A. H. CLARKE.

INTERFLOOR HEATER.

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1,332,459. Patented Mar. 2, 1920.

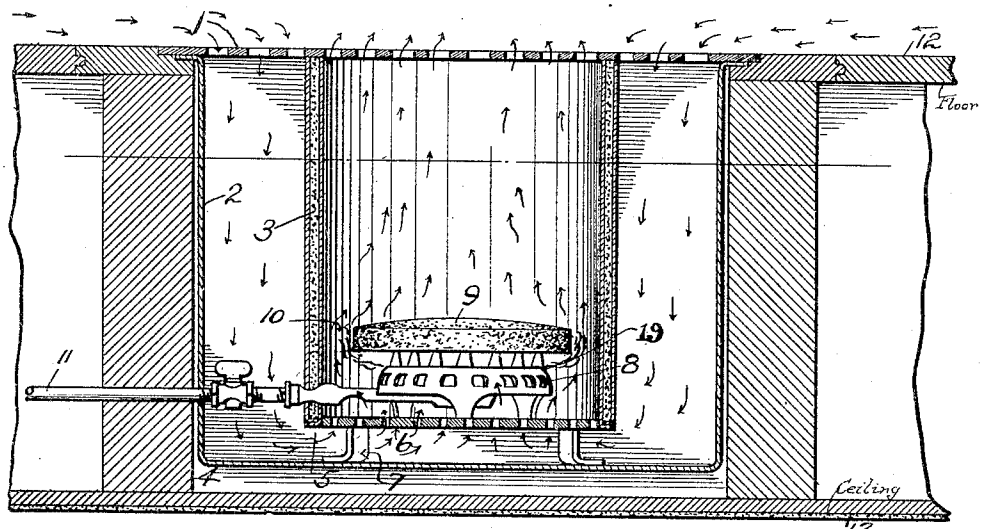


Fig. 1

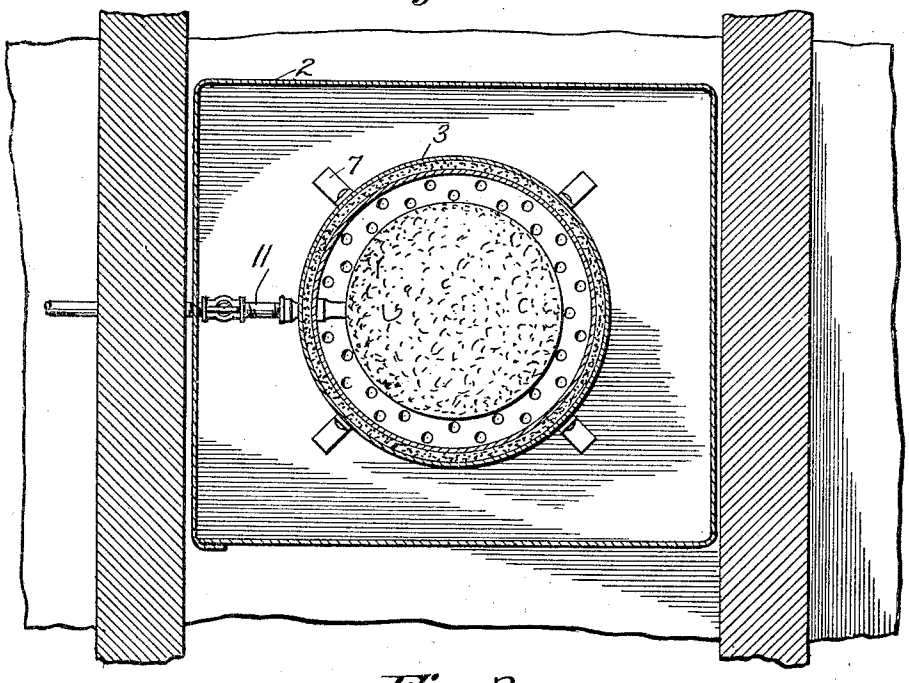


Fig. 2

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INTERFLOOR HEATER.

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To all whom it may concern:

Be it known that I, ADDISON H. CLARKE, a citizen of the United States of America, residing in Baltimore, State of Maryland, have invented certain new and useful Improvements in Interfloor Heaters, of which the following is a specification.

With a view to increased economy in installation and efficiency and economy in maintenance and operation, recent efforts at the development of domestic heating apparatus have been directed at the production of a suitable pipeless heating system, *i. e.*, one having no heat pipes, water pipes, steam pipes, radiators or the like.

A fairly satisfactory heating system has been developed having a single register or heating aperture, preferably near the center of the lower floor. Beneath this is a furnace inclosed within a double casing, the wall of the inner casing being apertured or spaced up from the floor or the bottom of the apparatus to provide a passage from the bottom of the outer casing to the bottom of the inner casing. One portion, preferably the peripheral zone of the register, is connected to the outer chamber and the other portion of the register to the inner chamber. In the operation of this system, all of the rooms to be heated must be open into the room or apartment in which the register or heating aperture is located.

According to the theory of operation, a cold air draft created by contact of the air with the cold outside walls and windows passes down the walls along the floors of the rooms, leading finally to the portion of the register which is connected to the chamber between the outside and inside casing. As the cold air draft enters this chamber, it passes to the lower part and through the aperture to the inner casing where it comes in contact with the walls of the furnace or fire box. The temperature of the air is thus raised and its specific gravity decreased by expansion so that it is forced upward by the action of the cold air in the outer chamber which has greater specific gravity. The hot air issuing from the center of the register diffuses through the building tending to go to the upper rooms where it gradually becomes cooled by contact with the walls and windows and then returns to the heater as already described.

This apparatus is however, operative only in connection with a smoke pipe which necessarily carries off a large part of the heat. It is also not operative in connection with any part of a building which is not open to permit free circulation of air to and from the heater. Often a cold air box or pipe is used.

The present invention relates to what may be termed an individual heater which is so small, inexpensive, easy to install and so inconspicuous, economical as to space and cheap to operate that it may be installed and operated in every room at a considerably less expense than that incident to the installation and operation of the so-called pipeless central heating plant of the type already referred to. Also, it is so designed as to give complete combustion of the fuel so that it produces no harmful gases or products of combustion, and no fresh air supply or cold air box or smoke pipe is necessary. This latter saves not only in construction and installation but accomplishes a large economy in the point of fuel as the products of combustion are the greatest heat carriers and when sent up chimney necessarily carry a very large part of the heat generated. The loss of heat incident to an outside cold air supply is apparent.

The device as developed may be termed a "pipeless interfloor heater". It consists of a box or casing preferably having a metallic bottom and sides covered by a register or grating set in the floor. Inside the casing, spaced well away from the walls thereof to allow a sufficient down draft space for cold air is an insulated drum or inner casing having thick walls of asbestos or other efficient, preferably non-combustible, insulating material. This drum or casing terminates at the top at the register or grating and at the bottom is spaced well above the bottom wall of the outside casing. In the inner casing or drum and near the bottom is a gas burner over which is a disk or heat reservoir, which though preferably of soapstone, may be of any suitable heat-storing material. The heat reservoir or disk is set well down toward the flame and the bottom of the drum or casing is closed by a perforated heating member directly beneath the burner and spaced a short distance from the heat reservoir. This grating or perforated bottom plate should be of metal, preferably having high heat conducting capacity. There is a gas pipe leading fuel to the burner but no smoke pipe or cold air pipe.

In operation, the cold down draft enters the outer portion of the register, passes down through the outer chamber whence it is then drawn upward through the perforations in the bottom plate and comes in contact with the flame. It spreads over the soapstone producing combustion at a high temperature with a surplus of air. The heat radiated from the soapstone or other heat reservoir is sufficient to raise the bottom plate to a high temperature even in the presence of the cold air draft so that the bottom plate serves as a pre-heater for the entire air draft, passing upward through the perforations therein. The feeding of an excess supply of hot air to the flame in the presence of the heat reservoir or soapstone disk which assists in the maintenance of the high temperature, gives absolutely complete combustion, that is, all the fuel is completely oxidized and in a condition of complete oxidation, and the products being neutral and stable are without odor or poisonous effect. The heavily insulated wall of the drum separating the cold from the hot draft, prevents transmission of heat to the outer or cold draft with consequent interference with the most efficient operation.

In the accompanying drawings I have illustrated a heating apparatus embodying the various features of my invention in the preferred form.

Figure 1 is a vertical central section; and Fig. 2 is a sectional plan.

Referring to the drawings by numerals, the apparatus consists of a register or grating 1 in the floor 12 covering a box or casing 2 located in the space between the floor 12 and the ceiling 13. This casing 2 incloses an inner drum 3 having a thick insulating wall. The drum 3 is spaced well away from the sides of the casing 2 and up from the bottom 4 of the casing, leaving a space 5 between the drum and the bottom of the casing. The drum contacts at the top with the register or grating 1. The bottom of the drum is closed by a perforated base plate 6 supported on legs 7. On the perforated plate 6 is a burner 8, fed by a gas pipe 11, and over the burner so that its surfaces are swept by the flame, is a heat absorbing and radiating member shown in the form of a soapstone disk 9, supported on projections, 19, extending upward from the burner, 8. This disk is close to the perforated plate 6 so that by radiation, it communicates a high temperature to the plate in spite of the cooling effect of the air draft. In fact, the plate serves to pre-heat the air passing through it, thus transmitting to the flame an excess supply of pre-heated air. This meets and combines with the burning gases passing in combination with the gases over the disk or heat reservoir 9 which is heated to a very high temperature. Under the circumstances, most complete combustion takes place, all the products being converted to stable oxids which are without poisonous effect and odorless.

The structure described forms a cold air passage leading downward from the outer portion of the register, 1, between the outer casing and the drum, 3, to and including the space, 7, beneath the drum, and between the bottom of the casing and the perforated heating plate, 6; and a hot air passage leading from the heating plate, 6, upward around the burner and the heating element and super heater, 9, through the drum, to the perforations in the central portion of the register or grating, 1.

The products of combustion are therefore permitted to pass with the hot air draft back into the room. In fact, the exhausted cold air is in this way completely sterilized and returned in a condition of dryness and purity which renders it highly beneficial, the natural and unpreventable influx of fresh air from the outside furnishing under ordinary conditions of winter weather an amply sufficient supply of new oxygen to replace that consumed.

The insulating wall of the drum 3 which separates the hot from the cold air draft is of great importance in that it prevents communication of the temperature of the hot up draft to the cold down draft or air current, the difference in temperature and consequent difference in specific gravity being in fact the motive power which renders the system operative and if this difference is reduced, the motive power and the resulting circulation are necessarily correspondingly reduced. In addition to this, the perforated pre-heating plate 6 in combination with the heat reservoir or soapstone disk 9, spaced only a short distance from the pre-heating plate, and the gas burner between these two members, constitute a novel feature or combination of features of great importance; the pre-heated air being combined in excess with the burning gases at a high temperature, produces perfect combustion so that the resulting hot air draft being drawn through the narrow space 10 in close contact with the heat reservoir 9 which attains an extremely high temperature, is given off at a very high temperature and in a state of actual purity in that all the fuel is completely burned to stable oxygen compounds so that the air is not contaminated with any active, odorous or poisonous gases.

I have thus described my invention specifically and in detail in order that its nature and operation may be fully understood; however, the specific terms herein are used descriptively rather than in their limiting sense and the scope of the invention is defined in the claim:

An interfloor heater of the character de-

scribed, comprising an outer casing having side walls and a bottom wall and open at the top, an inner drum with an open top and spaced from the sides and bottom of the casing and having an insulated wall, and a bottom formed of a perforated heating plate, a burner mounted above and near said perforated plate, a heat absorbing and radiating member mounted over and spaced from said burner, and a grating extending over the top of the casing and drum, the vertical space about the drum serving as a down draft passageway, and the drum serving as a hot air passageway.

Signed by me at Baltimore, Maryland, this 23 day of January, 1918.

ADDISON H. CLARKE.

Witnesses:
ZELLA KUHN,
ALICE G. DONEGAN.