C. J. L. KING.

OIL FURNACE.

APPLICATION FILED JULY 23, 1910.

990,565. Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.

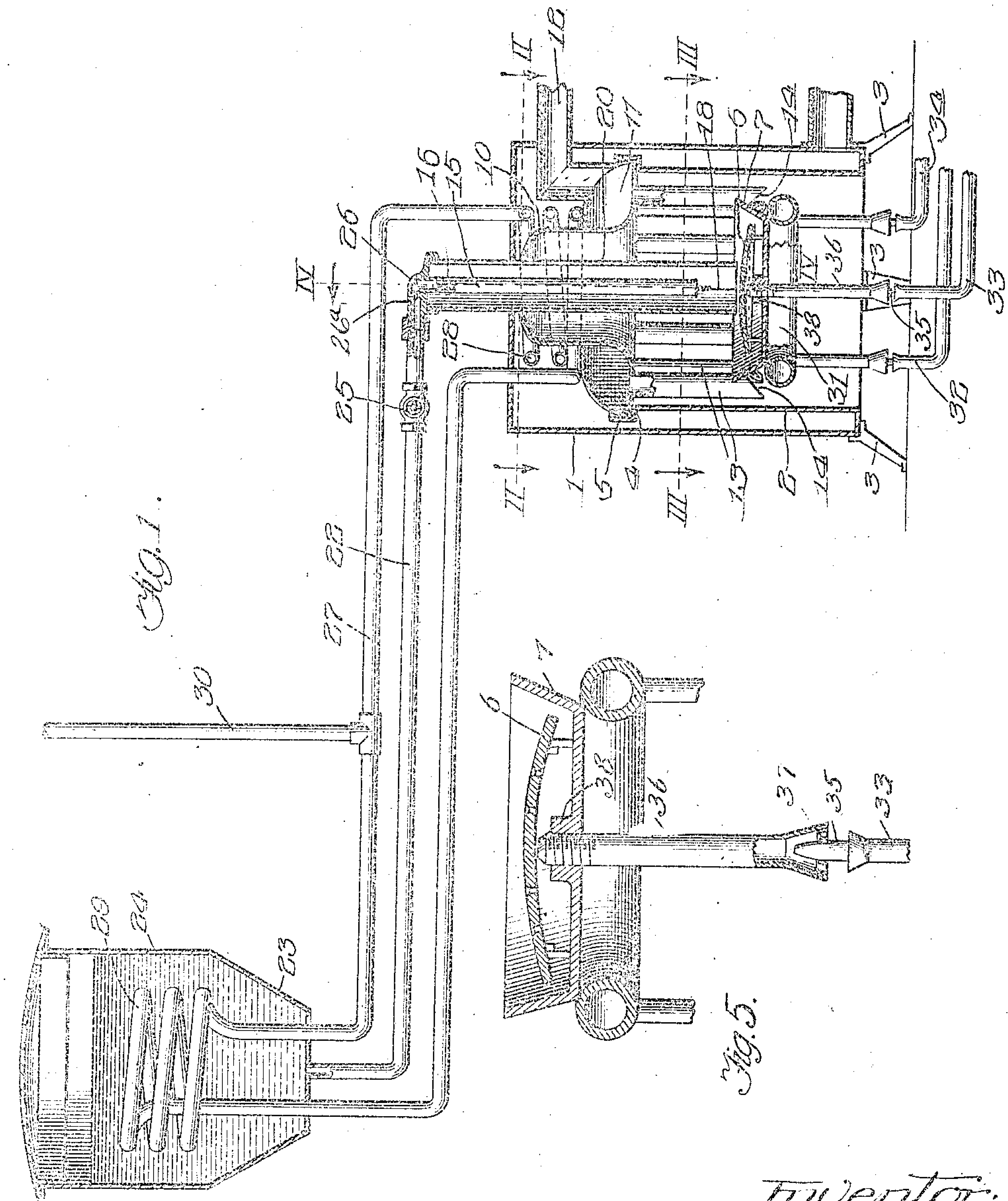

Fig. 1.

Fig. 5.

Witnesses:

[illegible]

[illegible]

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By [illegible]

Attys.

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2 SHEETS—SHEET 2.

Fig. 2.

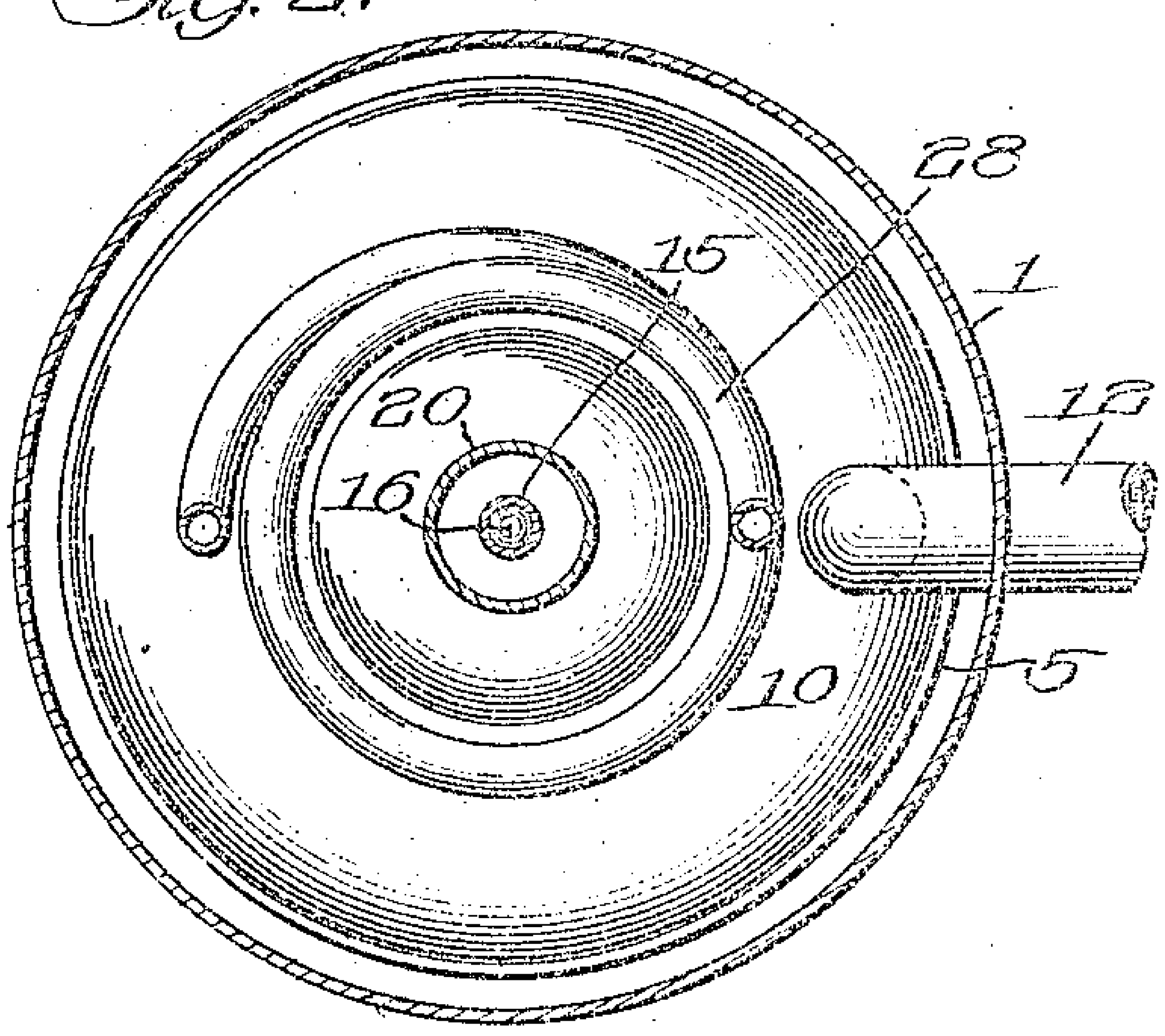


Fig. 4.

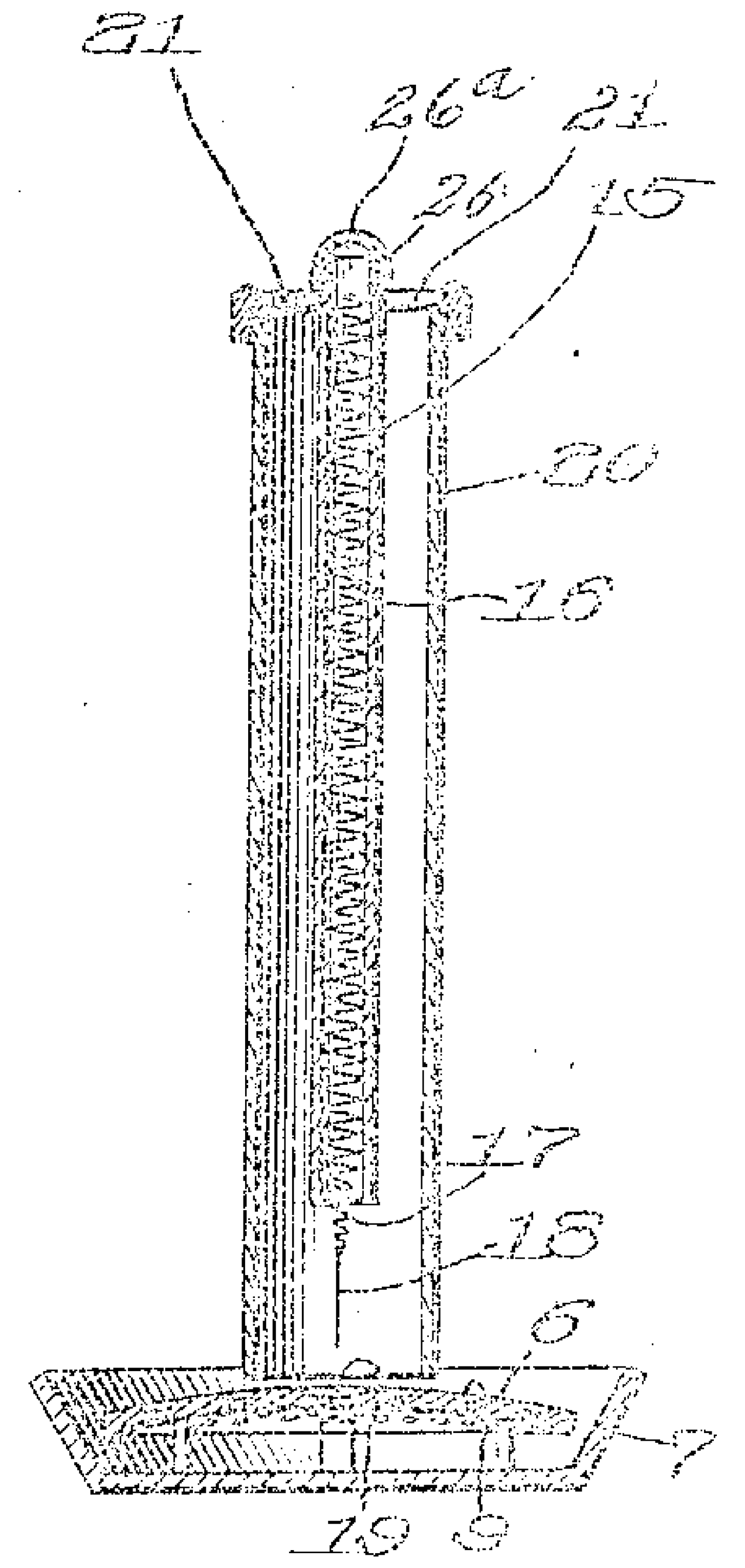
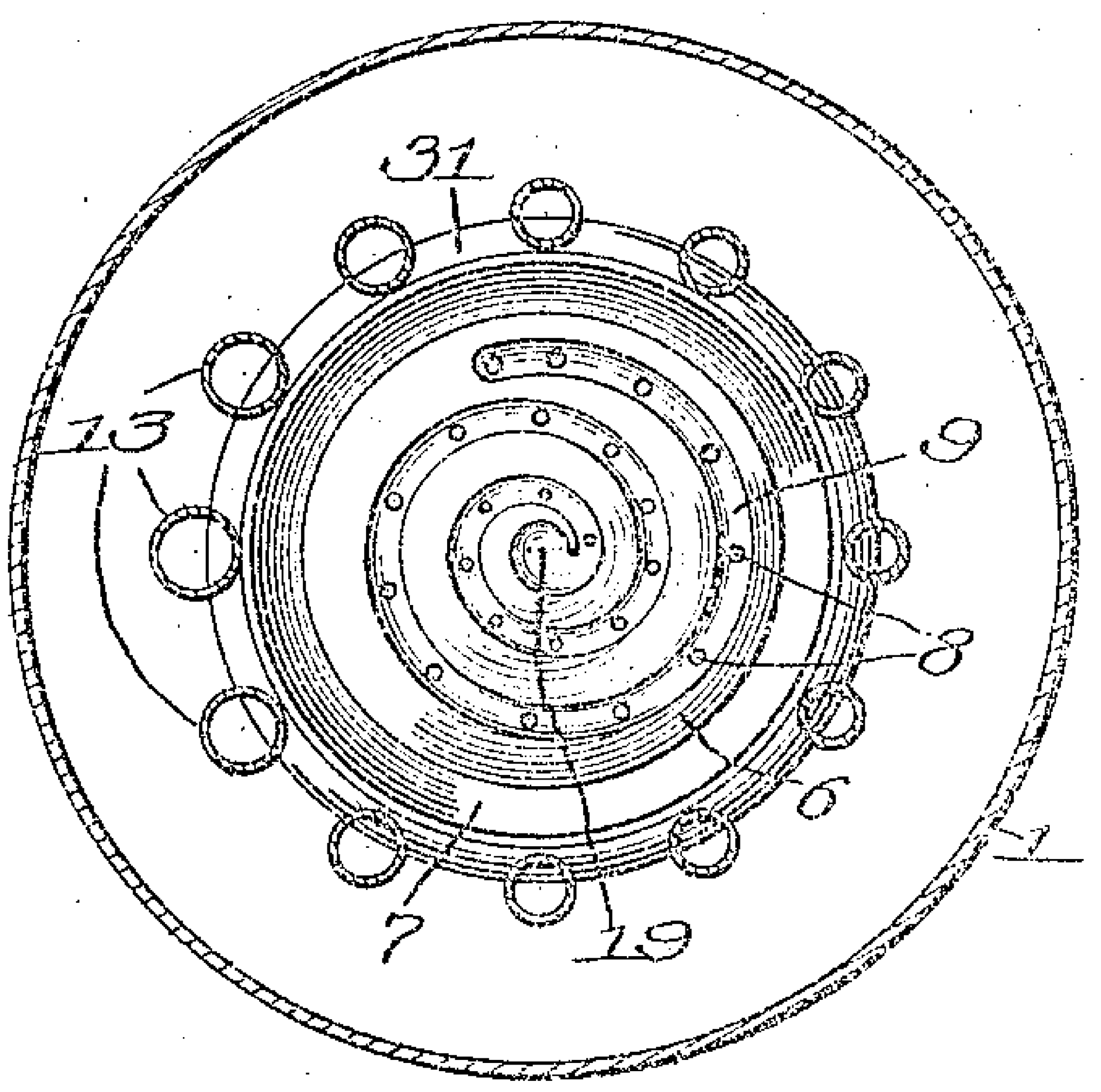


Fig. 3.



Witnesses:
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UNITED STATES PATENT OFFICE.

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OIL-FURNACE.

990,565. Specification of Letters Patent. Patented Apr. 25, 1911.

Application filed July 23, 1910. Serial No. 573,378.

To all whom it may concern:

Be it known that I, CHARLES J. L. KING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Oil-Furnaces, of which the following is a specification.

This invention relates to oil furnaces and has for its primary object to provide an improved construction, combination and arrangement of parts in an oil furnace.

One of the objects of the present invention is to provide improved means for feeding oil to an oil consuming furnace.

A more particular object is to provide an improved construction, combination and arrangement of parts in the fire chamber of an oil furnace for the purpose of securing the highest degree of combustion of the fuel.

Another object is to provide a burner plate of improved construction.

Another object is to provide improved means for maintaining the fuel mobile.

Other and further objects will appear in the specification and be specifically pointed out in the claims appended hereto, reference being had to the exemplification of the invention shown in the accompanying drawings.

In the drawings--Figure 1 is a sectional view of an oil consuming furnace constructed in accordance with the principles of the present invention, parts being shown in elevation. Fig. 2 is a section on the line II—II, Fig. 1. Fig. 3 is a section on the line III—III, Fig. 1. Fig. 4 is an enlarged detail section of the oil feeding tube together with its shield, taken on the line IV—IV, Fig. 1. Fig. 5 is an enlarged detail section partly in elevation of the burner.

Referring more especially to Fig. 1, which shows the embodiment of the invention in an oil consuming furnace for heating air, the furnace shell comprises an outer cylindrical wall 1 and an inner cylindrical wall 2, the former being closed at its upper end while the latter extends but a portion of the height of the former and is open at the top. Said furnace shell is supported upon a plurality of legs 3. Adjacent its upper end, the inner cylindrical wall 2 is provided with an annular shoulder 4 and an upper flange 5 which forms a seat for the upper removable end or dome for the inner or combustion chamber of the furnace. The burner, which is disposed within the combustion chamber, consists preferably of a burner plate 6 mounted within and spaced from a receptacle or pan 7 in the lower portion of said combustion chamber. As shown in Fig. 1, the burner plate 6 is convexed upwardly and as shown in Fig. 3 is provided with a plurality of perforations 8 arranged in spiral formation and having diameters that increase as their distances from the center of the spiral increase.

Connecting the perforations 8 in such a manner as to form a courseway for oil, is a spiral groove 9 which leads the oil dropped at the center of the plate 6 outwardly toward the periphery in a spiral path. By providing the perforations 8 of different diameters which grow larger as the distances from the center increases, simple and efficient means are provided for supplying a varying amount of air to the fluid to support combustion, which supply of air is graduated to meet the existing conditions and requirements and according to the mobility of the liquid. Thus the lighter elements will vaporize first while the heavier elements will pass over the smaller apertures toward the outer edge of the plate where they will be exposed to the hotter temperatures at that point. The upper removable end of the combustion chamber comprises a dome 10 with an annular gallery or chamber 11 extending there around, said chamber being, in the embodiment shown in the drawings, formed by bending the rim of the dome 10 back against the cylindrical wall of said dome, thus providing for the gallery 11 a wall exposed directly to the heat of the combustion chamber for a purpose to be hereinafter made clear. The gallery or chamber 11 is provided with a discharge outlet 12, which can be connected to a flue or chimney, not shown.

Disposed about the receptacle 7 and depending from the bottom wall of the chamber 11, are a plurality of uptakes 13, the lower ends of which are cut away to incline downwardly away from said receptacle 7, as shown at 14 in Fig. 1. As shown in Fig. 3, said uptakes 13 are proportioned in diameter to increase in size as their distance from the discharge outlet 12 increases, the object being to equalize the draft through all of said uptakes.

As shown in Figs. 1 and 4 of the drawings, the receptacle 7 is provided with upwardly flanged edges which provide a baffle for the

burning gases passing from the burner plate 6 to the uptakes 13.

Referring now to Fig. 4, the detail construction of the means for introducing oil to the center of the burner plate 6 will be understood and consists of a depending oil tube 15 which reaches to within a short distance of the burner plate 6. Within the tube 15 is provided a spiral guide-way for the oil in the form of a wire 16 wound on a helix whose diameter as it nears the bottom of the tube 15 decreases, as shown at 17, until finally the lowermost end of the wire assumes the form of a needle 18 disposed immediately above a well 19 formed at the center of the burner disk 6. In order to provide a shield for the oil tube 15 to protect it against the heat in the combustion chamber and thereby prevent a premature ignition, an outer tube 20 is concentrically mounted with the tube 15 and extends below the tube 15 to a point adjacent the burner disk 6. The upper end of the outer tube 20 is provided with threads whereby it is adapted to be suspended from the threaded cylindrical wall of a cap or air mixer 26 through which air is admitted into the outer tube 20 by means of openings 21 provided in the casting 26.

As shown in Fig. 1, the depending oil tube 15 is connected by screw threads with the casting 26, while a horizontal service pipe 22 which conveys oil directly from the lower contracted end 23 of an oil reservoir 24 is coupled directly to a tubular projection on the casting 26 which leads to the oil tube 15. A valve 25 serves to regulate the flow of the oil from the reservoir 24. Adjacent the upper end of the oil tube 15, a barrier or hurdle 20^a is provided in the tubular projection of the cap 26 to decrease the flow capacity of the pipe 22 sufficiently to insure the oil becoming thoroughly warmed and mobile before it enters the depending tube 15.

In order to provide means for keeping the oil in the reservoir 24 mobile, a circuit for conveying a heat medium from the furnace to said reservoir is provided in the form of a pipe 27, which pipe connects up with a coil 28 extending around the dome 10 within the air space of the furnace. Within the oil reservoir 24 is a second coil pipe 29 whereby the medium is adapted to give up its heat to the oil. In the present embodiment, the oil heating system is adapted to perform its work through the agency of water, for which purpose a branch pipe 30 from a water main, or other suitable source of supply, connects with the pipe 27.

In order to provide means for starting the burner when the furnace is cold the receptacle 7 is provided with an apertured boss 38 within which is adjustably mounted by means of screw threads, a burner tube 36 having an air mixer 37 slidably engaging the upper end 35 of a gas tube 33. In the present embodiment a sectional gas burner 31 is provided for creating an initial chimney draft when the furnace is cold and is supplied with gas through tubes 32 and 34.

The operation of the furnace will now be understood and is as follows: The valve 25 having been opened to the proper degree, the oil is admitted to the downwardly depending oil tube 15 wherein it strikes the spiral guide 16 whereby a whirling motion will be imparted to the oil. As the oil approaches the lower end of the tube 15, it passes over the contracted portion 17 out onto the needle 18 and drops into the well 19 from which it feeds around the spiral 9 and through the perforations 8, in the manner already indicated. Inasmuch as the plate 7 has already been heated to the necessary degree of heat by the burner 36, the oil is vaporized into a gas which expands and fills the upper end of the combustion chamber and dome 10. The upper end of the combustion chamber and dome being entirely air tight, a closed reservoir for gas is formed which burns in and around the uptakes 13 and bottom wall of the chamber 11. By reason of the draft up the chimney, air is drawn in through the openings 21 in the cap 26 and passes down the outer tube 20 into the combustion chamber and mixes with the gas formed therein. The air thus drawn in will be distributed radially in all directions over the burner plate 6 where some of it mixes with the gas formed from the oil and the remainder passes upwardly over the edges of the receptacle 7 and thence through the uptakes 13, wherein the combustion of any unconsumed gases continues. Such continued combustion also takes place within the chamber 11, being facilitated by having the walls of the uptakes 13 and chamber 11 exposed directly to the heat within the combustion chamber. A secondary combustion is thus provided, which, by reason of the construction and combination of parts, shown best in Fig. 1, takes place at a higher temperature than that existing at the burner plate. This device is peculiarly serviceable in cases where an over feed of oil takes place, in which instance unconsumed pyrogenous distillates collect within the uptake tubes 13 and in some degree within the chamber 11. These distillates are therefore not wasted but are made to undergo combustion which does not take place at the temperature existing within the combustion chamber.

What I claim is—

1. In a furnace, the combination with a burner disk and means for feeding oil to said disk, said disk being provided with a spiral groove for feeding the oil therearound and having a series of apertures in the groove extending through the disk, of a receptacle into which the excess oil from the

disk flows, a plurality of uptakes disposed about said receptacle, and a discharge outlet common to all of said uptakes.

2. In a furnace, the combination with a burner disk and means for feeding oil to said disk, said disk being provided with a spiral groove for feeding the oil therearound and having a series of apertures in the groove extending through the disk and gradually increasing in size as their distance from the center of the spiral increases, of a receptacle into which the excess oil from the disk flows, a plurality of uptakes disposed about said receptacle, and a discharge outlet common to all of said uptakes.

3. In a furnace, the combination with a burner disk provided with a spiral groove for feeding the oil therearound and having a series of perforations in and through the groove, means for dropping the oil at the center of the spiral, a plurality of up-takes disposed about said receptacle, and a discharge outlet common to all of said uptakes.

4. In a furnace, the combination with a burner disk and means for feeding oil to said disk, said disk being provided with a spiral groove for feeding the oil therearound and having a series of apertures in the groove extending through the disk, of a receptacle into which the excess oil from the disk flows, a plurality of uptakes disposed about said receptacle, a discharge outlet common to all of said uptakes, and an initial starting burner beneath the receptacle.

5. In a furnace, the combination with a burner disk and means for feeding oil to said disk, of a receptacle into which excess oil from the disk flows, a plurality of uptakes disposed about said receptacle and having their inlets below the top edge of the receptacle, and a discharge outlet with which the uptakes have communication.

6. In a furnace, the combination with a burner disk and means for feeding the oil to said disk, of a receptacle into which the excess oil from said disk flows, a plurality of uptakes disposed about said receptacle and having their inlet ends disposed below said receptacle, and an annular chamber disposed above the burner disk into which said uptakes discharge, said annular chamber being provided with a discharge outlet.

7. In a furnace, the combination with a burner disk and means for feeding the oil to said disk, of a receptacle into which the excess oil from said disk flows, a plurality of uptakes disposed about said receptacle and having their inlet ends disposed below said receptacle, and an annular chamber disposed above the burner disk into which said uptakes discharge, said annular chamber being provided with a discharge outlet, and said uptakes being larger in diameter as their distance from the discharge outlet increases.

8. In an oil furnace, the combination of a combustion chamber provided with a dome above and an annular chamber surrounding said dome, a burner plate in the lower portion of said combustion chamber, and a plurality of uptakes disposed about said burner plate and communicating above with said annular chamber, said annular chamber being provided with a discharge outlet for products of combustion.

9. In an oil furnace, the combination of a combustion chamber provided with a removable upper end comprising a dome and an annular chamber extending around the dome, said annular chamber being provided with a discharge outlet, a burner plate within said combustion chamber, a plurality of uptakes extending from points adjacent the burner plate to said annular chamber and a baffle interposed between said burner plate and the lower ends of said uptakes.

10. In an oil furnace, the combination of a combustion chamber having a removable dome and an annular chamber extending around said dome, said annular chamber being provided with a discharge outlet, a burner within said combustion chamber, a plurality of uptakes extending from points adjacent the burner to said annular chamber, said uptakes being proportioned in diameter to correspond with their relative distances from said discharge outlet, and a receptacle for excess oil beneath said burner, said receptacle being provided with an upwardly flanged edge extending between the burner and the lower ends of said uptakes.

11. In an oil furnace, the combination of a combustion chamber having a removable dome and an annular chamber extending around said dome, said annular chamber being provided with a discharge outlet, a burner within said combustion chamber, a plurality of uptakes extending from points adjacent the burner to said annular chamber, said uptakes being proportioned in diameter to correspond with their relative distances from said discharge outlet, and a receptacle for excess oil beneath said burner, said receptacle being provided with an upwardly flanged edge extending between the burner and the lower ends of said uptakes, the lower ends of the uptakes being cut away to incline downwardly from adjacent the plane of the upper edge of said receptacle.

12. In a furnace, the combination with a burner, means for feeding fluid fuel to the burner, of a receptacle into which the excess fluid from the burner flows, a plurality of uptakes disposed about the receptacle, and a discharge outlet common to said uptakes, said uptakes increasing in diameter as their distance from the discharge outlet increases.

13. In a furnace, the combination with a burner, means for feeding fluid fuel to the burner, a plurality of uptakes disposed

about the burner, and a discharge outlet common to said uptakes, said uptakes increasing in diameter as their distance from the discharge outlet increases.

14. In an oil furnace, the combination with a combustion chamber, of a burner, said chamber having uptake passages surrounding the burner, an oil supply pipe, means for conducting oil from said supply pipe to the burner, means for shielding the oil conducting means from the heat of said combustion chamber, and a discharge outlet with which the said passages have communication, said uptake passages being so disposed with respect to the said shielding means as to draw the products of combustion away from the last said means.

15. In an oil furnace, the combination with a combustion chamber, of a burner, said chamber having uptake passages encompassing the burner, an oil supply pipe, means for conducting oil from said supply pipe to the burner, means for shielding the oil conducting means from the heat of said combustion chamber, the last said means being provided with means for admitting air to said fire chamber, and a discharge outlet for said chamber, said uptake passages being so disposed with respect to the said shielding means as to draw the products of combustion away from the last said means.

16. In an oil furnace, the combination with a combustion chamber, of a burner plate, said chamber having uptake passages leading therefrom and surrounding the burner plate, a feed pipe having one end depending within the combustion chamber above said burner plate, a shield surrounding said depending end of the feed pipe and extending from said burner plate to the top of the fire chamber.

17. In an oil furnace, the combination with a combustion chamber embodying a fire chamber, of a burner mounted within said chamber, a tubular fire shield extending from a point adjacent said burner through the top wall of the combustion chamber, said shield being provided at its upper end with an open-ended transverse passage outside of the combustion chamber, means for supplying oil to the said passage, said passage passing through the upper end of the shield to depend over the center of the burner, said shield being provided with an air inlet, and a discharge outlet for the chamber.

18. In a furnace, the combination with a burner and means for feeding oil thereto, said means comprising a depending tube terminating short of the burner and a spiral guide within the tube, the diameter of the guide being reduced adjacent the bottom of the tube, of a receptacle for receiving the excess oil from the burner, a plurality of up-takes disposed around the receptacle, and a discharge outlet common to all of the said up-takes.

19. In a furnace, the combination with a burner plate and means for feeding oil thereto, said means embodying a depending oil tube, a tubular shield concentric with and surrounding the tube extending to a point adjacent the burner plate, of a receptacle for receiving the excess oil from the plate, a plurality of up-takes disposed around the receptacle, and a discharge outlet common to all of the up-takes.

20. In a furnace the combination with a burner plate and means for feeding oil thereto, said means embodying a depending oil tube, a spiral guide arranged within and extending throughout the length of the tube, a tubular shield concentric with and surrounding the tube extending to a point adjacent the burner plate, of a receptacle for receiving the excess oil from the plate, a plurality of up-takes disposed around the receptacle, and a discharge outlet common to all of the up-takes.

21. In a furnace, the combination with a burner and means for feeding oil thereto, said means embodying a depending oil tube, a spiral guide arranged within and extending throughout the length of the tube, the diameter of said spiral being reduced adjacent the bottom, a tubular shield concentric with and surrounding the tube extending to a point adjacent the burner, of a receptacle for receiving the excess oil from the burner, a plurality of up-takes disposed around the receptacle, and a discharge outlet common to all of the up-takes.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 18th day of July, A. D. 1910.

CHARLES J. L. KING.

Witnesses:
E. P. S. MILLER,
A. O. KNIGHT.