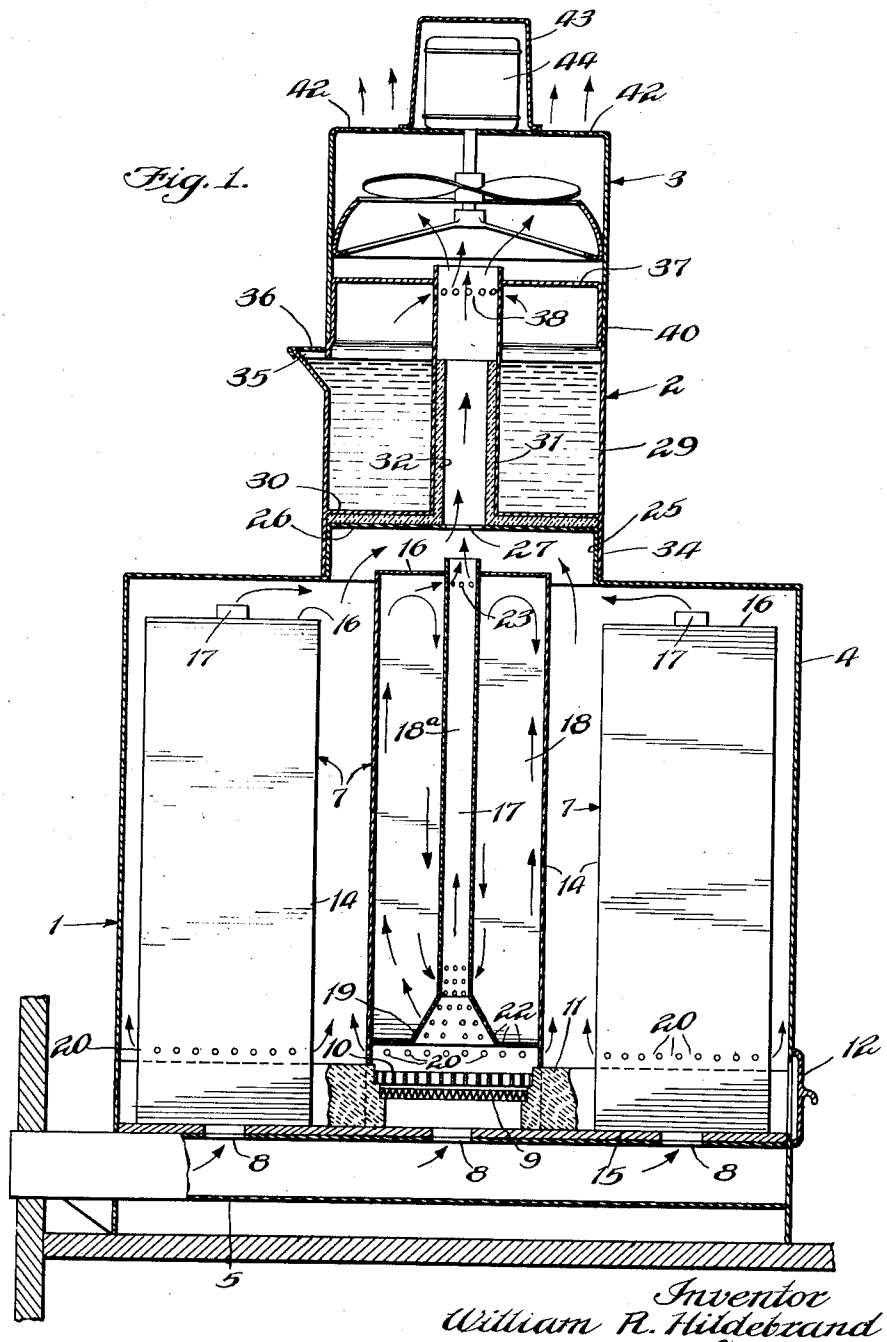
Jan. 9, 1940. W. R. HILDEBRAND 2,186,697

AIR CONDITIONING APPARATUS

Filed Feb. 26, 1937 2 Sheets-Sheet 1

Fig. 1.



Inventor
William R. Hildebrand
By Morris Spector
Atty.

Jan. 9, 1940. W. R. HILDEBRAND 2,186,697

AIR CONDITIONING APPARATUS

Filed Feb. 26, 1937 2 Sheets-Sheet 2

Fig. 2.

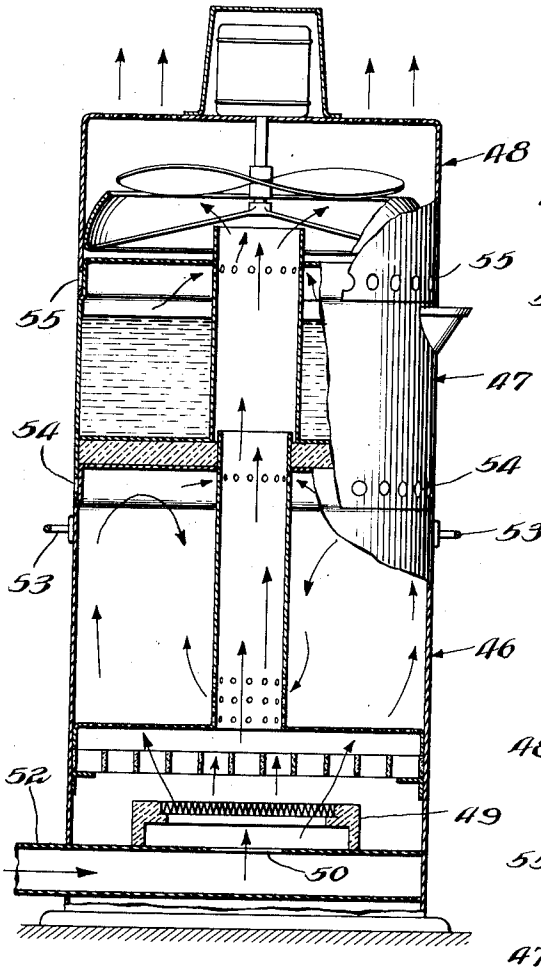


Fig. 3.

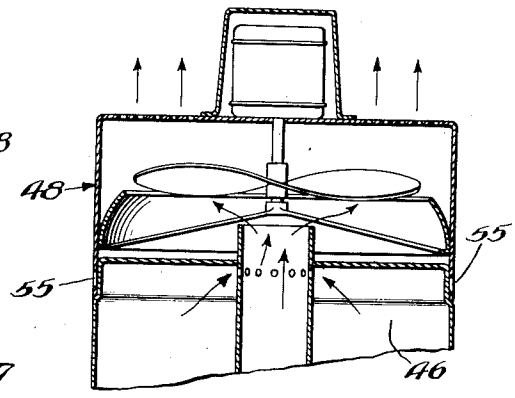


Fig. 4.

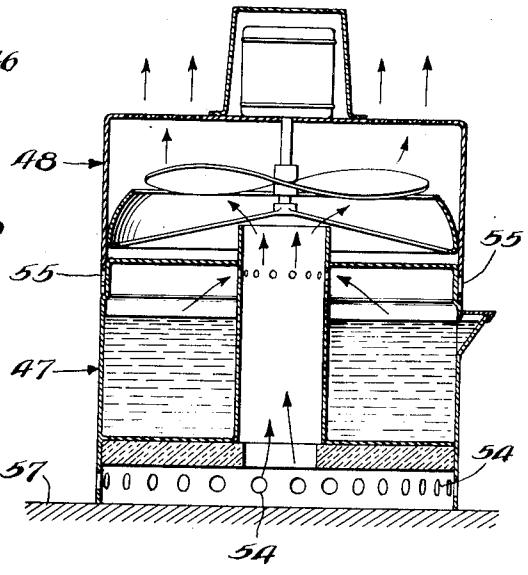
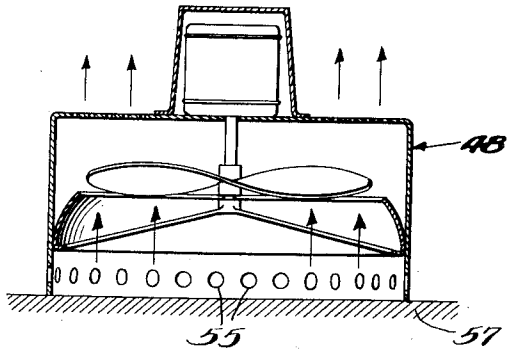


Fig. 5.



Inventor
William R. Hildebrand
By Morris Spector
Atty.

Patented Jan. 9, 1940 2,186,697

UNITED STATES PATENT OFFICE

2,186,697

AIR CONDITIONING APPARATUS

William R. Hildebrand, Chicago, Ill.

Application February 26, 1937, Serial No. 127,957

9 Claims. (Cl. 261—14)

This invention relates to air conditioning and is particularly concerned with stationary and portable air conditioning apparatus adapted to condition air in the room in which it is installed.

It is one of the objects of this inventon to provide a simple air conditioning apparatus which is flexible in operation to meet various conditions required, and which may be made in a few standard parts that may be assembled in various combinations as required.

It is a further object of this invention to provide a knockdown multi-unit air conditioning apparatus whose units may be employed singly and in combination to provide forced or thermosyphonic circulation of heated, unheated, cooled, humidified, medicated or unmedicated air. I provide an apparatus so constructed that it may utilize heating means that was initially designed for cooking or other purposes.

Another object of the present invention is to provide an air conditioning apparatus which is simple in structure, inexpensive to manufacture and economical in use.

It is another object of this invention to provide interchangeably connectible and cooperable heater, humidifier and blower units.

It is a further object of this invention to provide an air conditioning apparatus with a heat producer which may be removed for separate use without disturbing the operation of the remainder of the apparatus.

In accordance with the general features of one form of this invention, there are provided heater, humidifier and fan units constructed and arranged so that they may operate independently of or together with one another. The humidifier may contain water or medicated material, or when the heat is off, a refrigerant may be placed in the humidifier to cool the air that is being circulated. The air inlet of the unit may be connected to a source of fresh or outside air or may open in the room to receive room air. The heater may include a stove removable from the apparatus to serve independently. The units may be entirely separable from one another and interchangeably connected to permit independent operation of the fan, the heater, the fan and heater combined, the humidifier and heater combined, and the fan and humidifier combined.

The attainment of the above and further objects of this invention will be apparent from the following specification taken in conjunction with the accompaning drawings forming a part thereof.

In the drawings:

Figure 1 is a vertical sectional view of one form of the invention;

Figure 2 is a vertical sectional view of another form of the invention;

Figure 3 shows an operative assembly of the heater and blower units of Figure 2:

Figure 4 shows an operative assembly of the humidifier and blower units of Figure 2; and

Figure 5 shows the blower unit of Figure 2 operative by itself.

Referring now more particularly to Figure 1, there is shown a heater unit 1 superimposed by a humidifier unit 2 which supports a fan or blower unit 3. The heater unit comprises a casing 4, rectangular or oval in horizontal cross section, into which extends an air inlet or conduit 5 which may open on the outside of the building within which the unit is contained to draw in fresh air, or may terminate within the room. Housed within the casing is a bank of three heating and air circulating devices 7, each arranged over an air opening 8 in the conduit 5.

Each heating device comprises a heat producer such as an electric resistance element 9 superimposed by a perforated baffle plate 10 supported by a stove body 11 which has three heating units 9 and is adapted to be inserted into and removed from the casing through an opening normally closed by a door 12. Each heating element 9 and baffle plate 10 are at the lower end of an upstanding cylindrical shell or drum 14 which is slotted to straddle the stove body 11 and is supported by the base 15. The drum 14 is closed at the top 16 except for an opening through which an outlet tube or chimney 17, supported by the drum, extends. The tube terminates adjacent the top of the drum and extends downwardly therein, flaring at its bottom 19 to terminate at the drum wall above the baffle plate, thus providing outer and inner compartments 18 and 18a. The drum has openings 20 below the tube, the lower part of which is perforated at 22 and the upper part at 23.

When the element 9 is heated, air from the juxtaposed inlet opening 8 passes up through the baffle plate, some of it escaping through the holes 20 to the outside of the drum into the space between it and the casing 4. The remaining air branches into the upper part of the drum through the tube holes 22 and into the upper part of the tube. The air circulates in the manner indicated by the arrows, leaves the drum compartment 18 to enter upper and lower parts of the tube, and departs through the open top of the tube 17.

The casing 4 has a cylindrical top flange 25

terminating in an annular top 26 having an opening 27 through which heated air passes upwardly from the heating unit.

The humidifier unit 2 has a tank wall 29 with an annular base 30 and an inner wall 31 forming a tube for the upward passage of the heated air. Insulation 32 may be provided around the inside of the tube 31 and below the base 30 to prevent overheating of the liquid. The outer wall 29 has a depending skirt 34 nested with the flange 25 and adapted to rest on the casing or be fastened thereto. An opening 35 which has a cover 36 is provided for replenishment of the water or other liquid in the tank 29. The cover 36 forms an hermetic seal to insure maintenance of a partial vacuum within the humidifier.

The tank 29 terminates substantially above the liquid level therein in a top 37 to which extends the inner tube 31, which tube is perforated at 38. The heated air moving through the tube 31 thus creates a partial vacuum in the space above the liquid level in the tank 29 and draws vapors of the liquid into the upwardly moving air stream at the top of the tube 31.

The blower unit 3 is adapted to rest on the humidifier unit through a skirt portion 40 that fits over the top of the humidifier and is of the same diameter as is the bottom 34 of the humidifier, so that the blower unit may be placed directly on the cylindrical flange 25 when the humidifier is dispensed with. The top of the blower unit is perforated at 42, providing an outlet for the circulating air. A bracket 43 surrounds and helps support the fan motor 44.

Thus the apparatus comprises telescoped units forming an assembly which is compact, has a trim appearance and whose parts are efficiently interrelated. Suitably located control switches (not shown) may be provided for the fan and heater, and by operating them together or selectively a variety of effects may be obtained. The heat may be varied in accordance with the number of elements 9 in operation.

The casing 4 is preferably of metal so that when the heater is in operation the casing to some extent heats the surrounding air directly. When the heat is off and cool air is drawn in from the outside, the casing is cooler than the surrounding inside air and therefore absorbs heat from the surrounding room air. The telescopic connections are preferably alike so that the humidifier may be dispensed with and the blower unit telescoped directly to the casing 4, thereby increasing the flexibility of operation of the apparatus.

Figure 2 shows a portable air conditioning apparatus which in many respects resembles that of Figure 1. The modified form comprises a heater unit 46 adapted to directly support interchangeably a humidifier unit 47 or a blower unit 48, the latter being also adapted to be supported by the humidifier unit. A heat producer or stove 49 may be removably mounted over the opening 50 in the air inlet conduit 52. The air circulates within and leaves the apparatus as indicated by the arrows.

The conduit 52 may be detachably connected (not shown) to a source of fresh air or may terminate within the building or room. Handles 53 may be provided to facilitate moving the entire apparatus or the heater unit alone, and the other units may be similarly equipped.

The humidifier unit has a telescoped relation with the heater unit and, below the liquid containing portion, has openings 54 obstructed by the telescoping portion of the heater unit. The blower unit has openings 55 below its fan and blocked by the telescoping portion of the humidifier unit or the heater unit, as the case may be.

With this apparatus considerable flexibility of operation is inherent. In addition to the uses to which the form shown in Figure 1 may be put, it will be observed that the humidifier may be omitted, as shown in Figure 3, or the humidifier and blower may constitute an operative assembly as shown in Figure 4, resting on a support such as a floor 57, at which time air enters through the openings 54. Furthermore, the blower may be used alone, as shown in Figure 5, resting on a floor or other suitable support, air entering through the openings 55. Thus while the heater is used in one place, the fan, with or without the humidifier, may be used elsewhere.

The humidifier is adapted to be supplied with refrigerant such as ice cubes, which may be inserted through the supply opening, and also with medication.

The exterior of the apparatus may be round, rectangular, or of any other desired shape.

In compliance with the requirements of the patent statutes I have here shown and described a few embodiments of my invention. It is, however, to be understood that the invention is not limited to the precise constructions here shown, the same being merely illustrative of the principles of the invention. What I consider new and desire to secure by Letters Patent is:

1. Air conditioning apparatus comprising a heater, a humidifier removably supported thereby, a blower, and means on the heater and humidifier for interchangeably supporting the blower, said humidifier comprising a water receptacle having an air duct extending therethrough, said duct having an opening communicating with the receptacle and through which water vapor may pass from the receptacle into the air duct.

2. Air conditioning apparatus comprising a heater unit, a humidifier unit removably connected thereto and having a ventilating opening for admitting air to the interior of the humidifier unit in the absence of the heater unit but not when assembled therewith, and a suction blower unit formed to be removably connected selectively to the heater and humidifier units and having a ventilating opening for admitting air to the interior of the blower unit when used alone but not when connected to either of the other units.

3. Air conditioning apparatus comprising a pair of cooperative air conditioning units one of which is telescopically and removably connected with and adapted to receive air from the other, the first unit having a ventilating opening blocked by the telescoping portion of said other unit but operative in the absence of said other unit to admit air to the interior of said first unit when free of the telescopic relation.

4. Air conditioning apparatus comprising a heater unit, a humidifier and blower assembly telescopically and removably connected with and adapted to receive air from said unit, said assembly having a base provided with a vent obstructed by the telescoping portion of said unit but operative in the absence of said unit to admit air to the humidifier and blower when the assembly is separated from the heater unit.

5. Air conditioning apparatus comprising a heater unit, a humidifier unit telescopically mounted on said heater unit, said humidifier

having means forming a passageway through which air from said heater may pass and a depending skirt having a ventilating opening obstructed by the telescoping portion of the heater but adapted to admit air to the interior of the humidifier unit in the absence of the heater unit, as when the humidifier unit is removed from the heater, and an electrically operated suction blower unit formed to be removably and telescopically connected selectively to the heater and humidifier units and having a depending skirt with a ventilating opening obstructed by the telescoping portion of the heater or humidifier unit but adapted to admit air to the interior of the blower unit in the absence of the other units, the several telescopic connections comprising sliding fits enabling the units to be readily assembled and disassembled, the humidifier tank having a supply opening of a size to admit refrigerant such as ice cubes, and the heater and blower units being independently controlled to augment the flexibility of operation of the apparatus.

6. Air conditioning apparatus comprising a heater unit, a humidifier unit telescopically mounted on said heater unit, said humidifier having means forming a passageway through which air from said heater may pass and a depending skirt having a ventilating opening obstructed by the telescoping portion of the heater but adapted to admit air to the interior of the humidifier unit in the absence of the heater unit, as when the humidifier unit is removed from the heater, and an electrically operated suction blower unit formed to be removably and telescopically connected selectively to the heater and humidifier units and having a depending skirt with a ventilating opening obstructed by the telescoping portion of the heater or humidifier unit but adapted to admit air to the interior of the blower unit in the absence of the other units.

7. Air conditioning apparatus comprising a heater unit, a humidifier unit telescopically mounted on said heater unit, said humidifier having means forming a passageway through which air from said heater may pass and a depending skirt having a ventilating opening obstructed by the telescoping portion of the heater but adapted to admit air to the interior of the humidifier unit in the absence of the heater unit, as when the humidifier unit is removed from the heater, and an electrically operated suction blower unit formed to be removably and telescopically connected selectively to the heater and humidifier units and having a depending skirt with a ventilating opening obstructed by the telescoping portion of the heater or humidifier unit but adapted to admit air to the interior of the blower unit in the absence of the other units, the several telescopic connections comprising sliding fits enabling the units to be readily assembled and disassembled.

8. Air conditioning apparatus comprising a heater the top of which has an opening for permitting the egress of air therefrom, a fitting surrounding the opening and constituting a wall of the heater, a humidifier resting on the heater and having a skirt portion in telescoping relation to said fitting, said humidifier having means forming an air passageway extending therethrough and communicating with the opening in the top of the heater, said passageway also having at least one opening communicating with the interior of the humidifier so that air flowing through said passageway draws vapors from the humidifier, the top of the humidifier having a fitting of the same size and shape as the first mentioned fitting, and a blower resting on the humidifier and having a skirt portion in telescoping relation to the humidifier fitting and communicating with said passageway for effecting a movement of air therethrough, said two skirt portions being of the same size and shape so that the blower may fit directly upon the heater upon removal of the humidifier.

9. Air conditioning apparatus comprising a heater unit the top of which has an opening for permitting the egress of air therefrom, a fitting surrounding the opening and constituting a wall of the heater, a humidifier unit resting on the heater and having a skirt portion in telescoping relation to said fitting, said humidifier unit having means forming an air passageway extending therethrough and communicating with the opening in the top of the heater, said passageway also having at least one opening communicating with the interior of the humidifier so that air flowing through said passageway draws vapors from the humidifier, the top of the humidifier having a fitting of the same size and shape as the first mentioned fitting, and a blower unit resting on the humidifier unit and having a skirt portion in telescoping relation to the humidifier unit and communicating with said passageway for effecting a movement of air therethrough, said two skirt portions being of the same size and shape so that the blower may fit directly upon the heater upon removal of the humidifier, one of said units having a ventilating opening locked by the telescoping portion of the unit below it but operative in the absence of the unit below it to admit air to the interior of said one unit when free of the telescopic relation.

WILLIAM R. HILDEBRAND.