July 25, 1950 W. C. COLEMAN 2,516,369

HEATING APPARATUS

Filed Aug. 6, 1947

Fig. 1.

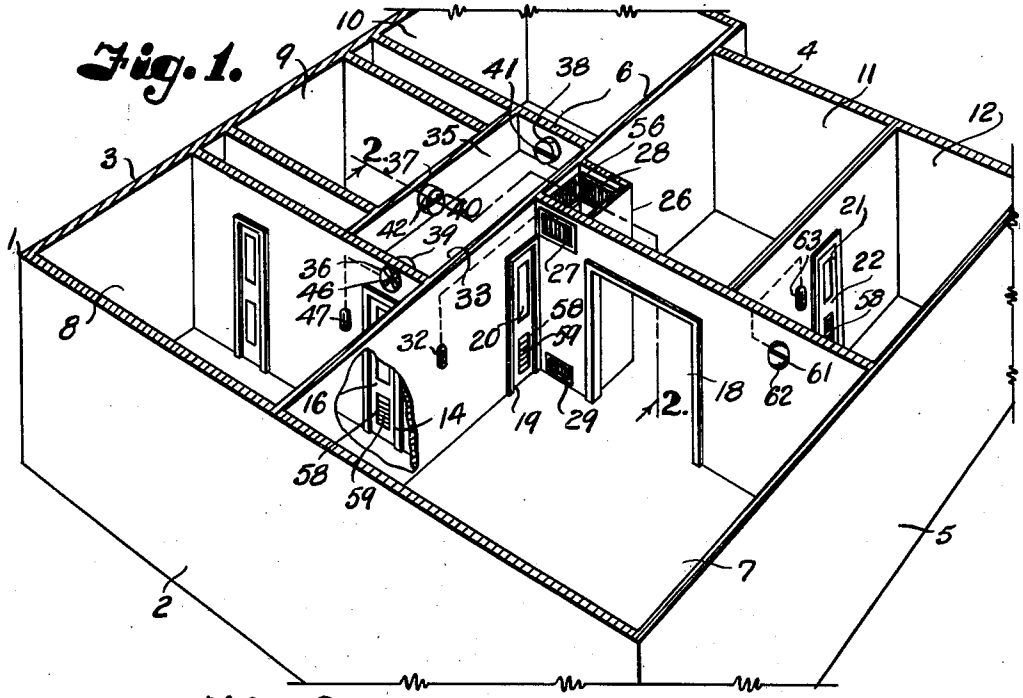



Fig. 2.

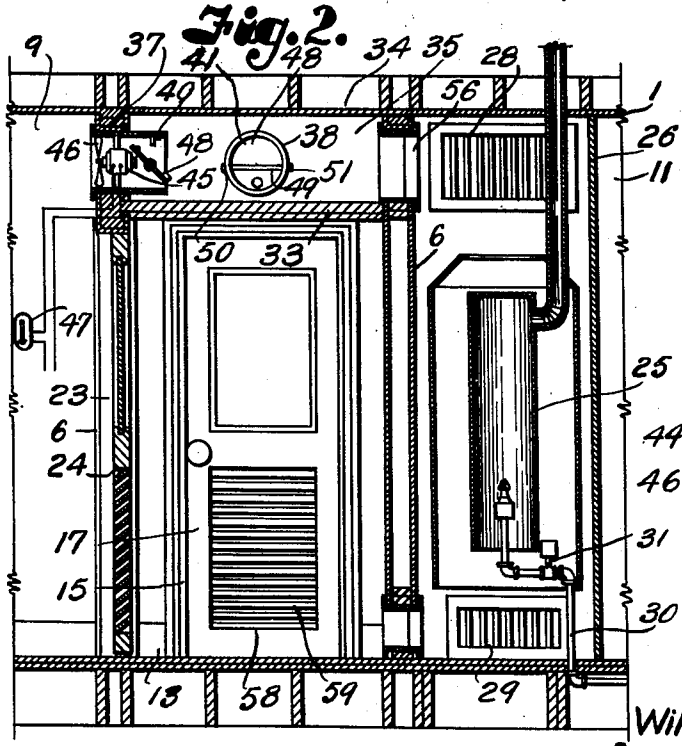
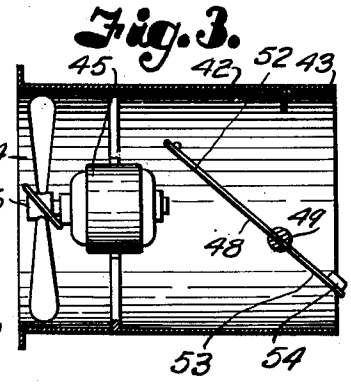



Fig. 3.




INVENTOR

William C. Coleman.

By

Fishburn & Mullendore

ATTORNEYS

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## HEATING APPARATUS

William C. Coleman, Wichita, Kans., assignor to The Coleman Company, Inc., Wichita, Kans., a corporation of Kansas

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4 Claims. (Cl. 237—2)

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This invention relates to warm air heating apparatus particularly for heating a plurality of rooms or spaces, of the type illustrated in my copending application, Serial No. 760,875, filed July 14, 1947, the object of the present invention being to provide a common heating unit for directly heating one or more of the spaces and which is connected with the other rooms or spaces through a distributing chamber directly supplied with warm air from the heating unit so as to maintain a higher temperature in those rooms heated from the distributing chamber than is possible with the structure disclosed in my copending application.

Other objects of the invention are to provide a chamber for receiving directly warm air from a heating unit and distributing the warm air to rooms or spaces separated from the space in which the heating unit is installed; to provide forced movement of heated air from the heating unit through the heat distributing chamber into the respective spaces to be heated responsive to predetermined temperatures to be maintained in said spaces; to provide for return of cooled air from the spaces served by the distributing chamber into the space that is directly heated by the heating unit for recirculation; and to provide a simple mechanism for discharging heated air from the distributing chamber into the spaces to be heated.

In accomplishing these and other objects of the invention, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawing wherein:

Fig. 1 is a perspective diagrammatic view of a common type dwelling having one or more rooms directly heated by a heating unit and one or more rooms that are separated from the directly heated rooms and which are heated in accordance with the present invention.

Fig. 2 is a vertical section on the line 2—2 of Fig. 1, particularly illustrating the heat distributing chamber and fan units for supplying air to the rooms separated from the rooms that are directly heated by the floor furnace.

Fig. 3 is an enlarged section through one of the fan units.

Referring more in detail to the drawings:

1 designates a dwelling having exterior walls 2, 3, 4 and 5 and various transverse partitions 6 forming rooms 7, 8, 9, 10, 11 and 12 and a central hall 13. The rooms 8 and 10 may be bedrooms having entrances from the hall 13 through doorways 14 and 15 that are normally closed by doors 16 and 17 for maintaining privacy in the respective rooms. The rooms 7 and 11 may be living and dining rooms connected by a relatively wide doorway 18 through which air may circulate freely therebetween. The living room 7 is usually connected with the hall 13 through a door opening 19 closed by a door 20. The room 12 may constitute a kitchen that is connected with the dining room through a door opening 21 that is normally closed by a door 22. The room 9 is a bathroom and connects with the hall 13 through a door opening 23 adapted to be closed by a door 24.

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Small dwellings of this character are often heated by a single heating unit located in the living room to directly heat the living and dining rooms and to heat to some extent, the bedrooms, bathroom and kitchen when the doors thereto are left open. In many instances the rooms not directly heated by the heating unit are inadequately heated and the rooms receive practically no heat when the doors are closed to maintain privacy in the respective rooms.

The present invention contemplates a heating unit 25 that is mounted in a casing 26 in a corner of the room 11 preferably adjacent the door opening 18 and hall 13.

The casing 26 may constitute the outer casing of the heating unit or it may be built into the corner to provide a vertical shaft in which the heating unit is installed. The upper end of the casing is connected with the rooms 7 and 11 by grill-covered openings 27 and 28 that are located in the walls forming the shaft. The bottom of the casing is provided with similar grill-covered openings 29 so that air from the floors of the rooms 7 and 11 pass into the casing to be heated by the heating unit and the heated air is discharged into the rooms. The rooms 7 and 11 are thus directly heated by natural circulation of the air around the heating unit.

A suitable fuel is supplied to the burner of the heating unit through a duct 30 under control of a valve 31 which is operated by a thermostat 32 located on one of the walls of one of the rooms 7 or 11. When the temperature in that room falls below the temperature set by the thermostat, the valve 31 is opened to allow flow of fuel to the heating unit until the temperature approaches that set by the thermostat when the heating unit is shut down until the thermostat again calls for heat as in the case of conventional thermostatically operated furnaces.

When the doors 16, 17, 20, 22 and 24 are open some of the warm air may move into the rooms 8, 9, 10 and 12 but this movement of air is rela-

tively small, particularly in cold weather so that it is difficult to heat the rooms 8, 9, 10 and 12 that are not directly heated.

As above pointed out, it is the purpose of the present invention to obviate this difficulty by providing an apparatus whereby heated air is discharged directly from the casing of the heating unit into a distributing chamber and positively discharged into any one of the separated rooms 8, 9 and 10 which require heat to maintain substantially high predetermined temperatures therein.

In carrying out the present invention, the hall 13 is provided with a horizontal transverse partition 33 extending thereacross at a point above the doors and spaced below the ceiling 34 (Fig. 2) to cooperate with the side walls in providing a heat distributing chamber 35. The heat distributing chamber thus formed is connected with the rooms 8, 9 and 10 through openings 36, 37 and 38 which are preferably located above the doors 16, 24 and 17 respectively. Located in the openings are air circulating units 39, 40 and 41 respectively. Each unit (see Fig. 3) comprises a casing 42 having open ends to provide an inlet 43 and an outlet 44, the inlet 43 being projected into the heat distributing compartment 35. Located preferably at the outlet end of each casing is a motor 45 having a fan 46 rotatable within the discharge openings of the casings to draw air through the inlets 43 and discharge the air into the room served thereby whenever the motor is energized responsive to a thermostat 47 located in that room as shown in Fig. 2.

In order to close flow through the casing when the fans are not in operation, the inlet end of each casing is provided with a damper 48 mounted on a cross shaft 49 having its ends journalled in suitable bearings 50 and 51 (Fig. 2) provided in opposite sides of the casing below the horizontal center thereof. The damper 48 is mounted on the shaft below the horizontal diameter thereof so as to provide an upper portion 52 of larger area than the lower portion 53. Each damper, however, is balanced to normally maintain a perpendicular position by a weight 54 that is suitably attached to the lower portion 53 of the damper. Therefore, when the fans are not in operation the dampers normally close flow through the casings, however, when the fans are in operation the movement of air acting on the larger upper areas 52 of the dampers cause the dampers to swing open and remain open while the fans are discharging heated air from the distributing chamber 35.

Heated air is delivered directly into the distributing chamber through a grill-covered opening 56 which is provided in the transverse wall 6 and which connects with the upper end of the heating unit casing.

In order to return the air from the respective rooms to the rooms 7 and 11, the bottom portion of each door is provided with openings 58 covered by louvers 59 as best shown in Fig. 2. It is thus obvious that when warm air is discharged into the rooms the cooler air is displaced through the louvered openings of the doors into the hall 13 and through the louvered opening of the door 20 into the room 7 for recirculation around the heating unit. The motors of the fan units are controlled by room thermostats 47 installed in the respective rooms 8, 9 and 10.

In order to satisfactorily heat the room 12 when the door 22 is closed, one of the inner walls is provided with an opening 61 in which is installed a fan unit 62 corresponding to the fan units previously described and which has the motor thereof controlled by a thermostat 63. Therefore, when the room 12 requires heat, warm air is drawn from the living room 7 by the fan unit 62 and is returned through the louvered portion near the bottom of the door 22 by way of room 11. It is thus obvious that a positive circulation may be maintained from the upper hot zone of the directly heated rooms to the other rooms when the thermostats in those rooms call for heat. The cooled air in each room, having settled to the floor, is forced to flow through the louvered door section and back to the furnace to be reheated.

Operation of the apparatus constructed and assembled as described is as follows:

The main thermostat 32 which controls the fuel supply to the heating unit is set to maintain a predetermined temperature in the living room 7, for example, 75° F. Therefore, whenever the temperature in the living room and dining room connected therewith tends to fall below the set temperature, the thermostat starts operation of the heating unit to heat the air in the casing 26 and cause an upward movement of heated air which discharges into the rooms 7 and 11 and into the distributing chamber through the grill openings 27, 28 and 56. A circulation is maintained in the rooms 7 and 11 until the temperature in the room 7 reaches the temperature set by the thermostat 32 whereupon the operation of the furnace is suspended until such a time that the temperature falls below that set by the thermostat.

Assuming that it is desired to heat the room 12, the thermostat 63 may be set to a desired temperature so that when the thermostat 63 calls for heat the motor for the fan unit 62 is energized to draw heated air from the ceiling zone of the room 7 and discharge it into the room 12 for raising the temperature therein, the cool air being displaced through the grill opening in the bottom of the door 22 for return to the heating unit. As warm air is drawn from the room 7 and the cool air from the room 12 is discharged into the room 7, the thermostat 32 again calls for heat and sets the heating unit in operation so as to maintain desired temperature in the rooms 7 and 11 while maintaining the desired temperature in the room 12. As soon as the set temperature is reached in the room 7, the thermostat 32 effects shutting down of the heating unit, however, the fan unit 62 may continue to operate until the temperature in the room 12 has reached the temperature as set by the thermostat 63.

When the temperature in the rooms 8, 9 and 10 fall below the temperatures set by the thermostats in those rooms, the fan units 39, 40 and 41 are set into operation to discharge heated air from the distributing chamber which is delivered directly thereto through the grill opening 56. Cool air is displaced through the louvered openings of the respective doors through the hall into the floor zone of room 7 for return to the heating unit.

It is obvious that the thermostats for the respective rooms 8, 9 and 10 may be set at different temperatures so that differential temperatures may be maintained in any one of the rooms and when that predetermined temperature is reached the circulating fan for that room is shut down to suspend discharge of heated air into the room. The other fan units may continue to operate until the temperatures in the rooms supplied thereby reach the temperatures set by the thermostats whereupon the units will shut down

until such a time that the thermostats again call for heat.

From the foregoing it is obvious that I have provided an apparatus for efficiently heating the separated rooms of small dwellings which have the principal rooms heated directly by a heating unit. It is also obvious that relatively high differential temperatures may be maintained in any of the respective rooms substantially up to the predetermined temperature to be maintained in the rooms 7 and 11 which are directly heated by the heating unit which has thermostatic controls and adequate B. t. u. output to replace the heat loss from all the rooms.

What I claim and desire to secure by Letters Patent is:

1. A heating apparatus for a dwelling having interconnected principal rooms connected with other rooms through a hall having walls common with said other rooms, doors between the rooms and said hall, louvers in lower portions of said doors, a partition extending horizontally across the hall and cooperating with a ceiling of said hall in forming an air distributing compartment in the hall above said doors, said air distributing compartment having discharge connections opening directly through said common walls into said other rooms, a heating unit having warm air discharge connections into the principal rooms and into said distributing compartment, circulating means in said discharge connections of the air distributing compartment for heated air to said other rooms to be returned when cooled to the principal rooms through the louvers in said doors by way of the hall and lower part of the principal rooms to the heating unit, means responsive to temperature in said other rooms for separately controlling actuation of said circulating means, and means for controlling actuation of the heating unit responsive to temperature in the principal rooms.

2. A heating apparatus for a dwelling having a principal room connected with other rooms through a hall having walls common with said other rooms, doors between the rooms and said hall, a partition extending horizontally across said hall and cooperating with a ceiling for said hall in forming an air distributing compartment above said doors, said air distributing compartment having discharge connections directly through said common walls with said other rooms, a heating unit having outlets into the principal room for heating air and a separate outlet discharging the heated air directly into the principal room and into said air distributing compartment with all of said outlets being interconnected within the heating unit, circulating means in each of said discharge connections for discharging the heated air from the distributing compartment directly into said other rooms for return when cooled to the principal room through said doors by the way of the hall, means for selectively controlling each circulating means for independently regulating temperatures in the respective rooms, and means for closing said discharge connections when the circulating means is not in operation.



3. A heating apparatus for a dwelling having principal rooms connected through a doorway, one of the principal rooms being connected with other rooms through a hall having walls common to said other rooms and the principal rooms, doors in said common walls to connect the hall with said other rooms and one of the principal rooms, a partition extending transversely across the hall at a point above said doors and cooperating with the ceiling of said hall in forming a warm air distributing compartment, said air distributing compartment having discharge connections through said common walls directly into said other rooms, a heating unit in the other of said principal rooms and having inlet and outlet connections with said one principal room and a discharge connection with said other principal room and a discharge connection with the air distributing compartment, and circulating means in said discharge connections between the hall and said other rooms for drawing air through said discharge connection from the heating unit into the air distributing compartment and through the air distributing compartment to said other rooms.

4. A heating apparatus for a dwelling having principal rooms connected through a doorway, one of the principal rooms being connected with other rooms through a hall having walls common to said other rooms and the principal rooms, doors in said common walls to connect the hall with said other rooms and one of the principal rooms, a partition extending transversely across the hall at a point above said doors and cooperating with the ceiling of said hall in forming a warm air distributing compartment, said air distributing compartment having discharge connections through said common walls directly into said other rooms, a heating unit in the other of said principal rooms and having inlet and outlet connections with said one principal room and discharge connections with said other principal room and a discharge connection with the air distributing compartment, circulating means in said discharge connections between the hall and said other rooms for drawing air through the discharge connection from the heating unit into the air distributing compartment and through the air distributing compartment to said other rooms, and automatic dampers in the discharge connections having the circulating means.

WILLIAM C. COLEMAN.


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