Feb. 7, 1928.

1,658,364

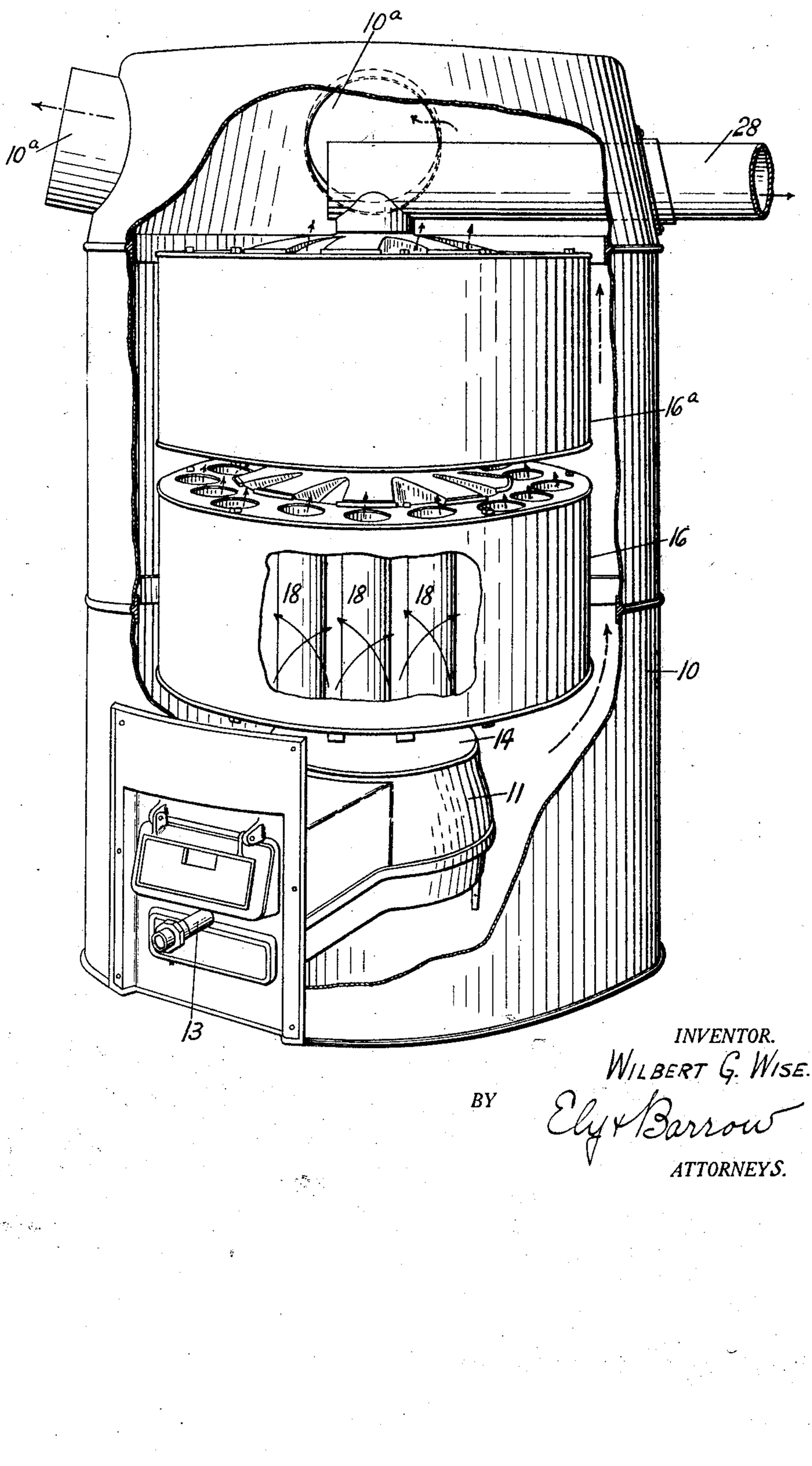
W. G. WISE

FURNACE

Filed Nov. 19, 1927

2 Sheets-Sheet 1

FIG. - 1.



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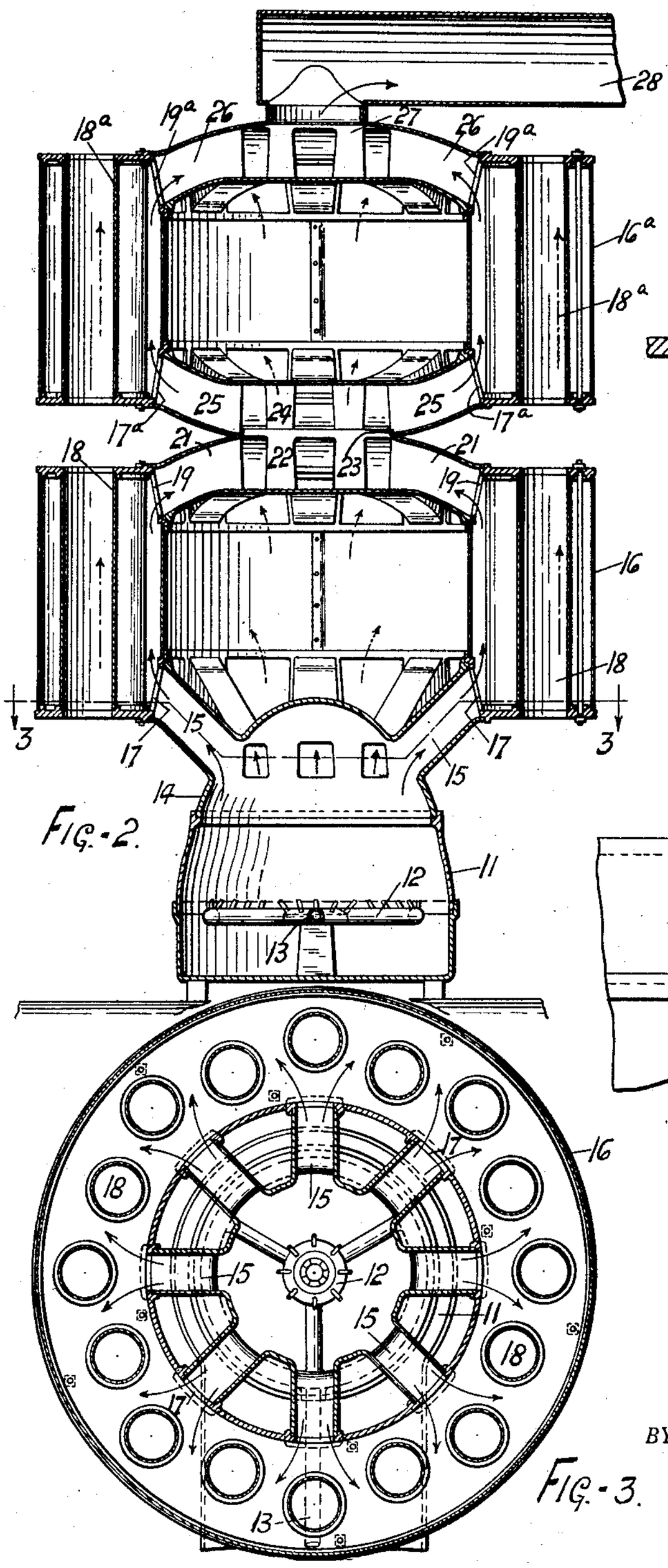

FIG.-2.

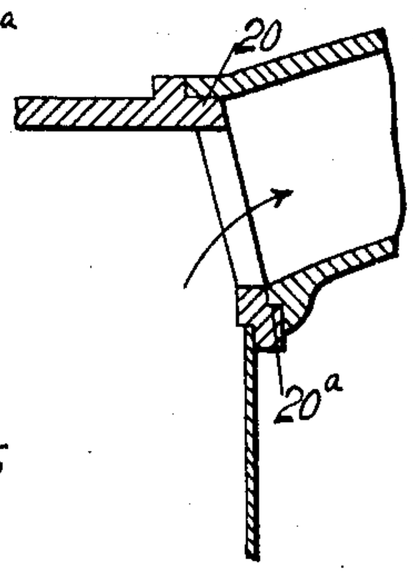

FIG.-4

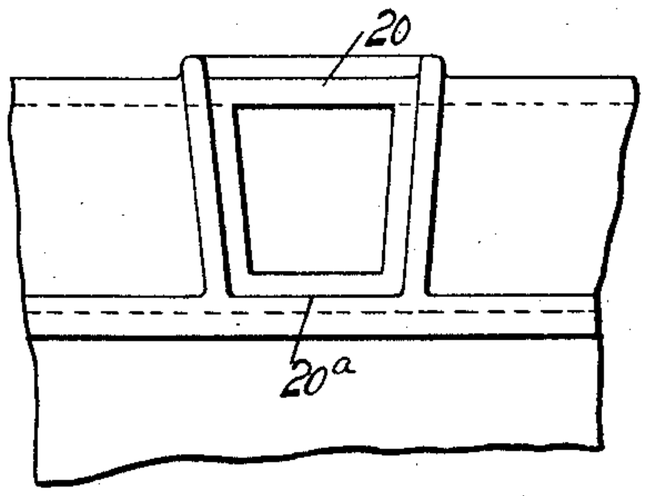

FIG.-5

FIG.-3.

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UNITED STATES PATENT OFFICE.

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FURNACE.

Application filed November 19, 1927. Serial No. 234,386.

This invention relates to furnaces for use of gaseous or vaporized fuels.

The general purpose of the invention is to provide an improved radiator construction for such furnaces whereby more efficient heating will result.

Particularly the invention has for its object the provision of a radiator including one or more radiator units to which the combusted gases are supplied from the central fire pot by ducts extending upwardly and outwardly and from which the gases are delivered by ducts upwardly and inwardly toward the center of the furnace whereby the heat in the gases will be more completely utilized to heat the air. The radiator is so designed that the air passes upwardly about the radiator, also through tubes extending upwardly through the radiator and also through the center of the furnace about the ducts which distribute the combusted gases to, or deliver the gases from, the radiator.

The foregoing and other objects are attained in the construction illustrated in the accompanying drawings and described below. It is to be understood that the invention is not limited to the particular construction shown and described.

Of the accompanying drawings,

Figure 1 is a perspective view of a furnace embodying the invention, partly broken away to illustrate the interior construction;

Figure 2 is a vertical diametral section through the fire pot and radiator thereof;

Figure 3 is a sectional plan on line 3—3 of Figure 2;

Figure 4 is a detail, vertical section illustrating the joint between the radiator ducts and the radiator drums; and

Figure 5 is an inner elevation of a drum at a port to which a radiator duct is fitted as shown in Figure 4.

Referring to the drawings, the numeral 10 indicates the usual furnace casing, provided with connections indicated at 10^a for the usual air ducts and having therein a fire pot 11 containing a burner 12 of that type employed for combustion of natural or artificial gas which may be supplied to the burner by piping 13.

The fire pot 11 is provided with a dome piece 14 from which radiate outwardly and upwardly, ducts 15, 15 on which is seated an annular, hollow radiator drum 16. Drum 16 has ports 17, 17 registering with ducts 15 for conducting the gases of combustion from the fire pot into the drum 16. Tubes 18, 18 extend upwardly through drum 16 and permit passage of air therethrough, to increase the radiating surfaces of the drum, alternate tubes preferably being radially offset, and certain of tubes 18, as illustrated in Figure 3, being opposite ports 17 so as to divide up the streams of gases of combustion entering the drum and thoroughly to distribute them to all of its radiating walls.

The drum 16 has outlet ports 19, 19 on the inner periphery thereof adjacent the top, flanged, as indicated at 20 and 20^a, Figures 4 and 5, to support a duct spider comprising a single casting including radial ducts 21, 21 leading to a central duct 22. In a single unit construction the duct 22 may be connected directly with a flue.

In the double unit construction herein shown duct 22 is flanged at its upper edge 23 to receive and support thereon a second duct spider casting comprising a central duct 24 fitted onto the top of duct 22 and radiating ducts 25, 25 for conducting the gases of combustion to a second radiator drum 16^a, the spider casting including duct 24 and ducts 25 providing a support for drum 16 upon the radiator structure previously described.

Drum 16^a has ports 17^a registering with ducts 25 and has tubes 18^a, 18^a similar to tubes 18 and has outlet ports 19^a similar to ports 19 for delivering the gases of combustion from the radiator into a third duct spider including radial ducts 26, 26 and central duct 27 which empties into a flue 28. The spider including duct 27 and radial ducts 26 is supported by flanges such as 20 and 20^a about the ports 19^a. The drum 16^a and duct spiders employed therewith provide radiating surfaces similar to drum 16 and its associated duct spiders. Of course, any desired number of radiator units may be supported one upon the other as disclosed herein.

In use the gases of combustion flow from fire pot 11 through ducts 15, into drum 16, being thoroughly distributed by the baffling action of the tubes 18 to all walls of drum 16 and pass from the upper end of drum 16 through ducts 21 to the center ducts 22 and 24. This bringing of the gases to the center of the furnace from each unit considerably retards the flow thereof and the

radial ducts provide effective radiating surfaces.

From central duct 24, the gases pass through ducts 25 and into and through drum 16ª in a manner similar to their passage through drum 16. From drum 16ª the gases pass through ducts 26 and duct 27 to flue 28, the heat thereof having been very efficiently utilized in warming the air in the furnace about the radiator. The paths followed by the gases of combustion are indicated in the drawings by full-line arrows.

The air about the radiator finds paths permitting free upward flow thereof about the fire pot and drums 16 and 16ª through the tubes 18 and 18ª and through the central openings of the drums in paths along the inner peripheral walls thereof and about the radial ducts through which the combusted gases are conducted to and from the drums. The paths followed by the air being heated are indicated by the broken-line arrows appearing in the drawing.

It will appear from the foregoing description that a very effective heating plant has been devised for use of gaseous or vaporized liquid fuels. Obviously modifications of this invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A furnace for gaseous or vaporized liquid fuels, said furnace including a casing, having air duct connections thereto, a fire pot in the casing, a burner in the fire pot, ducts radiating from the fire pot, an annular hollow radiator drum supported on the ducts and having inlet ports registering therewith, vertical tubes through the drums for conducting air therethrough, certain of said tubes being positioned in the drum opposite said ports, outlet ports in the drum adjacent the top, radial ducts leading to a central duct provided by a duct spider supported on said drum with the radial ducts registering with said outlet ports, a second duct spider comprising a central duct and radial ducts supported on said first spider, a second radiator drum similar to the first radiator drum mounted on said second spider and to which gases of combustion are delivered by said duct spiders from said first drum, a third duct spider similar to said first duct spider mounted on said second drum, said radiator including any desired number of said drums and spiders, and a flue connected to the third or last duct spider.

2. A furnace for gaseous or vaporized liquid fuels, said furnace including a casing having air duct connections thereto, a fire pot in the casing, a burner in the fire pot, ducts radiating from the fire pot, an annular hollow radiator drum supported on the ducts and having inlet ports registering therewith, vertical tubes through the drums for conducting air therethrough, certain of said tubes being positioned in the drum opposite said ports, outlet ports in the drum adjacent the top, radial ducts leading to a central duct provided by a duct spider supported on said drum with the radial ducts registering with said outlet ports, a second duct spider comprising a central duct and radial ducts supported on said first spider, a second radiator drum similar to the first radiator drum mounted on said second spider and to which gases of combustion are delivered by said duct spiders from said first drums, a third duct spider similar to said first duct spider mounted on said second drum, and a flue connected to the third duct spider.

3. A furnace for gaseous or vaporized liquid fuels, said furnace including a casing having air duct connections thereto, a fire pot in the casing, a burner in the fire pot, ducts radiating from the fire pot, an annular, hollow radiator drum supported on the ducts and having inlet ports registering therewith, vertical tubes through the drums for conducting air therethrough, certain of said tubes being positioned in the drum opposite said ports, outlet ports in the drum adjacent the top, radial ducts leading to a central duct provided by a duct spider supported on said drum with the radial ducts registering with said outlet ports, a second duct spider comprising a central duct and radial ducts supported on said first spider, a second radiator drum similar to the first radiator drum mounted on said second spider and to which gases of combustion are delivered by said duct spiders from said first drums, a third duct spider similar to said first duct spider mounted on said second drum, and a flue connected to the third duct spider.

4. In a furnace for gaseous or vaporized liquid fuel, a fire pot, a radiator comprising one or more hollow, annular drums, ducts radiating outwardly to deliver the gases of combustion to the interior of the drums, and ducts converging inwardly from the drums to cause the gases from said drums to flow toward the center of the furnace.

5. In a furnace, a heater comprising a burner, a radiator, and a flue, said radiator being constructed to direct the gases from the burner alternately, radially outwardly and radially inwardly until they pass into the flue.

6. In a furnace for use of gaseous fuel, a radiator construction including means providing passages for directing the gases of combustion alternately, radially outwardly and radially inwardly of the furnace, said radiator providing passages for air upwardly about the radiator and also through the radiator about said radial passages.

7. In a furnace, a radiator constructed to define a central air duct, and radiator ducts radiating to and converging from the radiator across said central air duct.

8. In a furnace a radiator construction including a fire pot and one or more radiator drums, said fire pot having radiating ducts providing a spider for supporting said drums, and duct spiders supported by the

drums for delivering gases therefrom, said duct spiders being adapted for supporting one drum upon the other.

9. In a furnace, a radiator for receiving gases of combustion, ducts radiating to said radiator to deliver the gases thereto, and ducts radially convering from the radiator to conduct the gases therefrom.

10. A furnace for gaseous fuel comprising a casing, a fire pot centrally located therein, and a radiator constructed to direct the gases upwardly, alternately, radially outwardly and inwardly and providing passages for air upwardly through the radiator.

WILBERT G. WISE.