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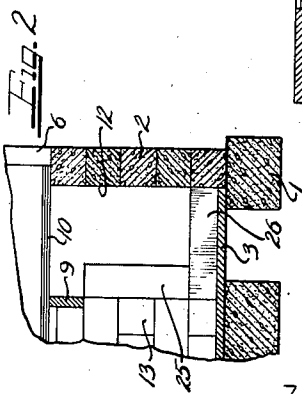
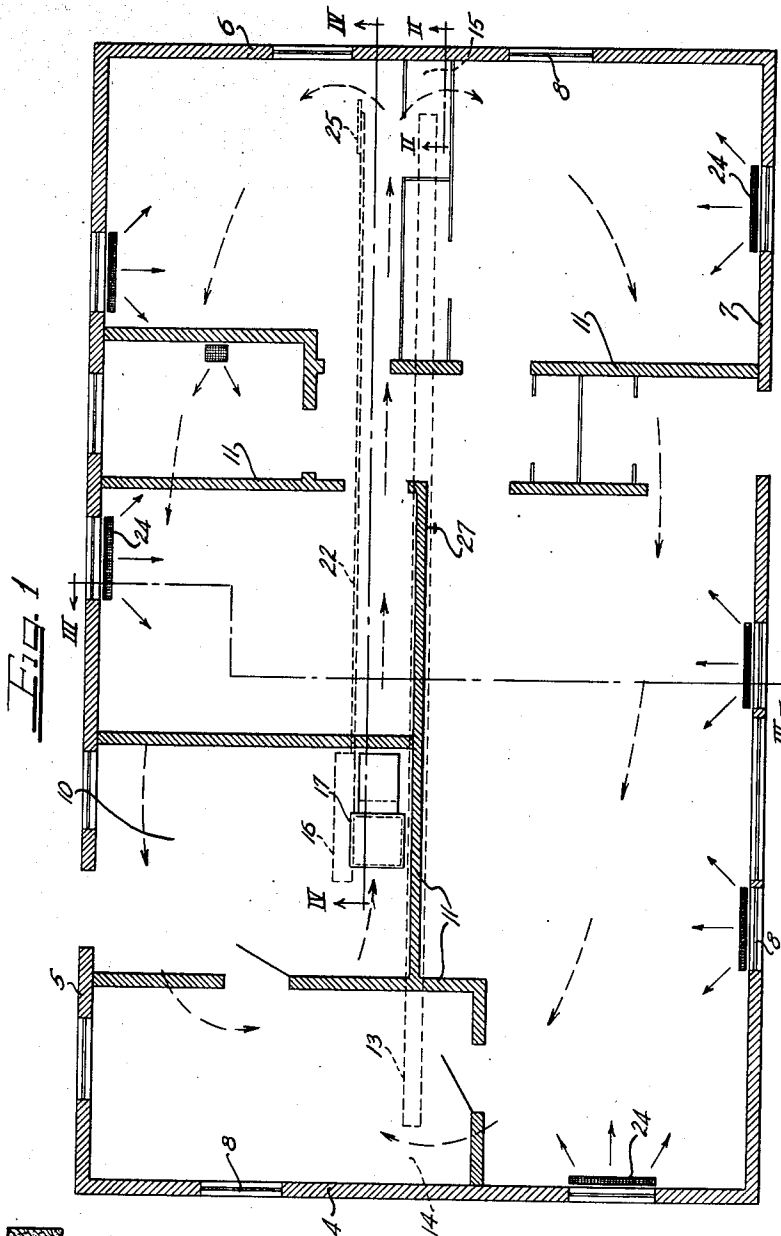
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RADIANT HEATING SYSTEM AND METHOD OF HEATING BUILDINGS

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2 SHEETS—SHEET 1



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RADIANT HEATING SYSTEM AND METHOD
OF HEATING BUILDINGS

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This invention relates to improvements in a heating system and method of heating a building, the invention being highly desirable for use in connection with one story buildings, such as dwellings, stores, and similar buildings, although the invention will have other uses and purposes as will be apparent to one skilled in the art.

By way of example and not by way of limitation, the instant invention is highly desirable for use in relatively small one-story homes having no basements, but having a crawl space beneath the floor.

Heretofore, difficulty has been experienced in adequately heating a one-story residence, especially of the so-called "ranch type" dwelling, from a single heating unit located in the utility room. That difficulty resided mainly in acquiring the adequate circulation of heated air from the heating unit, throughout the entire building. The difficulty of proper circulation was increased where the heating unit was on the same floor as the useful part of the building. In the event a sub chamber was provided underneath the floor to accommodate the heating unit, the distribution was purely hot air blowing through radiators and as such requiring too frequent cleanings of the interior. In nearly every instance of which I am aware various special ducts had to be employed to insure proper distribution of the heated air, and such ducts are objectionably expensive.

With the foregoing in mind, it is an important object of the instant invention to provide a simplified heating system for a one-story dwelling or other building that is extremely economical to install, and which operates sufficiently to heat the entire building substantially evenly.

Another feature of this invention is the provision of a combination radiation and convection hot air heating system for a building.

It is also a feature of this invention to provide an economical heating system for a small one-story building, wherein normal heating is obtained upon the radiation principle, while emergency heating may be obtained upon a combination of radiation and convection.

Still a further object of this invention is the provision of a heating system for a building in which heated air is forcibly discharged beneath the floor of the building in a confined path to a point adjacent a wall of the building, at which point the heated air is released for free circulation beneath the floor of the building and is drawn back to the heating unit for reheating from the end of a building opposite the point of discharge.

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A further feature of the invention resides in the provision of a heating system for a simple one-story building having a crawl space beneath the floor, wherein hot air is forcibly discharged into that crawl space, circulated along a plurality of paths beneath the floor, and drawn back into the heating unit for reheating and recirculation.

It is also a feature of this invention to provide a heating system for a building in which the heating unit is mounted on the same floor to be heated, but discharges hot air beneath the floor, there being registers in the floor and the heating unit having a return opening for air to be reheated below the floor and a similar opening above the floor with means to vary the amount of air returning through said openings.

Still another object of the invention resides in the provision of a simplified heating system for a single story building wherein hot air is discharged from the heating unit beneath the floor, caused to circulate beneath the floor, and returned to the heating unit, there being register openings in the floor, and means for controlling the amount of air passing through such openings.

A further object of the invention resides in the provision of a heating system for a single story building wherein hot air is discharged beneath the floor of the building, there being register openings in the floor, and means associated with the heating unit itself for varying the pressure of the hot air beneath the floor to thereby govern the amount of such hot air passing through the floor openings.

Still another object of the invention resides in the provision of a new and novel method of heating a building under the radiation principle.

It is a further object of the invention to provide a new and novel method of heating a building by a combination of radiation and convection.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic floor plan of a dwelling equipped with a heating system embodying principles of the instant invention;

Figure 2 is an enlarged fragmentary vertical sectional view taken substantially as indicated by the line II—II of Fig. 1, looking in the direction of the arrows;

Figure 3 is an enlarged fragmentary vertical sectional view taken substantially as indicated by

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the staggered section line III—III of Fig. 1; and

Figure 4 is a vertical sectional view taken substantially as indicated by the line IV—IV of Fig. 1.

As shown on the drawings:

While the illustrated embodiment of the instant invention has been shown incorporated in a building of the character of a single floor residence or dwelling having no basement, it will be understood that the invention may equally as well be employed with various types, especially those having a single story area to be heated, as will be apparent to one skilled in the art.

With reference more particularly to Figs. 3 and 4 it will be seen that the building selected for illustrative purposes includes a plurality of footings 1, upon which a foundation wall 2 is constructed. This foundation wall 2 may be of concrete blocks filled or impregnated with suitable insulation material, or any other satisfactory structure. Preferably, a sub-floor or base floor 3, which may be of insulated concrete, extends underneath the entire building.

On top of the foundation wall 2, the four walls of the building, 4, 5, 6 and 7, are constructed in any desirable fashion. These walls may be provided with suitable windows 8, where desired, and certain of the walls may be provided with entrance and exit doors as may be desired. Between the walls and also resting upon the foundation, suitable joists 9 extend, in the illustrated instance, the joists extending from the wall 5 to the wall 7. These joists support a floor 10 of any desirable construction.

Inside the building suitable partition walls 11 divide up the interior space into rooms of various sizes and character, as is usual in a dwelling.

Between the floor 10 and the sub-floor 3 a substantially sealed in crawl space 12 is provided. Substantially centrally of the building and running lengthwise thereof, is a supporting inside foundation wall 13 of the same character as the foundation wall 2. This wall 13 terminates short of the opposite ends 4 and 6 of the building so as to define therebetween passages 14 and 15, respectively, in the crawl space. Also, in that location of the building wherein the heating unit is to be disposed, a short supporting wall 16 may be provided in order to better carry the load.

As best seen in Fig. 1, a heating unit 17 may be mounted in what might be termed the utility room of the dwelling. This heating unit is preferably of a simple form, and may be fired by oil, gas, coal, or any suitable fuel. The heating unit also embodies a suitable fan to discharge hot air forcibly through a duct 18 which extends downwardly through the floor 10 as best seen in Fig. 4. The fan forcibly discharging the hot air from the heating unit obviously will draw in air to be heated, and in the present instance, the heating unit is provided with a grilled air intake opening 19 on the opposite wall from the duct 18, which opening is above the floor 10. As seen clearly in Fig. 4, the heating unit is also provided with an air intake opening 20 communicating with the crawl space below the floor. This intake opening 20 is provided with an adjustable damper 21 that may be varied from fully opened to fully closed position to govern the passage of air through the opening 20.

With reference again to Figs. 3 and 4, it will be seen that the hot air duct 18 from the heater discharges into a duct in the crawl space defined by a partition 22 and the aforesaid supporting wall 13. This duct in the crawl space preferably

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extends to a point adjacent the remote wall from the heating unit. In the illustrated instance, the duct terminates adjacent the wall 6 to leave a passage around the end of the duct opposite to the passage 15 around the end of the wall 13. Immediately behind the discharge duct 18 from the heating unit and beneath the floor, a transverse partition 23 blocks off the crawl space duct so that air discharged into this duct can only travel toward the wall 6, and that air so forcibly carried through the confined path defined by the partition 22 to the point adjacent the wall 6 can only return to the intake opening 20 of the heating unit by way of the paths defined by the dashed arrows in Fig. 1, one of these paths following entirely around the wall 13 and through the passage 14 at the opposite end of that wall from the discharge point, and the other path following around the end of the shorter wall 16. Thus, the hot air is distributed thoroughly beneath the floor 10, and may adequately heat the first story of the building by way of radiation from the floor.

During normal heating, most of the air will return to the heating unit to be reheated in the manner outlined above. Some small portion of that hot air will enter the space above the floor through a plurality of open registers 24 disposed at judicious locations. The air passing through the open registers 24 will of course return to the heating unit through the intake opening 19.

In order to insure an even distribution of heated air in the crawl space beneath the floor, a proportioning panel 25 is mounted for slidable movement at the end of the partition 22. This panel 25 has a portion extending beyond the partition as seen clearly in Fig. 4 to, in effect, lengthen the partition above a cold air stop 26. By adjusting the proportioning panel 25, the high pressure or hot air stream may be divided when discharged for free circulation in the crawl space in unequal amounts to the left and right of the crawl space conduit in accordance with the areas on each side of the conduit, or in accordance with the desires of the building occupants.

It will be understood that the floor registers 24 may be of the open type, or of the adjustable type and manually or automatically controlled. They are shown open in the illustrations because the heating system will function satisfactorily that way. It will also be understood that the adjustable damper 21 may be manually controlled, or automatically controlled by a thermostat diagrammatically indicated at 27 in Fig. 1, the system being substantially fully automatic in the event such thermostat is used.

In operation, the present system is extremely simple but highly effective. Hot air is forcibly discharged through the heating unit duct 18 into the crawl space duct, and released in the crawl space adjacent the wall 6 to follow separate return paths back to the heating unit for reheating. During the great majority of time most of the heating will be accomplished by virtue of circulation of hot air in the crawl space so as to warm the floor of the building. With the damper 21 fully opened only a small portion of the hot air will rise through the registers 24, and that merely due to the normal tendency of hot air to rise. Thus, during the great majority of the time the building is effectively heated without having blasts of hot air emanating directly into the rooms. Upon a sudden emergency, such as an unexpected and extreme drop in temperature, or in the early morning, the damper may be par-

tially or fully closed, thus establishing a pressure underneath the floor because of the fact that only a part or none of the air may return to the heating unit through the intake 20. Consequently, either a portion or all of the air must pass through the registers 24 and return to the heating unit through the intake opening 19 above the floor. Thus, a quick initial heating of the building is effected, and when the temperature has risen to a comfortable degree, the damper may be opened and thereafter the building maintains warmth by heating under the radiation principle.

It will be noted that with the instant system an extremely small and economical heating unit may be used, and there is no need to provide anything but a single duct in the floor space, with the exception of the simple form of registers 24 yet ample heating under the radiation principle is obtained with the use of hot air, and blasts of hot air through the registers may be obtained when desirable for emergency purposes. It is believed that the novel method of heating a building incorporated in this invention is sufficiently disclosed from the foregoing as to warrant no further explanation herein.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. The method of heating a building having a crawl space beneath the floor thereof, including the steps of forcing all the heated air from a source of heat through a confined path in an intermediate location in said crawl space to a point adjacent an outside wall, then dividing the air stream and discharging heated air freely into said crawl space to both sides of said confined path, and drawing at least the major portion of discharged air back to the source of heat along both sides of said confined path directly from said crawl space.

2. The method of heating a building having a space beneath the floor with a plurality of spaced openings through the floor communicating with said space and an air return opening in the floor, including the steps of forcing heated air from a source of heat along a confined path beneath the floor to a point adjacent a wall of the building, releasing said heated air for free circulation beneath said floor, drawing the major portion of air back to the heat source directly from below the floor, and drawing the remainder of the air back to the heat source from above the floor.

3. A heating system for a building having a crawl space beneath the floor and a plurality of openings through the floor, including a source of heat having a discharge opening below the floor, an intake opening above the floor, and an intake opening to receive air to be heated from below the floor, adjustable means in the last said intake opening variable from fully closed to fully open position, and a duct in said crawl space leading from the discharge opening to a point adjacent an outside wall of the building.

4. In a heating system for a building having a space beneath the floor with an inside vertical wall dividing said space into two sections and terminating short of opposed outside walls of the building to provide a connecting passage be-

tween said sections around each end of the inside wall, means substantially complementary to and spaced from said inside wall and forming therewith a duct, an opening in said floor above said duct, a heating unit above said floor having an outlet means extending through said opening for discharging heated air into said duct through one end of said duct against an outside wall of the building, another opening in said floor above the duct, said heating unit having an air return positioned over said second opening for drawing air to be heated into the other end of said duct, and partition means transverse to said duct between said openings.

5. In a heating system for a building having a space beneath the floor with an inside vertical wall dividing said space into two sections and terminating short of opposed outside walls of the building to provide a connecting passage between said sections around each end of the inside wall, means substantially complementary to and spaced from said inside wall and forming therewith a duct, an opening in said floor above said duct, a heating unit above said floor having an outlet means extending through said opening for discharging heated air into said duct through one end of said duct against an outside wall of the building, another opening in said floor above the duct, said heating unit having an air return positioned over said second opening for drawing air to be heated into the other end of said duct, partition means transverse to said duct between said openings, and panel means slidably associated with the discharge end of said duct for movement toward and away from the adjacent outside wall of the building to divide the stream of heated air in variable proportions.

6. In a heating system for a building having a space beneath the floor with an inside vertical wall dividing said space into two sections and terminating short of opposed outside walls of the building to provide a connecting passage between said sections around each end of the inside wall, means substantially complementary to and spaced from said inside wall and forming therewith a duct, an opening in said floor above said duct, a heating unit above said floor having an outlet means extending through said opening for discharging heated air into said duct through one end of said duct against an outside wall of the building, another opening in said floor above the duct, said heating unit having an air return positioned over said second opening for drawing air to be heated into the other end of said duct, partition means transverse to said duct between said openings, a series of open registers in the building floor, and damper means for controlling the flow of air through said air return to vary the amount of air passing through said registers from the space beneath the floor, said heating unit having another air return above said floor.

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