

July 9, 1929.

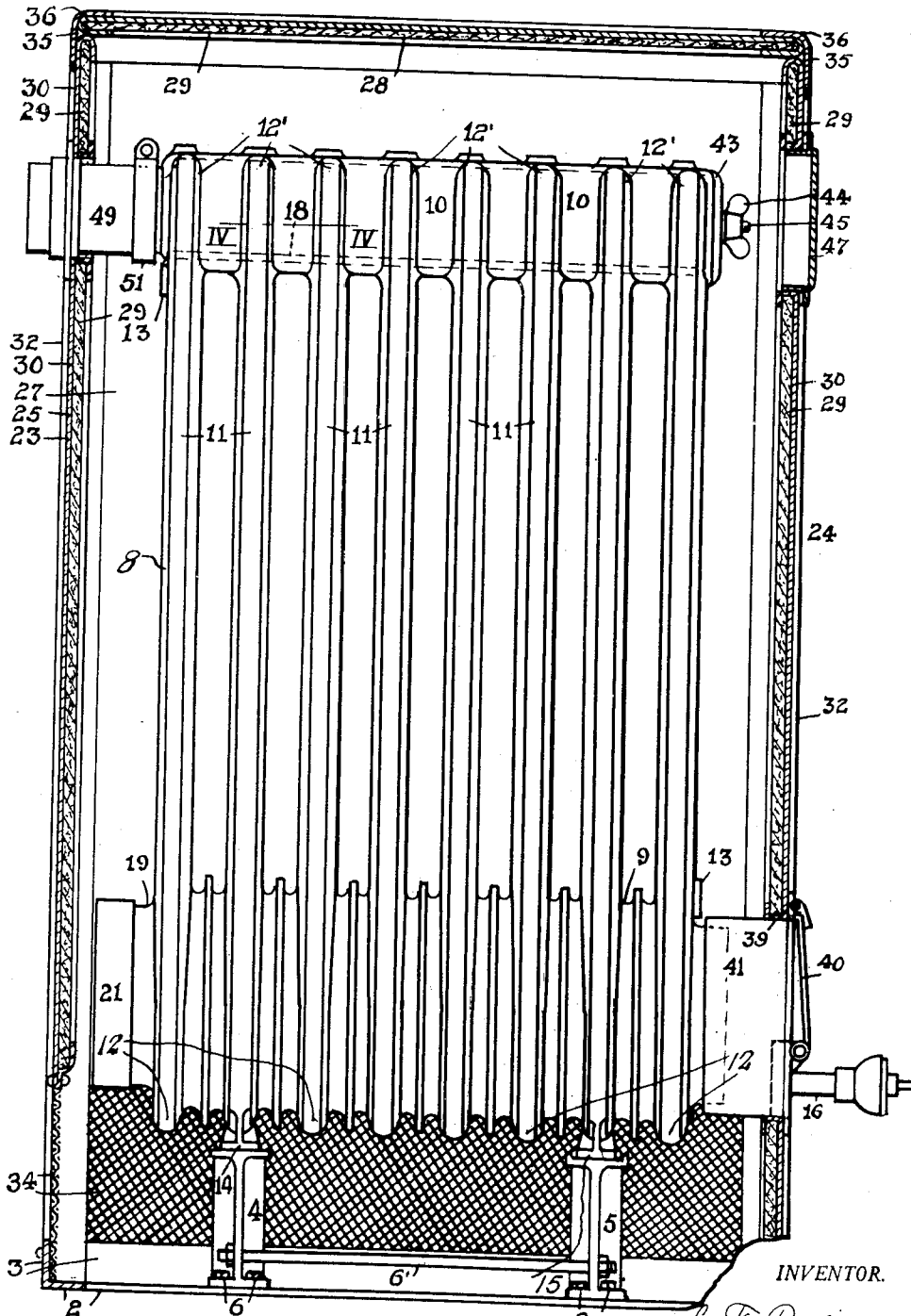
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GAS HEATED HOT AIR FURNACE

Filed Nov. 16, 1926

3 Sheets-Sheet 1



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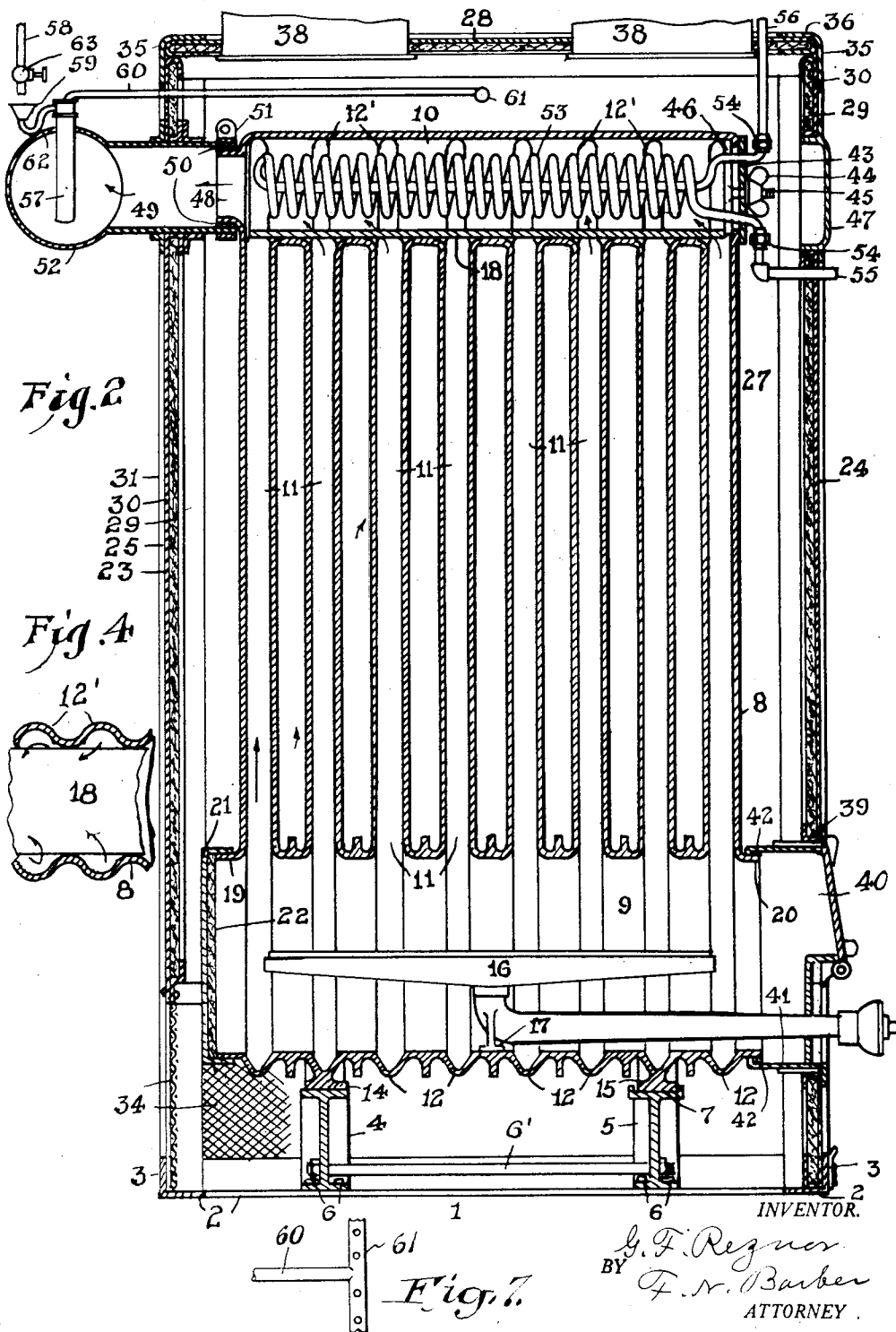
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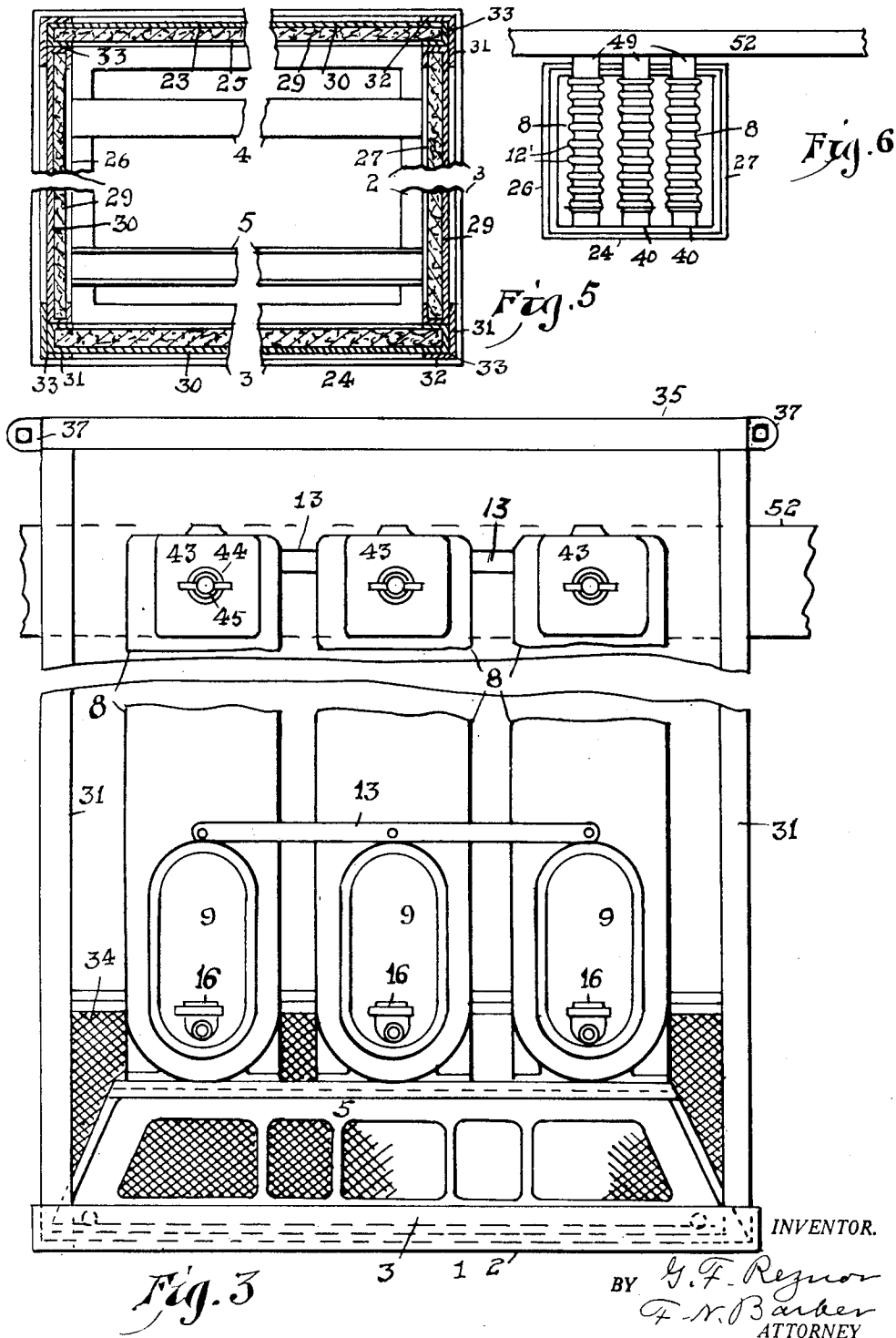
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UNITED STATES PATENT OFFICE.

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GAS-HEATED HOT-AIR FURNACE.

Application filed November 16, 1926. Serial No. 148,872.

My invention relates to hot-air furnaces preferably heated by gas.

The objects of this invention are to provide a hot-air furnace composed of a selected number of integral cast-iron units assembled into a heat-radiating structure made gas-tight without the use of cement; to provide for the said structure a casing composed principally of readily assembled and disassembled panels of novel construction; to provide means permitting the said structure freely to expand and contract with respect to its parts, its support, and the said casing; to provide suitable choke plates in the said units to prevent too free escape of hot gases into the chimney flue or waste-gas pipes; and to provide suitable devices for heating water for household or other uses and for moistening the hot air delivered from the casing to pipes leading to one or more rooms of a dwelling or other structure to be warmed. Other objects appear hereinafter.

Referring to the accompanying drawings, Fig. 1 is a vertical section of the furnace casing and a side elevation of one of the heat-radiating units. Fig. 2, a vertical section through both the casing and one of the heat-radiating units; Fig. 3, a front view of the furnace with the front panel of the casing and the parts carried thereby removed; Fig. 4, a section on the line IV—IV on Fig. 1; Fig. 5, a horizontal section of the casing; and Fig. 6 a diagrammatic view showing the connection of my heating units with the pipe leading to a chimney.

On the drawings, 1 designates a base composed of metal angle bars having rectangular or L-shaped cross-sections and united end to end into rectangular shape, wherein the horizontal members 2 constitute the bottom support for the entire furnace, and the vertical members 3 form a rectangular enclosing wall at the bottom of the furnace.

Two horizontal metal rails or rests 4 and 5 tied together by rods 6' are seated on opposite members 2 to which they are preferably attached by bolts or rivets 6, the top of the rail 4 being preferably plane and the top of the rail 5 having a longitudinal slot 7.

The heating units 8 are identical and only one will be described. They are each made of cast iron in a single piece. Each unit is described as follows: 9 is a horizontal oval combustion or primary chamber with the longer axis vertical. 10 is a horizontal vent

chamber and parallel therewith. The chambers 9 and 10 are connected to the vertical flues 11 which communicate with both chambers. The flues 11 are made of rather thin material and extend horizontally beyond the chambers 9 and 10 in both directions. Where the flues join the chamber 9, the latter is provided with outwardly hollow ribs 12 continuous with the edges of the flues, the ribs extending along both sides of the chamber and thence continuously across the bottom thereof. The flues 11 are wider than the diameter of the chamber 10 and are continued as ribs 12' along the sides of that chamber, and they may continue over the top of the chamber 10, if desired. The flues 11 are rather narrow and are spaced rather closely along the lengths of the chambers 9 and 10.

Any desired number of units 8 may be arranged side by side and connected in a rigid series by the tie-plates or bars 13. Each unit is provided with feet 14 and 15, the former seated on the rail 4 and the latter in the groove 7. The latter holds the units from bodily movement across the rails and the smooth top of the latter permits unobstructed contraction and expansion of the units lengthwise of the chambers 9 and 10 and transversely of the rails.

A burner 16 shown in the present case as a gas burner is placed in the combustion chamber 9 of each unit 8, the burners having feet 17 seated in the bottoms of the chambers 9.

A horizontal choke or retard plate 18 comprising a rectangular plate of metal is placed within each vent chamber 10, shown in Figs. 1, 2 and 4, and covers the central part of the flues 11 and prevents too free or rapid escape of the hot gases until most of the heat has been given up. It will be understood that, in case a plurality of units 8 are used in a furnace, each chamber 10 will have a choke plate 18.

The ends of each combustion chamber are extended beyond the flues to form the flanges 19 and 20. Each rear flange 19 is covered by a metal cap 21 packed gas-tight by an asbestos gasket 22 clamped between the flange 19 and the inner face of the cap.

All the furnace structure described is surrounded by a casing or jacket 23, comprising the front panel 24, the rear panel 25, the side panels 26 and 27, and the top panel 28. Each panel preferably comprises a rectangular sheet 29 of asbestos covered on its outer faces with a rectangular metal sheet or cover 30

having all its edges turned over the edges of the sheets 29 forming recesses which retain the sheets 29 and 30 in assembled condition and protect the edges of the asbestos sheet.

Each front and rear panel has welded or otherwise secured to their outer faces near their lateral edges the corner L-shaped angle strips 31. Those members of the angle strips 31 which are secured to the panels extend outwardly beyond the panel and parallel therewith to a distance equal to the thickness of a panel, at which distance the angle strips are turned at a right angle away from the outer face of the panel to form the angle member 32 whereby recesses 33 are formed to receive the lateral edges of the panels. Instead of having two angle strips 31 attached to two panels out of the four vertical panels, each of the latter could have a single angle strip 31 to form a groove 33 for the reception of the edge of the adjacent panel.

The front panel 24 rests on the member 2 of the base 1 and just within the adjacent member 3 thereof. The front and side panels have their angle strips 31 resting in the corners of the base 1 and on the members 2. The rear and side panels as described are shown as not reaching the base, but are continued down to the base 1 by small mesh wire screens 34 attached to the bottoms of the said panels and to the angle strips or members 31 and the base members 3. These screens provide openings for the admission to the casing of air to be heated. In some cases one or two panels only will have screens. The screens while not absolutely essential are strongly recommended, except in cases where air to be cooled is conducted into the casing through pipes, in which cases the panels will extend the full height of the casing and be provided with openings with which the said pipes will register in the usual manner.

The panel 28 rests on the upper ends of the four panels 24, 25, 26, and 27. A sheet metal binding frame 35, L-shaped in cross-section, has one member 36 lying on the top of the panel 28 close to its edges and the other member engaging its edges and the outer faces of the panels beneath. The binding frame is made of two sections having their adjacent ends drawn toward each other by bolts 37 so as to clamp the panels into a rigid unit.

38 are flues for conveying hot air from the casing.

The front panel has openings 39 (only one shown) each to receive a door frame 40, which overlaps the front of the panel around the opening 39 therefor and has an inner projection or extension 41 slipped over the flange 20, a ring of packing 42 being between the extension and the flange, which provides a slip joint which permits the independent expansion and contraction of the unit and the door frame without bulging the casing.

The front ends of the vent chambers are

closed by the plates or doors 43, which are clamped to the said front ends by the nuts 44 working on the bolts 45 secured to the bars or plates 46 prevented from accidental displacement by their engagement with the walls of the end ribs 12'. The doors 43 on all the units 8 are opposite an opening in the front panel, this opening being normally closed by the door 47 held in place by any suitable means.

Each vent chamber 10 has a rear extension 48 over which is slipped a flue 49 leading rearwardly through the panel 25. A ring 50 of asbestos packing is placed between the extension 48 and the flue 49 and a clamping ring 51 is placed on the flue 49 and opposite the ring 50 to make a tight joint. The flues 49 are connected to an off-take or waste-gas flue or manifold 52 which should be connected to a chimney.

For the purpose of heating water for household or other uses, I provide at least one of the vent chambers with a coil 53 of copper pipe having its inlet and outlet passed through the door 43, the said inlet and outlet having just outside the door 43 the union joints 54 whereby the coil can be disconnected from the water feed and service pipes 55 and 56, whereby the coil together with the door 43 may be removed from the casing or inserted in its proper place, the door 47 having been first removed.

In order to moisten the hot air delivered from the casing 23 to living rooms by way of the flues 38, I provide a humidifier comprising a brass or copper pipe 57 set in the hot gas flue 52. Water from the supply pipe 58 drips into the funnel 59 whence it flows down into the pipe 57 where it is converted into steam which is carried off by the pipe 60 leading from the top of the pipe 57 to the interior of the casing 23 above the heating units 8, where the steam is discharged from the distributing pipe 61 connected to the end of the pipe 60. The water from the funnel flows to the pipe 57 through the trap or U-shaped connection 62 so as to form a water seal against the escape of steam back through the funnel. The pipe 58 has the regulating valve 63 by which the rate of discharge of water into the funnel may be regulated.

The flues 11 and the ribs 12 and 12' extending beyond the peripheries of the combustion and vent chambers form an accordion or bellows-like jointless construction which expands and contracts freely without undue strain and permits each unit to be made in one piece and obviates the use of rods commonly used for clamping together the parts of a heating unit containing hot water or steam.

In this furnace the hot gases are split into thin streams by the thin flues 11, and the air being heated is also split into fine streams as it circulates among the flues 11 which present a large amount of heating surface to the air.

The heating units are not fastened directly

or indirectly to the casing at any points, but make telescopic or slip joint connections therewith. It is to be noted also that no furnace cement is used in this furnace.

5 I claim—

In a heating unit for a gas-heated hot-air furnace, a combustion chamber, a vent chamber above the combustion chamber, and flues connecting the chambers, the chambers hav-

ing hollow peripheral ribs continuous with 10 the sides of the flues and projecting outwardly beyond the adjacent wall portions of the chambers, in combination with a choke plate within the vent chamber and covering the upper ends of the flues but leaving the hollows 15 of the ribs open for the passage of hot gases.

In testimony whereof I affix my signature.

GEORGE F. REZNOR.