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2,324,540

FORCED AIR HEATER

Filed Sept. 13, 1941

2 Sheets-Sheet 1

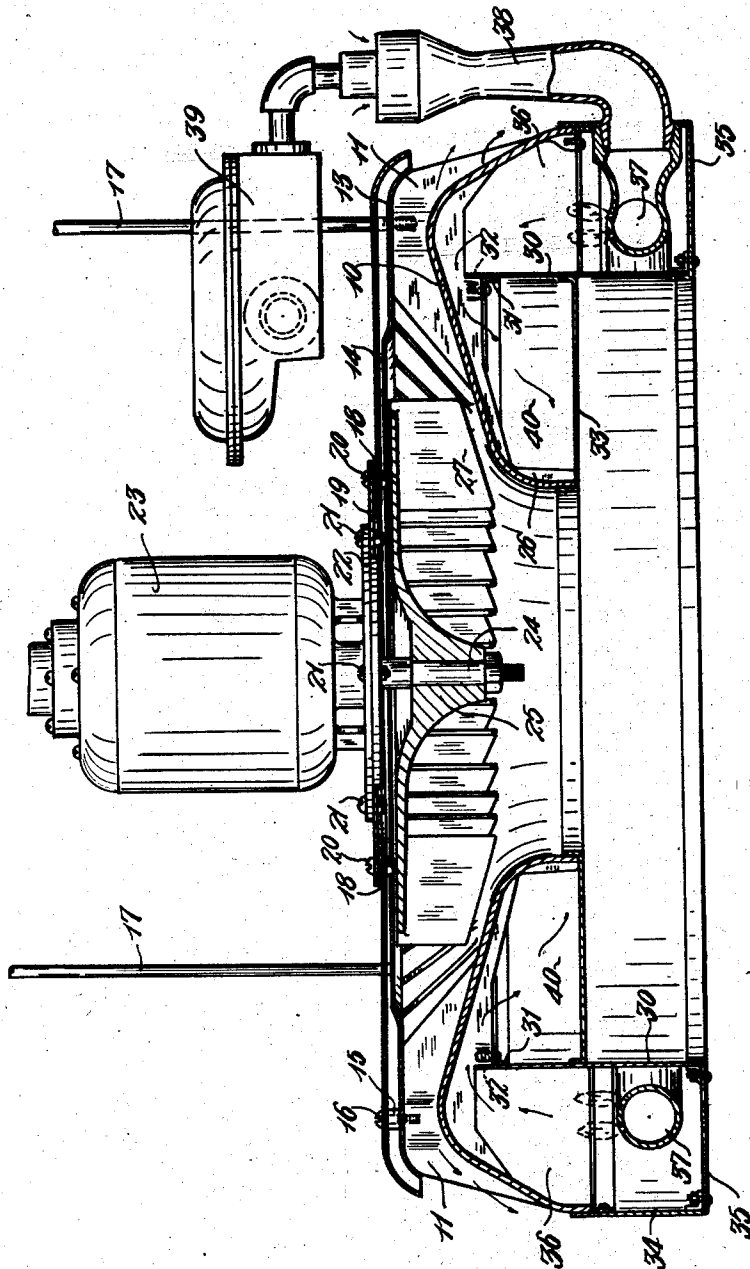


FIG. 1

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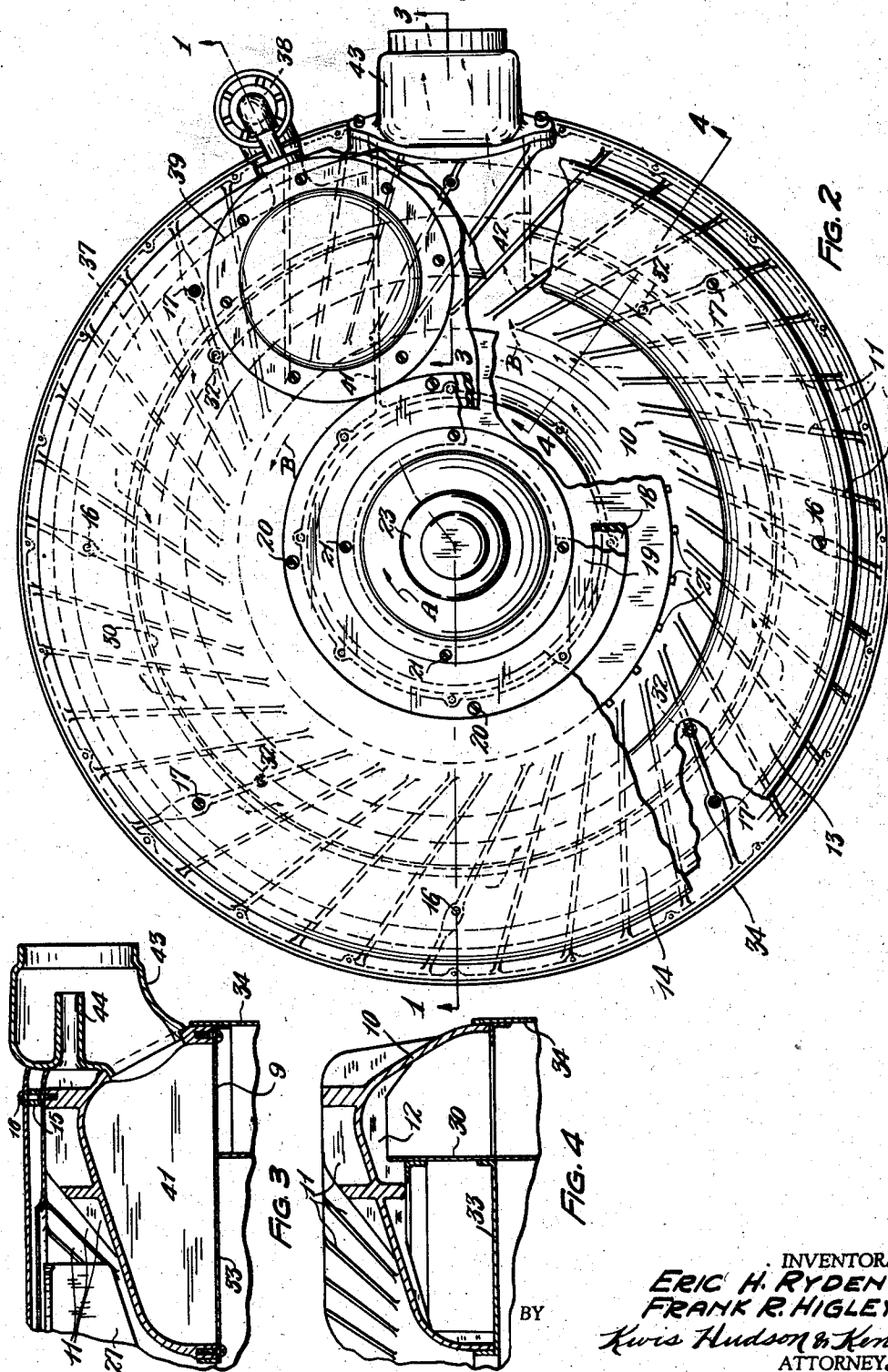
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FORCED AIR HEATER

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4 Claims. (Cl. 126—110)

This invention relates to improvements in forced air heaters, and has reference particularly to heaters that are designed to be hung from the ceiling of a room and to discharge heated air in a radial or downwardly radial direction.

One of the objects of the invention is the provision of a heater of the type indicated which shall be compact, of low cost, and highly efficient in operation.

Another object is the provision of a heater of the character stated which shall be compact and pleasing in appearance and yet adapted to utilize an annular burner of relatively large size.

A further object is the provision of means for inducing a draft for exhausting the products of combustion in a heater of this character.

Other objects and features of novelty will appear as we proceed with the description of that embodiment of the invention which, for the purposes of the present application, we have illustrated in the accompanying drawings, in which

Fig. 1 is a vertical central sectional view of a heater embodying the invention, the view being taken substantially on the line 1—1 of Fig. 2.

Fig. 2 is a plan view of the same, some of the parts being broken away in order to more clearly illustrate the invention, and

Figs. 3 and 4 are detail sectional views, taken substantially on the lines 3—3 and 4—4, respectively, of Fig. 2.

An important element of the present construction is an iron casting 10 comprising an annular wall provided on its upper side with vanes 11 and on its lower side with fins 12. The lower side of the casting and the fins 12 absorb heat from combustion gases, while the upper side and the vanes 11 transfer this heat to centrifugally moving air.

The vanes 11 are surmounted by an annular plate 13 having a slight upturn at its inner edge and a downwardly curved rim shaped to conform to the curvature of the vanes 11. A second and somewhat wider annular plate 14 is mounted above plate 13, being spaced from the latter plate by a plurality of washers 15 which surround screws 16 that extend through holes in the plates 13 and 14 and are threaded into tapped holes in certain of the vanes 11. The heater is designed to be supported from above by means of rods 17 which extend through suitable holes in the plates 13 and 14 and are threaded into tapped holes in certain of the vanes 11.

The plate 14 may carry a soft rubber ring 18 upon which is supported the outer edge of an annular metal plate 19, these two plates being

secured together with the ring 18 interposed between them by a series of small bolts 20. The inner edge of plate 19 is attached by means of bolts 21 to a flange 22 that is integral with the housing of an electric motor 23 having a depending shaft 24 upon which is mounted the rotor 25 of a centrifugal blower which turns in the direction of arrow A, Fig. 2. Air to be treated enters axially from below through the throat 26 of the casting 10, and is forced outwardly in directions conforming generally to the planes of the vanes 11 through a diffuser comprising the upper surface of the casting 10 and the lower surface of the plate 13, the vanes 11 being positioned substantially in the stream lines of air flow so as to interpose a minimum of friction. The blades 27 of the rotor taper outwardly somewhat, and their lower edges are substantially parallel with the upper surface of the inner part of casting 10.

From the lower side of the casting 10 there is suspended a combustion chamber and a hot gas conductor. As illustrated herein the sheet metal work for these parts comprises a cylindrical element 30 to which is welded or otherwise secured a series of angle brackets 31. Screws 32 project through these brackets into tapped holes in certain of the fins 12. An annular plate 33 with upturned inner and outer flanges is suitably secured to the throat 26 of the casting 10 and to the cylindrical sheet metal element 30. From the outer downturned edge of the casting 10 there is supported a further cylindrical element 34, and an annular plate 35 is secured to the lower edges of the two elements 30 and 34. The chamber 36 provided by the elements 30, 34 and 35 and the outer downturned wall of casting 10 is utilized as a combustion chamber, and in it is mounted a substantially annular gas burner 37 which receives a gas and air mixture through a goose neck 38, to the upper end of which is connected a gas valve 39, of any desired character, a diaphragm valve being illustrated. A valve of this kind is necessarily somewhat bulky, but in this case it occupies space which would otherwise be unoccupied, that is space above the plate 14 necessitated by the vertical dimension of the motor 23.

The chamber 40 provided within the cylindrical element 30, the plate 33 and the casting 10 constitutes a substantially annular conductor for hot gases. These gases flow upwardly from burner 37 through combustion chamber 35, wipe against the wall of casting 10 and then inwardly along the fins 12 over the top of cylindrical element 30 and into conductor 40. A vertical wall 41,

which may be formed as an integral part of casting 10, blocks the conductor 40 and the upper part of the annular combustion chamber 36 at one point. The hot gases flow in the direction of the arrows B through the conductor around the casting and out to the flue between the wall 41 and a second wall 42 which blocks off the upper part of the combustion chamber only. The upper part is separated from the lower part between walls 41 and 42 by a floor member 9. The gases are discharged through a flue connection 43, Fig. 3, which embodies a tubular element or nozzle 44 communicating with the diffuser. Air from the blower discharged through the nozzle 44 induces suction which causes the hot gases to flow through the conductor 40 and out to the flue, this action being particularly important until the flue heats up to thereby induce a natural draft. The fins 12 which preferably are of the same number as the vanes 11 and are in the same planes with those vanes, guide the hot gases from the combustion chamber 36 into the gas conductor 40 in approximately the directions in which the gases would flow were the vanes omitted. Hence they do not interpose any considerable amount of friction. They are omitted in the passage between the walls 41 and 42 so that there may not be any interference with the travel of the outgoing gases.

The casting 10, it will be observed, forms a common cover for the combustion chamber 36 and the gas conductor 40. The hot gases from the burner at all points around the apparatus flow upwardly and against the casting wall and then inwardly and downwardly into the conductor 40. All of these gases after entering the conductor unite to form a stream flowing in a circular path through the conductor and out to the flue through connection 43 as previously stated. Air to be heated flows upwardly at the center of the apparatus into the blower and out through the diffuser formed by the annular casting 10 and the annular plate 13, leaving the heater in more or less radial directions but with a downward tendency due to the downward slope of the outer portion of casting 10 assisted by the downwardly curved rims of plates 13 and 14. The two slopes of the casting wall, together with the plate 13, produce a venturi effect which assists the action of the diffuser.

In the foregoing description we have necessarily gone somewhat into detail in order to explain fully the particular embodiments of the invention herein illustrated, but we desire it to be understood that such detail disclosures are not to be construed as amounting to limitations, except as they may be included in the appended claims.

Having thus described our invention, we claim:

1. In a forced air heater, an annular combustion chamber, an annular conductor for hot gases concentric with and adjacent to said combustion chamber, a common cover for said combustion chamber and conductor leaving an upper annular passage between them, said conductor having an exit for combustion gases, means on the upper side of the cover and cooperating therewith to provide an air diffuser discharging peripherally, and a centrifugal blower rotor mounted concentric with said combustion chamber and conductor to receive air axially and discharge it directly into said diffuser in contact with the upper surface of said cover.

2. In a forced air heater, an annular combustion chamber, an annular gas burner therein, an annular conductor for hot gases concentric with and adjacent to said combustion chamber, said conductor and combustion chamber having a common side wall and a common cover, the cover being spaced from the top of the side wall to provide an annular passage between them, means on the upper side of the cover and cooperating therewith to provide an air diffuser discharging peripherally, and a centrifugal blower rotor mounted concentric with said combustion chamber and conductor to receive air axially and discharge it directly into said diffuser in contact with the upper surface of said cover.

3. In a forced air heater, an annular hot gas conductor, means arranged adjacent said conductor to provide an air diffuser passage exposed on one side to a face of said conductor and discharging peripherally, a centrifugal blower rotor mounted concentric with said conductor to receive air axially and discharge it directly into said diffuser in contact with said conductor face, said conductor having an exit opening, and an air tube arranged concentric with said exit opening, a portion of the air discharged by said rotor passing through said tube, thereby inducing ejection of the exhaust gases.

4. In a forced air heater, a combustion chamber, an annular conductor for hot gases connected with said combustion chamber, said conductor having an exit for combustion gases, means on the upper side of the conductor and cooperating therewith to form a diffuser discharging peripherally, a centrifugal blower coaxial with said diffuser arranged within the latter adapted to force air over the conductor through said diffuser, and means for causing a portion of said discharged air to have ejector effect upon the exhaust gases passing out through said exit.

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