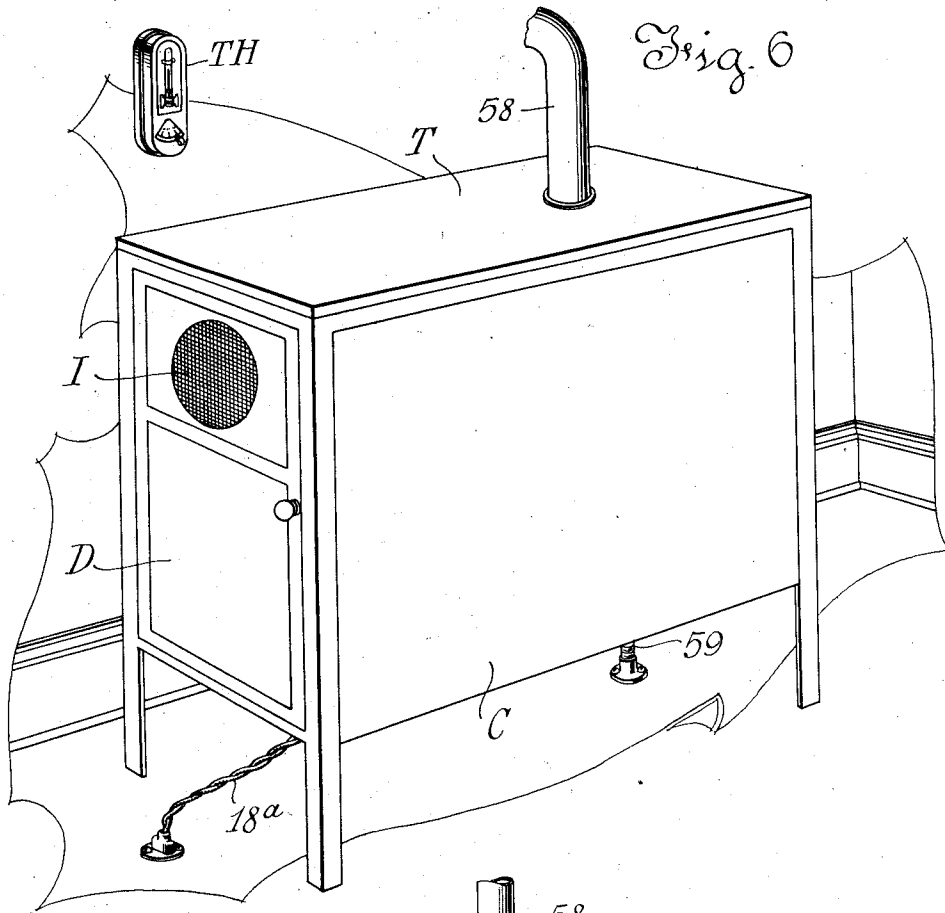
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AIR HEAT GENERATOR

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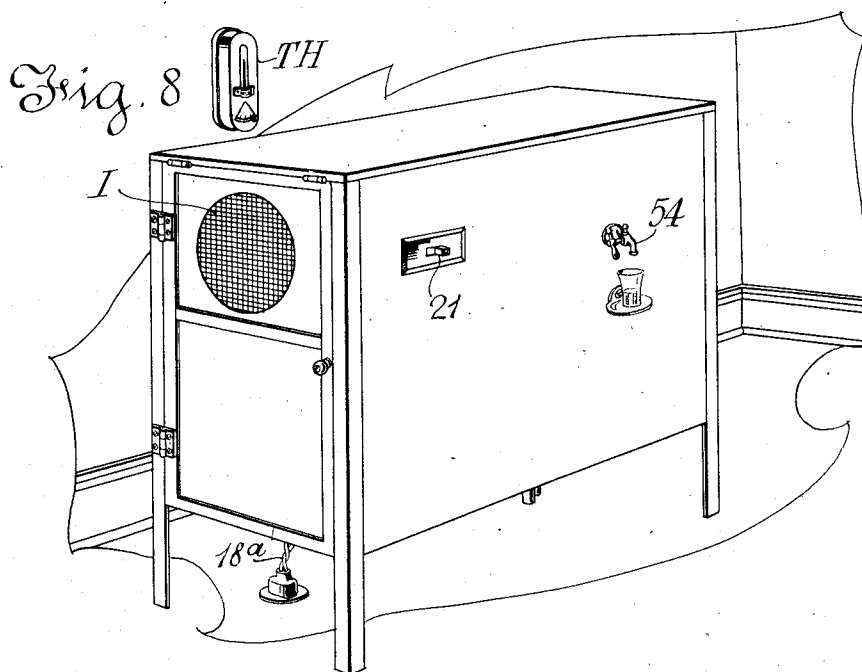
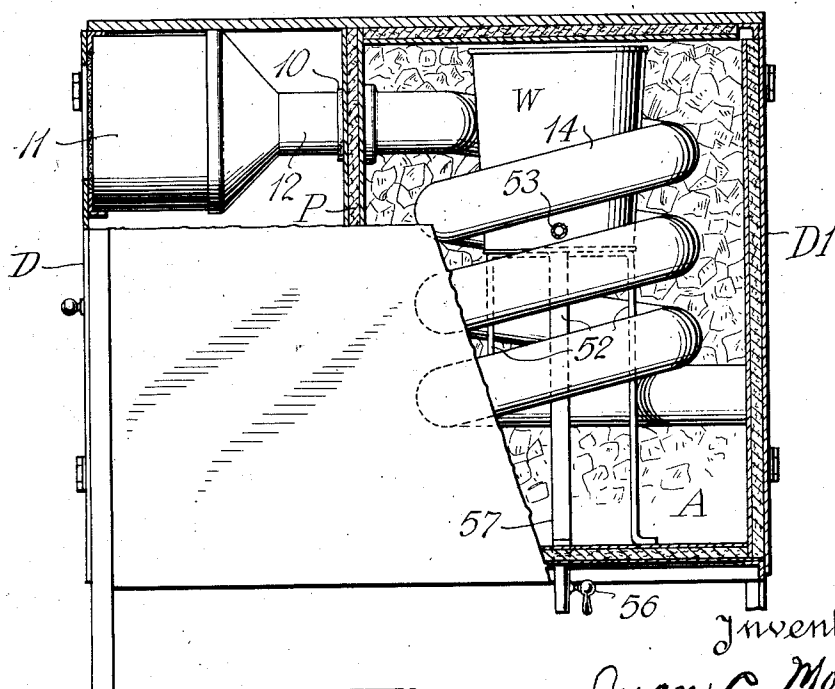


Fig. 9



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UNITED STATES PATENT OFFICE

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AIR HEAT GENERATOR

Application filed October 14, 1926. Serial No. 141,453.

This invention relates to a device for heating and cooling rooms, that is, a device which is convertible from a heat generator and distributor to a frigid air distributor. One object of the invention is to provide a comparatively simple, inexpensive, and thoroughly practical, effective and desirable device of this character which is particularly useful for heating individual rooms, hallways, etc., in winter, and for cooling such rooms and hallways in summer.

Another object is to provide a device of this character which is automatically controlled for regulating the degree of heat to be maintained in the room or hallway to be heated or cooled.

Another object is to provide a device of this character with means for forcing the heated or cooled air from the device in a horizontal direction at a level comparatively near the floor of the room or hallway to be heated or cooled, for causing such heated or cooled air to intermingle with the atmosphere in the resident section of the room or hallway, that is, the portion of the room or hallway where persons are or likely to be present, as distinguished from the upper part of the room in which persons do not reside.

Another object is to provide a device of this character which is electrically operated and controlled and which is connectible to an ordinary electric circuit such as usually employed for the lighting and heating of residential rooms and apartments or homes.

Another object is to provide a unitary structure which is freely movable, as a unit, from room to room or from any locality to another without disarranging the essential combination of its component parts.

Another object of the invention is to provide a device of this character which can be opened and closed easily and conveniently for gaining access to the internal elements thereof.

Another object is to provide a well insulated air tempering compartment and a motor-containing compartment separated from one another by an insulating partition provided with an insulating tubular section be-

tween two heat conducting tubular sections in the air tempering compartment and motor-containing compartment, respectively, for preventing heat conduction from the air tempering compartment from detrimentally affecting the operation of the motor.

Other objects and important features are pointed out or implied in the following details of construction, in connection with the accompanying drawings in which:

Figure 1 is a perspective view of the apparatus which constitutes one form or embodiment of my invention.

Fig. 2 is a top plan view of the cabinet or casing which includes the air tempering compartment and the motor-containing compartment, the hinged cover being omitted, the mirror and its supporting uprights being also omitted.

Fig. 3 is an enlarged left end view of the cabinet, the hinged door being open and exposing to view the motor, fan blades, motor-fan-casing and the insulating plate having certain electrical connections and controlling elements thereon, the right leg of the cabinet being broken off.

Fig. 4 is a longitudinal vertical central sectional view of the cabinet and its contents.

Fig. 5 is a diagrammatic view of the electric system forming part of this invention.

Fig. 6 is a perspective view illustrating a slightly modified form of the invention, such as shown in Figure 7 wherein a gas burner is employed in lieu of the electric heater shown in the previously described figure.

Fig. 7 is a side elevation, partly in section, of the form of invention shown in Fig. 6.

Fig. 8 is a perspective view of another modified form of the invention, including a spigot for supplying cooled water or tempered water from the interior of the air tempering chamber.

Figure 9 is a side view, mostly in vertical section, showing the form of invention illustrated in Figure 8.

Referring to these drawings in detail, in which similar reference characters correspond with similar parts throughout the several views, and first referring particularly

to Figures 1, 2, 3, 4 and 5, it will be seen that each form of the invention includes a cabinet which consists of an air tempering compartment and a second compartment 5 which contains a motor-fan-casing, a relay switch and other electrical controlling and connecting devices. In these first five figures, the cabinet is shown at C, and its left end is provided with a hinged door D which 10 has an air inlet in its upper part, preferably covered by a sheet of screen wire or other foraminated material as shown at I. The top T is hinged to one end of the cabinet and is adapted to be raised for gaining access to 15 the air tempering chamber, so as to make any necessary adjustments or repairs, also to place material or articles within this air tempering chamber. If preferable, the top T may be hinged on a partition P which 20 divides the cabinet into the two compartments and is composed principally of heat insulating or heat resisting material. This partition is provided with an opening through which extends an insulating tubular 25 section 10 which connects with a motor-fan-casing 11 through the medium of a tubular section 12 which forms the outlet of the motor-fan-casing. Within this motor-fan-casing a motor-fan 13 is mounted in any 30 preferred and appropriate way, and the motor which drives the fan is indicated at M. A coiled tubular member 14 connects to the other end of a tubular section 10, so that the parts 10, 12 and 14 constitute a continuous air passage which has its outlet at O (see 35 Figure 4), this outlet being covered by wire screening or other foraminous material.

A heating unit H is removably seated on the floor of the air tempering compartment 40 which is designated by the letter A, and this heating unit is normally electrically connected with any appropriate and convenient source of electric energy (as shown in Figure 5), through the medium of conducting means 45 extending through the partition P into the chamber which is designated by the reference character B and which contains a relay switch R and other electrical connections on an insulating plate or slab S.

50 The right-hand end of the air tempering compartment is provided with a door D¹ having an opening into which the outlet O of the coiled pipe section 14 extends when the door is closed. This coiled pipe section 55 is supported by horizontal bars 15 secured to opposite sides of the air tempering compartment A. It has its upper end preferably flared, as at 16, and encloses the contiguous end of the pipe section 10. The pipe section 60 14 has a vent-opening 17 to permit expanded air to pass therethrough from the compartment A, and to relieve such compartment from outward air pressure such as would result from a partial vacuum forming in the 65 air tempering compartment.

A conduit 18 is provided through the bottom of the compartment B for permitting electric conductors to extend therethrough for connection with the electric controlling elements on the slab S. 70

Referring now to Figure 5, the electrical connections and controlling elements are shown diagrammatically, and it will be seen that the motor M may be connected to or disconnected from the service wires 20 through 75 the medium of a cut-out switch 21. When this switch is closed, the motor is in circuit with service wires through the medium of conductors 22 and 23, the latter terminating in a resistance 24 which forms part of a rheostat, the movable contact of such rheostat being indicated at 25. This movable contact 80 is an extension of a thermostatic element 26 which is here diagrammatically shown and may be of any appropriate and preferred construction. This device in which the rheostat 24 is controlled by the thermostat 26, will hereinafter be referred to as a thermorheostat, and is designated by the reference 85 characters TR. The heating unit or heater H is also in circuit with the service wires, when the switch 21 is closed provided the circuit is also closed at 26^a which forms part of a relay switch hereafter more fully described. 90 This heater has its terminals connected to conducting wires 27 and 28, and the switch 26^a is interposed in the conducting wire 28. It is through these conducting wires 27 and 28 that the switch 21 connects with the motor M and the heater H. The primary element of a 95 potential transformer PT is also connected to these conducting wires 27 and 28, the secondary elements of said potential transformer having one of its terminals connected to a conducting wire 29 which leads to the stationary element 30 of a thermostat which has its movable element or contact finger 31 between two adjustable contacts 32 and 33. 100 These contacts 32 and 33 are connected to conducting wires 34 and 35 which lead to electromagnets 36 and 37 respectively. Armatures or switch elements 38 and 39 are in position to be operated by the respective 105 magnets 36 and 37 and to close the electric circuit at 40 and 41 respectively. Both armatures 38 and 39 are electrically connected by a conductor 42 to the conducting wire 27, and the stationary contacts of the switches 40 and 41 are connected respectively to conducting 110 wires 44 and 45 which have their terminals connected respectively to two coils 46 and 47 which have a common connection with the conducting wire 28 through the medium of a conducting wire 48. Cut-out switches 49, 50 115 and 51 are provided between the magnets and the potential transformer, also in the conducting wires 44 and 45. The parts 36, 37, 38, 39, 40, 41, 46 and 47 and their electrical connections between one another combine to 120 125 130

form the relay switch mechanism and potential transformer shown in side elevation in Figure 4 and in front elevation in Fig. 3. The thermostat which is abbreviated TH, in Figures 1 and 6 is composed of the parts indicated by reference characters 30, 31, 32 and 33, and this thermostat may be placed at any convenient locality in the room to be heated or cooled by this apparatus, and its electrical connections 29, 34 and 35 may enter the cabinet through the conduit 18 through which the service wires 20 may also enter, or if preferable, the wires 27 and 28 may enter through this conduit 18, while the main cut-out switch 21 may be at any convenient place in the room instead of in the compartment B.

Now, presuming that the room is to be heated, the service switch or main cut-out switch 21 must be closed, and assuming that the service wires are energized, the current will at once energize the heater H and at the same time energizes the heat rheostat or thermo-rheostat to start the motor M, so that when the air is heated in the heating chamber A, the heat thereof is transferred by conductivity of the pipe section 14 into this pipe section, while the fan 13 is operated by the motor M to draw air through the inlet I and force it from the fan-motor-casing 11 through the tubular sections 10, 12 and 14, and the latter section retards the flow of air there-through because of the coiled formation of this pipe section 14 continually changing the direction of flow of the air. This enables the air to be heated within the pipe section 14 sufficiently for killing any germs that might be in the air, and this heated air passes out through the outlet O into the room so it commingles with the atmospheric air and raises the temperature of the latter. As the temperature rises, the thermostat-rheostat (TR) operates to decrease the resistance, thereby causing the motor to increase its speed and the speed of the fan 13, thereby forcing the air more speedily through the heating coil or pipe section 14, to prevent overheating of the air, thus regulating the temperature of the air from the outlet O and, at the same time increasing the velocity of the air and increasing the distance to which the stream of warmed air extends from the outlet O. As this outlet is horizontally disposed and relatively near the floor on which the device is seated, the horizontal stream of air pierces the lower strata of atmosphere within the room, commingling therewith and thereby heating this lower strata which is relatively cold because of its greater weight than the upper strata. By this means, the temperature is kept more even throughout the room than it can be kept by means of heaters from which the heated air immediately rises to the upper part of the room.

Now, assuming that it is desired to use this device for lowering the temperature in hot

summer weather, the heating unit H is removed through the door D1, the door is then closed and fastened, and the lid or hinged top T is raised for opening the compartment A at the top, and now, this compartment A is filled or partly filled with ice which surrounds the tubing 14 so as to cool the latter and to cool the air therein, so now when the motor fan operates, it forces this cooled air out through the opening O so it commingles with the relatively warm air in the room and lowers the temperature throughout the room in which the device is operating. It should be understood that the contacts 32 and 33 are made adjustable for enabling the contact arm 31 of the thermostat to make contact therewith, respectively, at different temperatures, thereby predetermining the respective degrees of temperature at which the device will automatically start and stop the motor fan.

In connection with the air cooling arrangement, I may also provide a water container W which may either be sufficiently tall and narrow to rest on the floor of the compartment A and extend up through the coil or tubing 14, or may be provided with supporting legs 52, as shown in Figure 9. This water container W, when surrounded by ice, is cooled by the ice, at the same time kept from becoming excessively cool because of the relatively warm air in the tube 14 surrounding the water container. The pipe 53 is provided for the water container, the outer end of this pipe terminating in a spigot 54 through which the water may be drawn for drinking purposes.

In this connection, while Figure 1 is shown to include a thermorheostat, and Figure 8 is shown to include a water spigot, it is understood that the thermorheostat and water spigot may both be included as parts of the same device. It should also be understood that all forms of the invention may include a furniture member or mirror 55, as shown in Figure 1, if so desired. Instead of packing ice around the coil of tubing 14, the water container W may be employed as the ice container, especially where the device is to be used in moderately warm weather for slightly lowering the temperature. A drain cock 56 may be employed in a pipe 57 which is extended from the interior of the container W through the floor of the compartment A.

Referring to Figures 6 and 7, and especially to the latter figure, it will be seen that my inventive ideas also contemplate the use of a flame F for supplying heat to the compartment A, and a flue 58 is employed in the upper part of this compartment A for carrying off the products of combustion from the flame F. Any appropriate means may be employed for supplying air for maintaining the flame F, and in this connection, attention is again directed to the opening 17 in the coil of tubing 14, for heating purposes.

The conduit 18 may be omitted, and the conducting wires may be provided with appropriate insulation as indicated at 18a. The flame F may be fed with gas or other fluid fuel through a feeding pipe 59.

Any appropriate means may be employed for supporting the slab S on which the relay switch R and its cooperative parts are supported, brackets 60 being here shown for supporting such slab.

Although I have described this invention in accordance with the form illustrated by accompanying drawings, it is not my intention to limit my patent protection to the exact construction and arrangement here shown, but the inventive ideas contemplate appropriate changes within the scope of the following claims.

What I claim as my invention is:

1. In a device of the character described, the combination of a cabinet including a heat insulated compartment and a second compartment separated from one another by a heat insulating partition, the said partition having an opening therethrough, said heat insulating compartment having an outlet opening, an air conduit extending through the opening of said partition and to the said outlet opening, a means for affecting the temperature within said heat insulated compartment and thereby affecting the temperature within said conduit, a fan-casing within said second compartment, a fan in the fan-casing and operable to force air through said conduit, and means automatically operable for increasing and decreasing the speed of said fan in accordance with the temperature of the atmosphere contiguous to such means.

2. In a device of the character described, the combination of a heat insulating compartment, a heat conducting conduit therein, said compartment having an inlet opening and an outlet opening at which the ends of said conduit terminate, means for affecting the temperature in said compartment and thereby affecting the temperature within said heat conducting conduit, a fan-casing outside of said heat conducting compartment and provided with means to convey air from said fan into said conduit, electrical means to drive said fan, and a heat insulating tubular section interposed between said conduit and the means which conducts air from said fan-casing, substantially as shown, to prevent the conduction of heat from said heat conducting conduit into the presence of the electrical means which drives said fan.

3. In a device of the character described, the combination of a cabinet or the like, an air conducting conduit of heat conducting material in the cabinet, means to affect the temperature of the air around said conduit and thereby affect the temperature within said conduit, a fan to force air through said

conduit, electrical means to drive said fan, and a thermo-rheostat on said cabinet and controllable by the temperature conducted from said cabinet to the thermo-rheostat so as to control said electrical means in such manner as to increase the speed of the fan in proportion to the temperature in the part of the cabinet contiguous to the thermo-rheostat.

4. The combination in a device of the character described, of a cabinet provided with a heat-insulating partition having an opening therethrough, an electric heating unit in said cabinet, said compartment having a second opening, an air conducting tubular coil in said compartment and having its ends in open communication with the said openings of said compartment, a fan-casing, a fan in said casing, a second compartment containing said fan-casing in position for conducting air from the fan into said tubular coil, electrical means for driving said fan, said electrical means including a potential transformer and a relay switch, a rheostat operable to control the current of said electrical means, a thermostat to control said rheostat, and a second thermostat provided with means to control said relay switch.

5. In combination, a cabinet, automatic means to heat the cabinet, thermostatic means to control the heating of the cabinet, a tubular coil member in said cabinet with said heating means and having atmospheric communication at its ends, and means to force a draught through the coil member and electrically controlled means to control the draught-forcing means.

6. In an automatic system of air temperature generator, the combination of a cabinet with a furniture member, a partition in said cabinet and forming two compartments thereby, one compartment for a heating element with a tubular coil member, a heat insulation encasing said elements, the second compartment for a motor and fan casing and electrical connections, said second casing having an air intake opening at one end and an air outlet opening at the other end, said casing and tubular coil member having an atmospheric communication therethrough.

7. In an automatic system of air temperature generator, the combination of a cabinet including an inner shell and an outer shell with a heat insulation separating said shells, a part of said inner shell and insulation forming a partition in said cabinet thus forming two compartments, a heater element and a tubular coil member in one compartment, a casing and electrical connections in the other compartment, an air intake opening at one end and an air outlet opening at the other end, said casing and tubular coil having an atmospheric communication therethrough.

8. In an automatic system of air temperature generator, the combination of a fan, an

electric motor for driving the fan, an electric circuit connected to the motor for energizing it, a circuit closer for the electric circuit, a thermostat connected to the said circuit
5 closer and operable at a relatively high temperature for closing the circuit closer, a second circuit closer for the electric circuit, and a second thermostat which is operable at a relatively low temperature for opening the
10 said circuit closer.

9. In an automatic system of controlling air temperature, the combination of a cabinet, a tubular air-receiving means in the cabinet and having both ends open to the outer air,
15 an electric heating unit for heating the air-receiving means, an electric motor, a thermostat to control the motor, a fan operable by said motor to force a draught through the air-receiving means, and a second thermostat
20 operable to control the electric heating unit.

10. In an automatic system for controlling air temperature, the combination of means to effect a hot atmosphere to a normal and predetermined temperature, a tubular coil having
25 an air-inlet at one end and an air-outlet at its other end, a fluid receptacle surrounded by said tubular coil, a heat-insulated compartment containing said coil and fluid receptacle and also providing means to contain a
30 means for cooling the coil and the receptacle, means to force air through said coil, and temperature-controlled means to control the air-forcing means.

11. In an automatic system of controlling
35 air temperature, the combination of means to effect a hot atmosphere to a normal and predetermined temperature, a tubular coil having an air-inlet at one end and an air-outlet at its other end, a heat-insulated compartment containing said coil and providing
40 a container for a cooling means to cool said coil and thereby effect a cool atmosphere, means to force air through said coil, a temperature-controlled means to control the air-forcing means, and a second temperature-controlled means for controlling the temperature
45 irrespective of the air-forcing means.

In testimony whereof, I affix my signature.

JUAN C. MONTERO.

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