April 1, 1924. 1,488,699

H. W. NEAL

HEAT RADIATOR DEMONSTRATOR

Filed Dec. 5, 1923

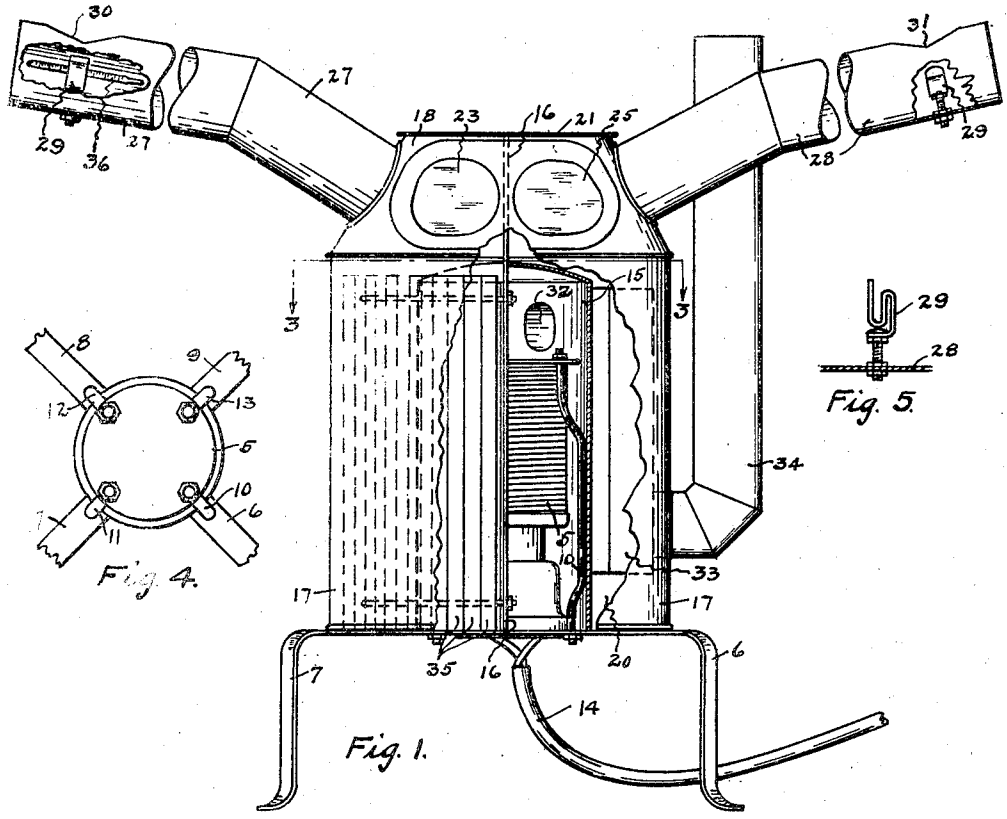


Fig. 1.

Fig. 4.

Fig. 5.

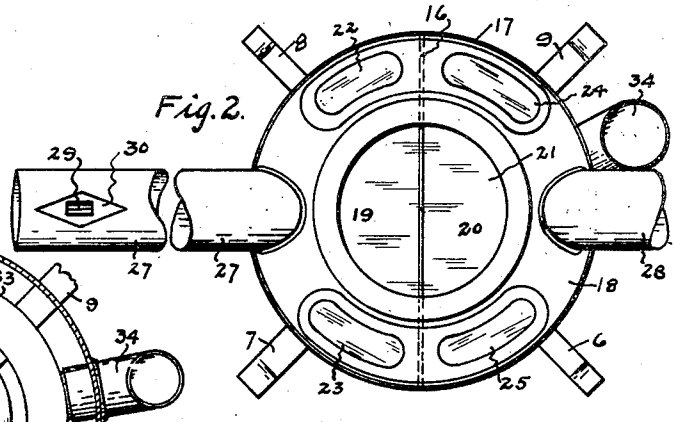


Fig. 2.

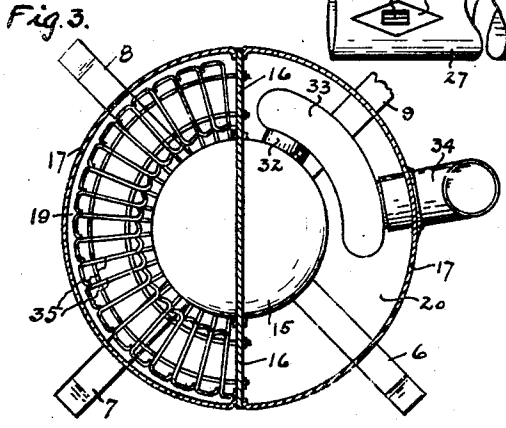


Fig. 3.

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UNITED STATES PATENT OFFICE.

HARRY W. NEAL, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO HALL-NEAL FURNACE COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF INDIANA.

HEAT-RADIATOR DEMONSTRATOR.

Application filed December 5, 1923. Serial No. 678,763.

To all whom it may concern:

Be it known that I, HARRY W. NEAL, a citizen of the United States, residing at Indianapolis, in the county of Marion and the State of Indiana, have invented a new and useful Heat-Radiator Demonstrator, of which the following is a specification.

My invention relates to improvements in means for demonstrating the difference in heat radiation from various radiating surfaces, and it is the object of my invention to provide such means in a small compact form that is easily portable for the primary purpose of making convincing demonstrations of the difference in heat radiation in various types of hot air furnaces. It is my further object to provide such means in a form that admits of ready inspection of its internal construction and in which a convenient source of heat is supplied, with means for determining the difference in radiation of heat from the varying radiating surfaces.

There are many variant types of heating furnaces offered to the public, but the public has had no actual means of determining the relative merits of such furnaces as heating devices other than from installations in varying types of buildings, under which conditions many variations enter so as to make actual comparisons of the heating ability a matter of conjecture. With my invention, the varying types of furnaces may be assembled in minature to operate under identical conditions and the merits of each type convincingly shown by actual direct comparison.

I accomplish these and other objects as may hereinafter appear by the means as shown in the accompanying drawing, in which—

Fig. 1 is an elevation of my heat radiator demonstrator, with a fragment of the outer housing and a section of the inner combustion chamber wall removed to indicate the inner construction more clearly; Fig. 2, a top plan view of the heat radiator demonstrator; Fig. 3, a section taken on the line 3—3 in Fig. 1; Fig. 4, a top plan view of the heating element with fragments of the supporting legs removed; and Fig. 5, an end view of the thermometer support as used in the discharging conduits.

Like characters of reference indicate like parts throughout the several views.

I mount an electrically operated heating element 5, of common and well known construction, on the center of a base formed by joining the four legs 6, 7, 8, and 9 at the center, and secure the heating element 5 to the base legs by the four outwardly bent bolts 10, 11, 12, and 13. The heating element 5 is put in a suitable electrical circuit by means of the conductors in the cable 14.

I form a cylindrical combustion chamber 15, open at the bottom and closed at the top and having an internal diameter such that the chamber 15 will just slip down over the four bolts 10, 11, 12, and 13 and be positioned thereby centrally on the base legs 6, 7, 8, and 9. To the outside of the combustion chamber 15, on diametrically opposed elements of the cylindrical wall and the corresponding diameter of the top, I secure a dividing partition 16, which extends outwardly and is secured to the walls of the housing 17 so as to locate the housing 17 to contain the chamber 15 centrally within the housing. The housing 17 is entirely open at the lower end and rests upon the base legs 6, 7, 8, and 9. The upper end of the housing is permanently enclosed by the top 18 having the shape of a frustrum of a cone. The partition 16 extends upwardly into the top 18 and makes a tight fit against the sides and top, such that the interior of the entire enclosure bounded by the outer housing 17, the top 18, and the combustion chamber 15 is effectually divided into the radiating chamber 19, and a second radiating chamber 20 of equal volume.

The top 18 is surmounted by a window 21 of some suitable transparent and heat proof material as mica or the like, to afford a view into either of the two chambers. Mounted on the conical side of the top 18, are the windows of like material, 22, and 23, giving view into the chamber 19, and the similar windows 24 and 25 giving view into the chamber 20.

Discharging from the conical wall of the top 18 from the chamber 19, is the hot air conduit 27 extending outwardly and slightly upwardly to an appreciable lateral distance. A similar conduit 28 discharges in like manner from the chamber 20. Near the outer ends of the conduits are secured the clamps 29, Figs. 1, 2, and 5, for the purpose of holding thermometers 36, and the open-

ings 30 and 31 are cut in the conduits to permit observation of the thermometers 36, as shown in Fig. 1, in conduit 27.

The combustion chamber 15 discharges near its upper end through the pipe 32 into the upper portion of the radiating drum 33 located in the chamber 20. The drum 33 in turn discharges from near its bottom on the opposite side into a smoke pipe 34 extending outwardly through the housing 17 and thence upwardly to a point substantially above the top 18.

Within the chamber 19, the radiating fins 35 extend radially at close intervals entirely around the half circumference of the combustion chamber 15 lying within the chamber 19 and form a plurality of flues open at the bottom and top. This construction embodied in chamber 19 represents in miniature one form of a heating furnace, while the construction embodied in the chamber 20 represents a common and well known type of hot air furnace construction having the usual heating drum in addition to the combustion chamber.

In making a demonstration, I allow an electric current to flow through the heating element 5 to produce a comparatively intense heat. The heated air within the combustion chamber 15 will rise and escape through the pipe 32 into the drum 33, down through the drum and out and up through the smoke pipe 34 into the open. Such action represents the usual action employed in hot air furnaces in effecting a large radiating surface heated by the flow of hot gases from the combustion chamber. The air in the chamber 20 between the outer housing 17 and the combustion chamber 15 will become heated and rise, such action drawing air from without up through the open bottom across the heated surfaces within the chamber 20 and creating a flow of warm air discharging through the conduit 28, which action would correspond to the flow of hot air to the registers within a building in the usual furnace installation.

At the same time the foregoing flow of warm air is taking place from the chamber 20, the heat from the combustion chamber 15 is distributed by the fins 35 in the chamber 19 and air enters the chamber from the opening below, passes up through the flues formed between the fins 35, becomes heated, and discharges through the conduit 27. The readings of the thermometers 36 in the conduits 27 and 28 will indicate the comparative radiating efficiencies of the two constructions as described. In practice, I find that the air discharging from the chamber 19 from the fin construction to be several degrees higher in temperature than that of the air discharged from chamber 20. Inasmuch as the source of heat is common to both chambers of equal volume and of symmetrical shape, the difference in temperature can be due only to the ability of the one construction to radiate more heat than the other.

When the demonstration is completed, the conduits 27 and 28, and the smoke pipe 34 may be removed from the housing, and the housing and its associated parts removed from the base legs and the heating element all for the purpose of allowing the demonstrator to be reduced to a form that may be placed in some form of sample case to be readily carried from place to place.

Having fully described my invention in the form now best known to me, I desire to point out that the precise structure as set forth may be varied without departing from the spirit of the invention and I therefore do not desire to be limited to the form as shown any more than may be required by the following claims.

I claim:

1. In a heat radiating demonstrating device, a plurality of radiating chambers having a common source of heat, conduits discharging from said chambers, and means of indicating temperatures of air discharged by said conduits.

2. In a heat radiating demonstrating device, a plurality of radiating chambers having variant radiating surfaces within the chambers; means of producing a supply of heat common to all of said chambers; a conduit discharging from each of said chambers; and means within each of said conduits of determining the temperature of the air passing through the conduits.

3. In a heat radiating demonstrating device, a plurality of radiating chambers within a common housing, each chamber having within it a variant radiating surface; means of producing a supply of heat common to each of said chambers and said means located centrally of the chambers; a conduit discharging upwardly and outwardly from each of said chambers; and means within each of said conduits of determining the temperature of the discharging air.

4. In a heat radiating demonstrating device, an outer housing; an inner central combustion chamber; partitions within the housing defining a plurality of radiating chambers; a plurality of heat radiating surfaces within the radiating chambers; conduits discharging from the radiating chambers; means of determining the temperature within the conduits; and means of producing heat within the combustion chamber.

5. In a heat radiating demonstrating device, a supporting base; an outer housing; a plurality of inspection windows in the outer housing; an inner central combustion chamber; a plurality of heat radiating chambers having equal volume and formed within the

said housing and without the combustion chamber; a plurality of heat radiating surfaces within each of said radiating chambers; a conduit discharging from each of said radiating chambers; means within each of said conduits of determining the temperature; and means of discharge from the combustion chamber through one of the radiating chambers to a smoke pipe without the housing.

6. In a heat radiating demonstrating device, a supporting base; a heating element secured thereto; a combustion chamber; means of positioning the combustion chamber centrally of the heating element; an outer housing resting on said base; a plurality of inspection windows in said housing; a plurality of heat radiating chambers having equal volume formed within the said housing by partitions extending between the combustion chamber and the outer housing; a plurality of heat radiating surfaces within each of said heat radiating chambers; a detachable conduit discharging from each of said heat radiating chambers; means of determining the temperature within each of said conduits; and means of discharge from the combustion chamber through one of said radiating chambers to a detachable smoke pipe without the said housing.

7. In a heat radiating demonstrating device, in combination, a supporting base; a heating element secured thereto; a cylindrical combustion chamber; means of detachably positioning the combustion chamber centrally of the heating element; an outer cylindrical housing resting on said base; a plurality of windows in said housing; a diametrical partition within said housing dividing two heat radiating chambers of equal volume within said housing and without said combustion chambers; a plurality of radiating surfaces in one of said heat radiating chambers consisting of a plurality of radial fins in contact with the combustion chamber; a radiating drum in the other of said radiating chambers; means of discharge from the combustion chamber into the drum; a detachable smoke pipe without the said housing; means of discharge from said drum into said smoke pipe; a detachable conduit discharging from each of the said radiating chambers; and means of determining the temperature within each of the said conduits.

Signed this the 30th day of November, 1923, at Indianapolis, county of Marion, and State of Indiana.

HARRY W. NEAL.