

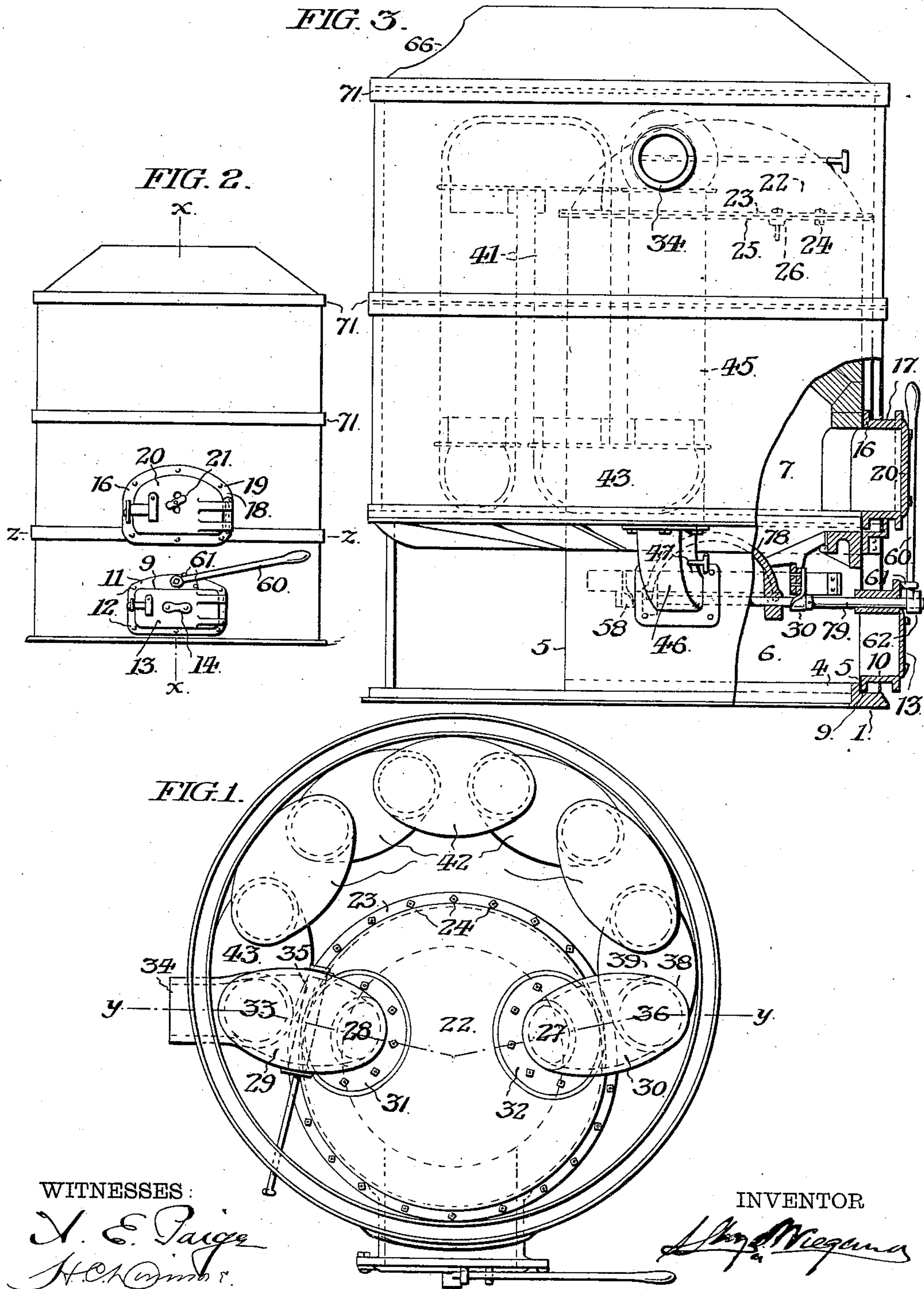
(No Model.)

2 Sheets—Sheet 1.

S. L. WIEGAND.
AIR HEATING FURNACE.

No. 529,090.

Patented Nov. 13, 1894.



WITNESSES:

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INVENTOR

S. L. Wiegand

(No Model.)

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FIG. 4.

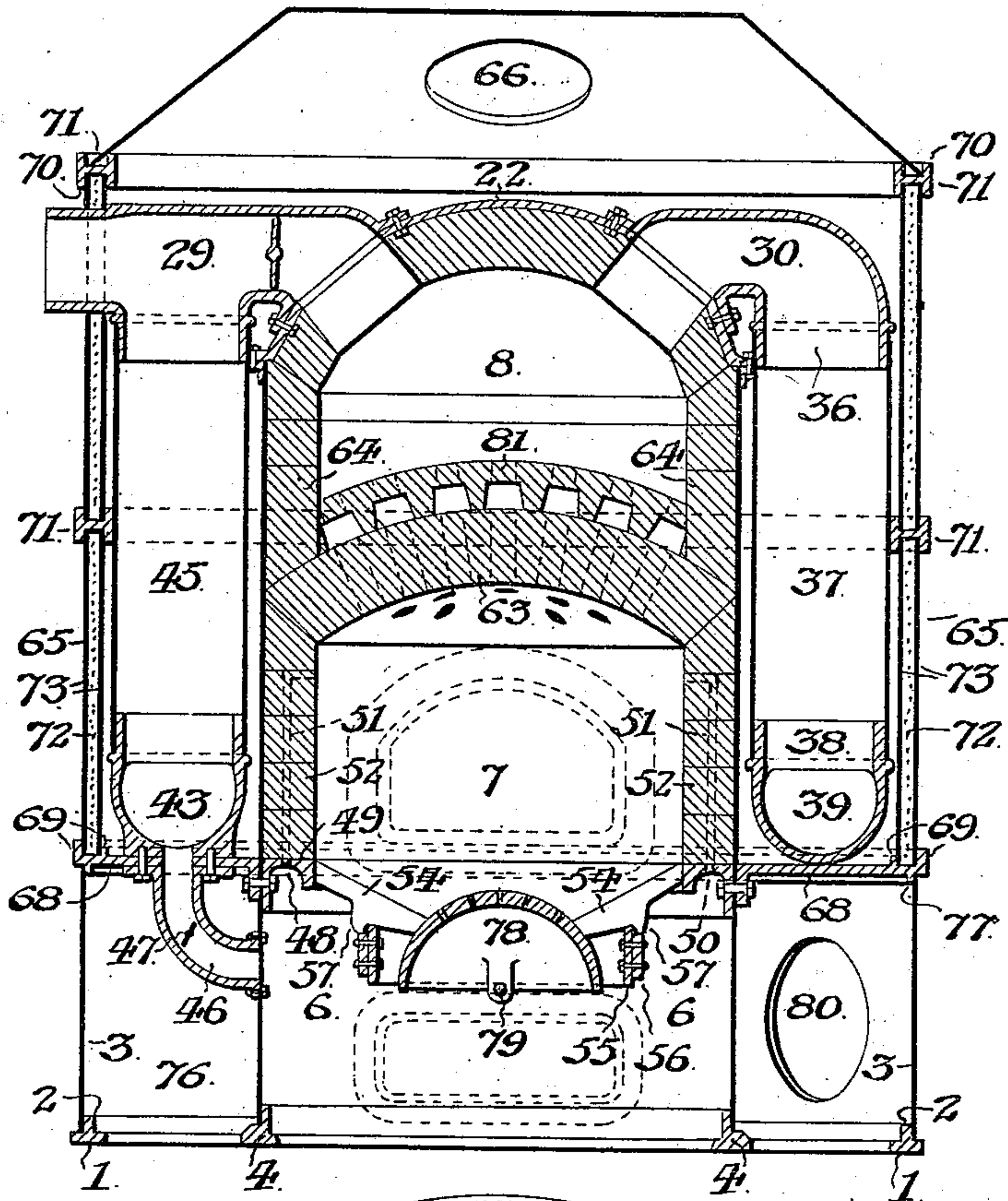
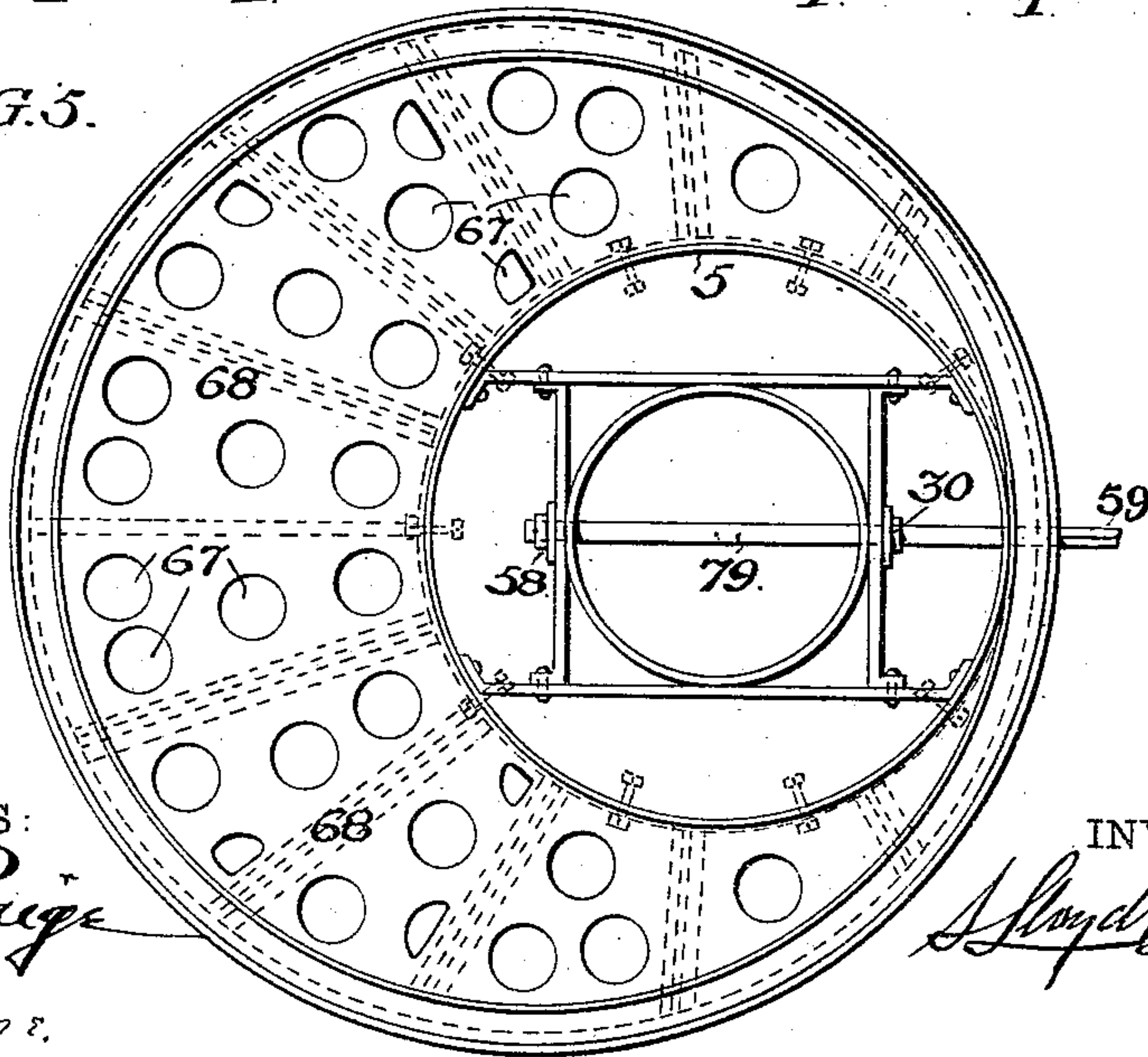


FIG. 5.



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UNITED STATES PATENT OFFICE.

S. LLOYD WIEGAND, OF PHILADELPHIA, PENNSYLVANIA.

AIR-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 529,090, dated November 13, 1894.

Application filed September 20, 1893. Renewed June 9, 1894. Serial No. 514,105. (No model.)

To all whom it may concern:

Be it known that I, S. LLOYD WIEGAND, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Air-Heating Furnaces; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof as to enable others skilled in the art to make and use the said invention.

This invention relates to furnaces for heating air for the purpose of warming and ventilating buildings and has for its object greater convenience and economy of construction, improved durability and better convenience and economy in use.

To this end this invention consists in a new construction and arrangement of parts as shown in the accompanying drawings and hereinafter fully and particularly described.

Referring to the drawings, Figure 1 shows a plan or top view with the top of the inclosing casing removed; Fig. 2, a front elevation; Fig. 3, a vertical section in the plane indicated by the dotted line X X in Figs. 1 and 2; Fig. 4, a vertical section in the plans indicated by the dotted line y y in Fig. 1; and Fig. 5, a section made in the horizontal plane indicated by the dotted line z z in Fig. 2.

1 represents the base plate having an outer vertical rim 2 which stiffens and strengthens it and affords lateral support for the lower edge of an inclosing case 3 forming a cold air chamber.

4 is a smaller upwardly projecting rim placed eccentrically to the outer rim also formed on the base 1 which affords lateral support to the cylindric shell 5 forming the ash pit 6, chamber of the furnace 7, and combustion chamber 8.

9 is an ash pit door frame having a short neck 10 secured by a flange 11 and bolts 12 to an opening of corresponding shape and size leading into the ash pit 6.

13 is the ash pit door, hinged to the frame 9 and provided with a valve or register 14 by which the admission of air to the ash pit 6 is regulated when the door 13 is closed.

The eccentric position of the rim 4 and cylindric shell 5 allows the short neck 10 to be used and affords convenient access to the ash

pit 6 for removing ashes and also permits like easy access to the furnace chamber 7 through the door frame 16 and short neck 17 which is fastened by a flange 18 and bolts 19 to a correspondingly shaped opening in the shell 5 directly above the ash pit door 13.

The furnace door 20 is hinged to the frame 16 and provided with wicket 21 with mica or other transparent plates through which the burning fuel may be observed without opening the door 20 for that purpose.

22 is a dome fitting upon the top of the shell 5 and provided with a flange 23 which is preferably secured to the shell 5 by bolts 24 engaging a flange 25 on the shell 5 lugs or ears 26 as indicated by dotted lines in Fig. 1 may be substituted for the flange 25 with a rim 15 on the dome 22 embracing the shell 5. Openings 27 and 28 are made in the dome 22 through which the products of combustion are passed into pipe connections 29 and 30.

The pipe connections 29 and 30 are made of light metal preferably cast iron and are attached to the dome 22 by flanges 31 and 32 formed in them and bolted to the dome 22. The pipe connection 29 has a branch 33 opening downwardly and another branch 34 leading horizontally outward from the combustion chamber 8. A damper 35 is placed in the pipe connection 29 between the flanged end 31 and the branches 33 and 34. The damper when open permits the products of combustion to pass directly from the combustion chamber 8 to the chimney and when closed compels the products of combustion to pass from the combustion chamber 8 through the pipe connection 30.

The outlet branch 36 of the pipe connection 30 opens downwardly and fits in a vertical cylindric pipe 37 to the lower end of which is fitted the inlet branch 38 of a return bend 39 and to the outlet branch 40 of this return bend is fitted another vertical cylindric pipe 41, and on the upper end of the pipe 41 is fitted the inlet branch another return bend 42 similar to the return bend 39 and this series of vertical pipes 41 and return bends 42 is continued to a return bend 43 having its outlet 44 beneath and connected with the downwardly opening branch 33 of the pipe connection 29, to which branch 33 the branch 44 is connected by a pipe 45.

By tracing the several connection and pipes as above described it will appear that there is when the damper 35 is closed a conduit for the products of combustion leading from the combustion chamber 8 through the pipe connection 30, pipe 37, return bend 39, pipe 41 and similar connected return bends 39 and pipes 41 to the return bend 43 and pipe 45 to the branch 33 and thence through the branch 34 to the chimney.

When the damper 35 is open the products of combustion pass directly from the combustion chamber 8 through the pipe connection 29 directly to the chimney. This arrangement of direct outlet to the chimney, permits of the easy kindling of a fire in the furnace without confining the smoke and gas in the building as occurs frequently when chimneys are cold from disuse and the draft weak; and is also useful when for any reason it is desired to rapidly reduce the temperature of the building more quickly than the fire can be moderated. In the under side of the return bend 43 there is an opening to which a pipe 46 is connected leading from the side of the ash pit 6.

A damper 47 is fitted in the pipe 46 which when opened permits a draft of air to flow in at the ash pit door and through the ash pit 6, pipe 46, return bend 43, pipe 45, branch 33 and branch 34 to the chimney carrying with it any dust that may be raised when making or removing ashes. The normal position of the damper 47 at other times is closed.

In the inside of the cylindric shell 5 a ring 48 is securely fastened having a horizontal upper surface 49 with perforations 50 in it, through which air passes upwardly from the ash pit 6 into channels or grooves 51 in a refractory lining 52 in the furnace chamber 7 and becomes heated in its passage and is discharged in the upper part of the furnace 7 where it enters into combustion with gases evolved from the fuel. On a lower rim or inner flange 53 of the ring 48, several slotted segments 54 forming a grate of inverted truncated conical form rest. The lower ends of the segments 54 are supported by a ring 55 secured by braces 56 in the shell 5. Lugs 57 on the under sides of the segments 54 abut against the ring 55 and hold them in position.

In the circular opening within the lower ends of the grate segments 54 is loosely fitted a perforated spherical segment or zone 78 which supports and admits air to the central body of fuel. This spherical segment is supported on and turns with a horizontal arbor 79 having the same axis as the spherical surface and resting in bearings 30 and 58 in which it turns and is provided with wrench seats 59 at the front end on which is fitted a wrench or lever 60. The motion of the lever 60 is restricted by stops 61 between which it may be vibrated far enough to shake and sift ashes and cinders from the fuel resting on the segment 55 but not far enough to let the segment 55 turn so as to drop the fuel be-

tween its edge and the inner ends of the grate segments 54.

The eye of the wrench or lever 60 which fits in the wrench seats 59 is made long on the outer side so as to form a projecting hub or boss 62. By removing the lever 60 from the wrench seats 59 and reapplying it with the boss on the inner side the lever is then unrestricted by the stops 61 and the segment 55 may be turned far enough to empty the fuel from the furnace chamber 7 into the ash pit 6, thus while guarding against accidental dumping of the fire, furnishing a means of doing so when desired.

Above the lining 52 of the furnace chamber 7 is placed a perforated dome 63 of refractory material which deflects heat upon the fuel on the grate and maintains a temperature favorable to the evolution of gas from the fuel. The gases thus evolved mingle with the heated air entering the furnace through the channels 51 in the lining 52 and burn in the combustion chamber 8 which is also preserved at a high temperature by a refractory lining 64 of slow heat conducting properties.

The ignition of gases and heated air is further promoted by tiles 81 of refractory material placed over the apertures in the dome 63 which change the direction of the currents entering the combustion chamber 8 from the furnace chamber 7 and enforce more intimate mixture of the air and combustion gases.

The combined effect of the furnace and combustion chamber is to generate the heat by thorough combustion of the fuel gas before passing the products of combustion to the heating pipes 37 and 41 and connected branches and return bends wherein the heat is imparted by conduction to the air entering from below, and guided through the casing 65 from which it is discharged through suitable conduits 66 to the apartments to be warmed and ventilated.

The return bends 39 and 42 and pipes 37, 41 and 45 are supported by a frame 68 secured to the shell 5 through which frame 68 there are apertures 67 to admit and distribute air into the space inclosed in the casing 65.

The casing 65 is supported by rims 69 formed on the frame 68 and is braced by rims or flanges 70 on rings 71, and the flanges 75 of the door frame 16.

The casing 65 is preferably made double of two metallic plates 73 with the space 72 between them filled with slow conducting material.

When the heated air to be supplied to apartments is to be brought from any other source than the apartment in which the furnace is located the space between the base plate 1 and the frame 68 is inclosed by a casing 3 fitting and attached to the lower rim 77 of the frame 68 the rim 2 of the base plate 1 and the flange 74 of the ash pit door frame 9 forming a cold air chamber 76. Into this cold air chamber 76 the air to be heated is conducted

by a suitable pipe 80 from any desired source of pure air supply.

The construction of the furnace chamber, ash pit and combustion chamber in a single cylindric shell and the attachment of outlet pipes to a dome placed thereon reduces the workmanship of the wrought metal shell to a minimum as does also the construction of the air heating pipes with connecting return bends, so that any mechanic can easily produce these pipes from sheet metal and for renewal, these parts can be readily produced. These sheet metal parts and cylindric hot air pipes and casing can be varied in height to suit the location in which the furnace is to be erected and can be cheaply and readily produced in locations where only the most moderate skill of workmanship is at command. A feature of great value commercially thus results from this mode of construction.

The return bends are most readily produced by casting in sand molds in the same manner as kettles with green sand cores, and as thus made can be much thinner than if cast on dried cores.

The entire length of the conduit of products of combustion from the combustion chamber is swept through by the flow of the heated products of combustion and all of it is efficient for heating air, whereas in the usual mode of connecting sheet metal drums or cylinders for air heating furnaces by means of T branches flanged and riveted on the sides near the ends and closing the ends with flat heads a considerable part at the end of each cylinder contains products of combustion not in active circulation and contributing but slightly to the heating efficiency of the apparatus. In addition to this the quality of metal, of sufficient ductility to flange with necks for drums, is more expensive and is less capable of resisting corrosion than the coarser and less pure metal which can be bent into cylinders and which as a consequence is more durable than the purer ductile metal.

Having described this invention and the operation thereof, what I claim therein is—

1. In a furnace for heating air, the base plate 1, cylindric furnace body 5 located ec-

centrically on the base, the domes 22 and 63, 50 frame 68 and casing 65 in combination with the pipe connections 29 and 30, return bends 39, 42 and 43, and pipes 37, 41 and 45 constructed and arranged substantially as shown and described.

2. In a furnace for heating air, the ash pit 6, furnace chamber 7 and combustion chamber 8, contained in a cylindric shell 5, the surrounding casing 65, frame 68, connections 29 and 30, return bends 39, 42 and 43 and pipes 37, 41 and 45 in combination with the damper 35, constructed and arranged substantially as shown and described.

3. In a furnace for heating air, the ash pit 6, ring 48 having perforations 50 therein, furnace chamber 7, refractory lining 52 having air channels therein communicating with the perforations 50, the perforated dome 63 and conical grate 54 in combination with the spherical perforated segment 78, arbor 79 and wrench 60 all constructed and arranged to operate substantially as set forth.

4. In a furnace for heating air, the ash pit 6, furnace chamber 7 and combustion chamber 8, contained in a cylindric shell 5, the shell 5, the frame 68, connections 29 and 30 return bends 39, 42 and 43 and pipes 37, 41, 45 and 46 in combination with the damper 47 constructed and arranged to operate substantially as shown and described.

5. In a furnace for heating air, the supporting frame 68, return bends 39, 42, 43 in combination with the pipes 37, 43 and 45 constructed and arranged substantially as shown and described.

6. In a furnace for heating air, the base plate 1, cylindric furnace body 5 located eccentrically thereon, the dome 22, frame 68, casing 65, cold air chamber 76, connections 29 and 30, return bends 39, 42 and 43, pipes 37, 41, 45 and 46 in combination with the dampers 35 and 47 all constructed and arranged to operate substantially as shown and set forth.

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Witnesses:

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