

F. S. LANG.

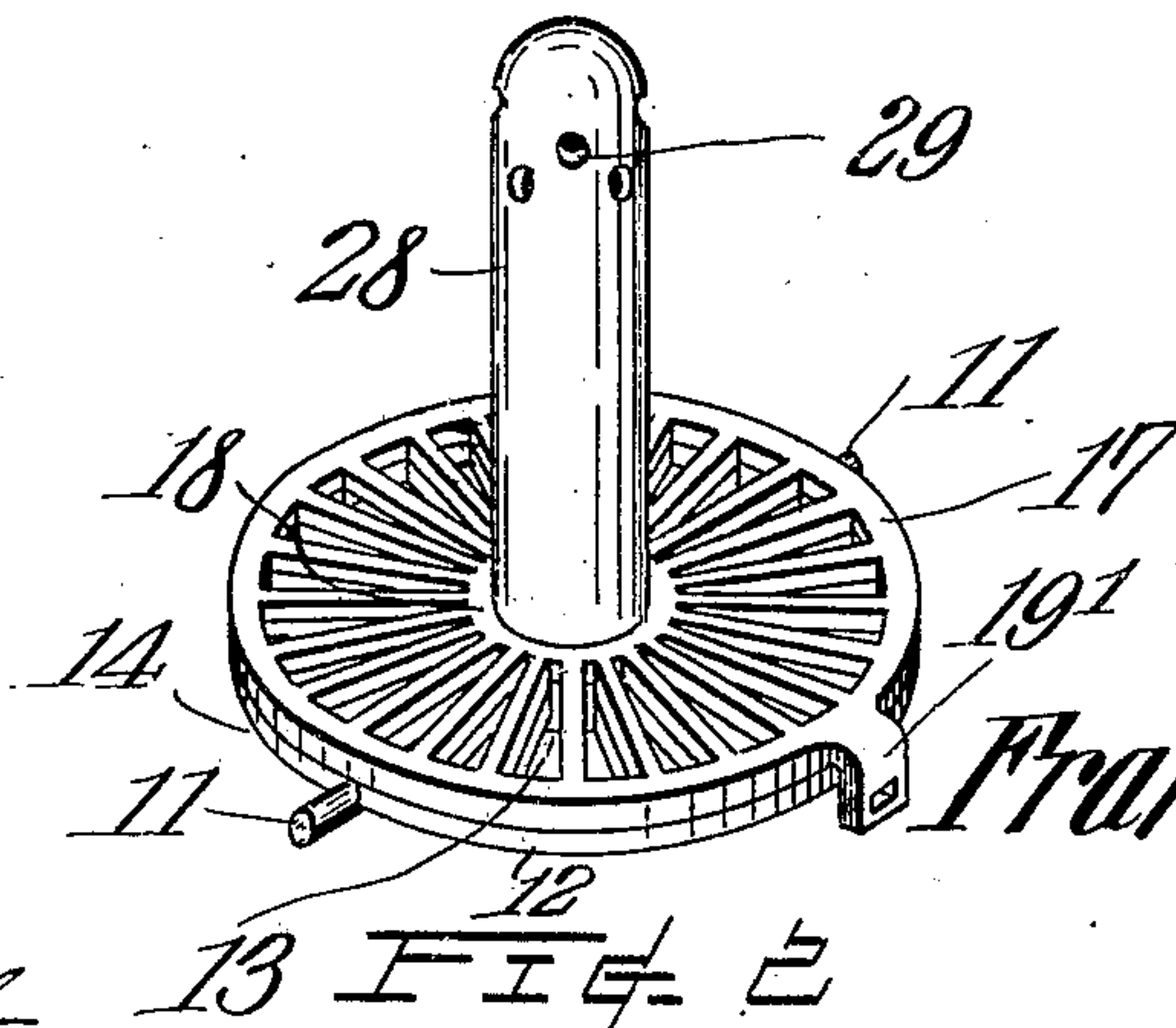
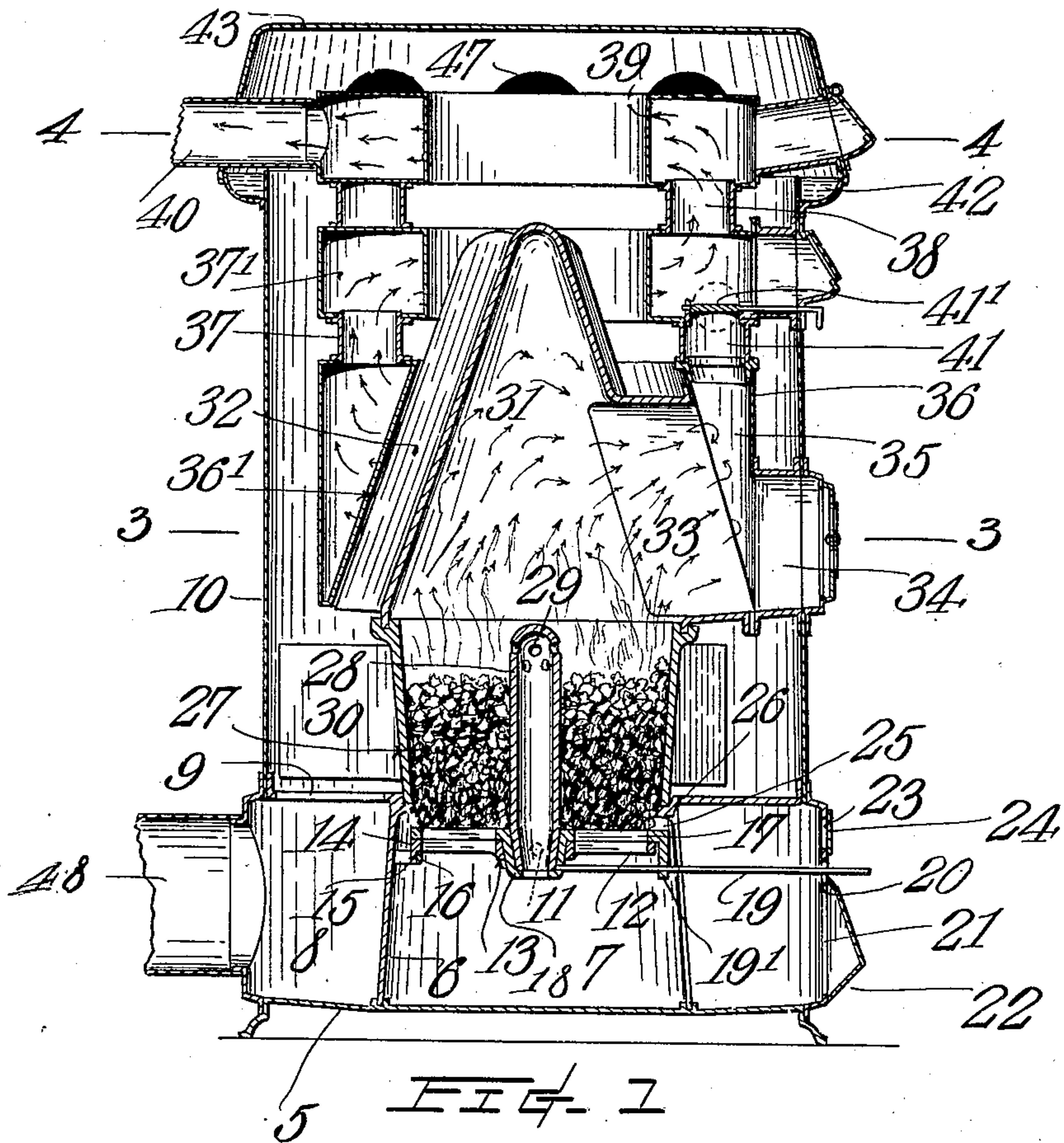
FURNACE.

APPLICATION FILED JUNE 5, 1908.

925,486.

Patented June 22, 1909.

2 SHEETS—SHEET 1.



WITNESSES:

E. J. Harriet
C. Daniels

Frank S. Lang
INVENTOR.

by *C. A. Snow & Co.*
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2 SHEETS—SHEET 2.

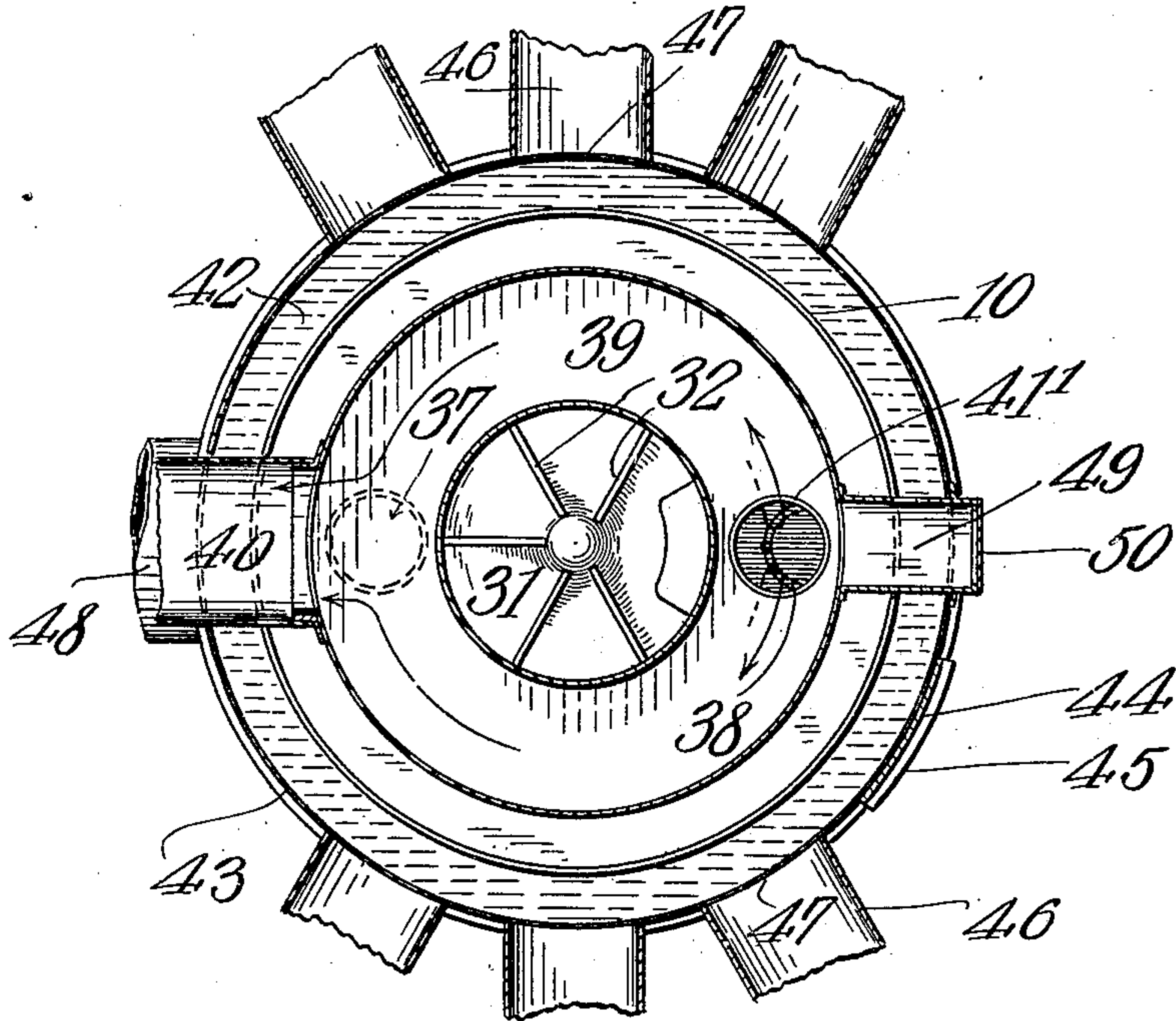


FIG. 4

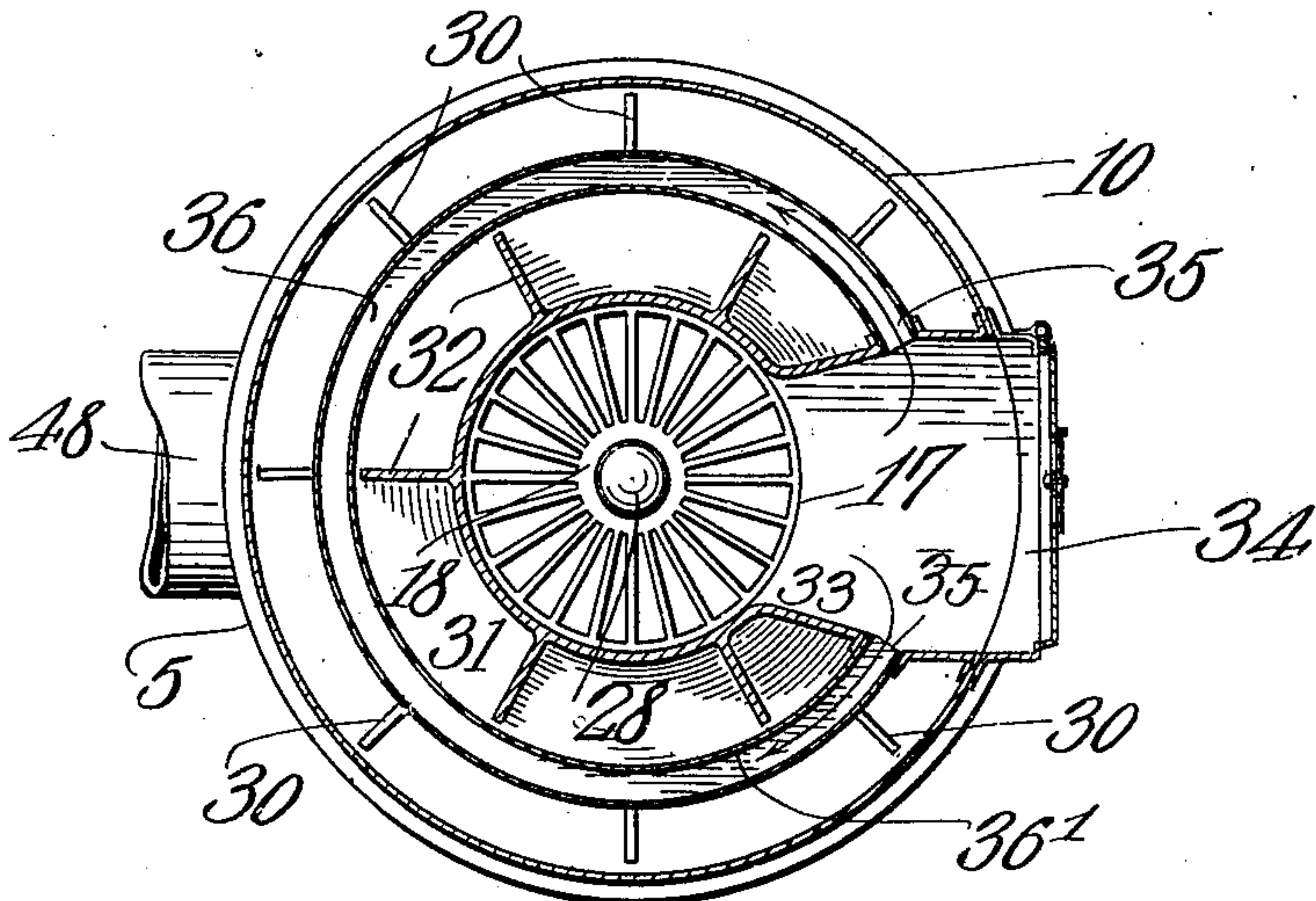


FIG. 5 *Frank S. Lang*
INVENTOR.

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E. J. Stewart
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UNITED STATES PATENT OFFICE.

FRANK S. LANG, OF SEATTLE, WASHINGTON.

FURNACE.

No. 925,486.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed June 5, 1908. Serial No. 436,934.

To all whom it may concern:

Be it known that I, FRANK S. LANG, a citizen of the United States, residing at 902 First avenue, S. Seattle, in the county of King and State of Washington, have invented a new and useful Furnace, of which the following is a specification.

This invention has relation to furnaces and it consists in the novel construction and arrangement of its parts as hereinafter shown and described.

The object of the invention is to provide a furnace especially adapted to be used for heating air and which is so arranged as to coke the fuel and burn the resultant gas and fuel without smoke. The fuel is burned from the top to the bottom of the fire pot and is completely consumed. The fire pot is provided with a central air tube open at its upper and lower ends which serves as a means for leading air above the fuel and also as a dust passage when the fire is raked.

A great saving may be effected by the use of the present invention as an inferior grade of fuel may be burned and in fact the lower grades of coal produce greater quantities of gas and consequently serve as an admirable fuel.

In the accompanying drawings:—Figure 1 is a vertical longitudinal section of the furnace. Fig. 2 is a perspective view of the grate devices, and Figs. 3 and 4 are horizontal sectional views taken on planes 3—3 and 4—4, respectively, of Fig. 1.

The base section 5 is divided by a partition 6 to afford a centrally disposed ash-pit 7 and an air receiving chamber 8 thereabout. This chamber 8 is open, as at 9, at the top to allow of the upflow of air into the space inclosed by the heater casing 10. Seated in journal bearings provided upon diametrically opposite sides of the partition 6 and in proximity of the top are trunnions 11 of a circular grate member 12 having radial arms which may be formed integral with the hub 13 and its rim 14. From this rim is a depending lug 15 arranged to enter a loop shaped attachment 16 at the back side of the partition for the purpose of making locked engagement to prevent the turning of said grate-member when shaking the other grate-member 17 and at the same time allow the tilting of the grate for dumping purposes.

The grate-member 17 is the counterpart of

the member 12 with similar radial arms, a rim, and a hub 18 but is seated for rotation upon the member 12 by having its hub 18 extend through the hub 13 of the other and is rotated by a shaker bar 19 having one end socketed in the hub 18 and extending through a lug 19' upon the rim of the upper member and thence through a slot 20 it protrudes outside of the heater. Below this slot and communicating therewith is an opening 21 in the peripheral wall of the said base section and through which communication is had with the ash-pit.

22 is a door for the opening 21 and directly above the slot 20 is another opening 23 with a door 24 for the insertion of a "slice-bar" (not shown) for cleaning clinkers from the top of the grate-member 17 and to accommodate such bar the grate is positioned at such an elevation as to provide a space 25 between the grate top and a ledge 26 above which supports a fire-pot 27. Socketed within the grate hub 18 is an upwardly extending tubular member 28 which is open at the bottom and closed at the top and adjacent the latter it is provided with a plurality of holes 29. These holes are disposed to be above the top of the charge of fuel which is proposed to be employed and they serve to supply air to combine with the gases emanating from the bed of coal to effect the complete consumption of the combustible gases thereof. Said fire-pot is desirably made of increasing diameter toward the top in order to sustain part of the weight of the fuel and prevent its "packing" as would be the case if it were borne by the grate alone, and also to present a large surface for the separation of the gases from the fuel.

Exteriorly of the fire-pot are radially directed fins 30, and supported in a circumferential groove provided about the top edge of the fire-pot is a conical shaped hood 31 provided exteriorly with radially directed fins 32. This hood is provided at the front with a passage 33 through which access is had for supplying fuel to the fire through a door opening 34 in the casing. Lateral openings 35 in the side walls of this passage, see Figs. 1 and 3, communicate with an annular radiator 36 through which the combustion gases normally travel, as indicated by the arrows, to the rear, whence they ascend through a flue 37 into a superposed

annular radiator 37' and flow forward to ascend through another flue 38 into a like radiator 39 above, see Figs. 1 and 4, from which the gases escape by a smoke pipe 40 to a chimney. The radiator 36 is in the form of a hollow drum with a conical inner wall 36'. Said wall 36' is parallel with the hood 31 and is spaced from the same so that the air has an unobstructed passage between the same. When starting a fire however, a by-pass flue 41 may be employed to make communication between the radiators 36 and 37' at the front and immediately below the flue 38 whereby a more direct travel is had and the flow correspondingly increased such as to facilitate the rapid generation of heat so that the draft thus created will suffice to cause the free flow of gases in the before explained backward and forward course through the radiators when the by-pass flue is closed by a damper 41' provided.

Secured to the casing 10 and about its top edge is an annular trough 42 for the reception of water, and carried by this trough is the casing-cap 43 provided with an opening 44 wherethrough the trough is from time to time replenished with water, and for which is provided a removable closure 45. Hot air pipes 46 are connected through openings 47 in said cap with the interior of the casing and an air supply pipe 48 is provided to admit air into the heater base about the ash-pit.

Passage ways 49 are provided to make connection between the radiators 37' and 39, respectively, with openings in the casing wall and cap for removing soot deposits from the radiators when cleaning the same, and at other times these ways would be closed by doors, such as 50.

The operation of the invention may be described as follows:—When starting a fire the upper grate member 17 is first adjusted to have its radial bars register with the bars of the grate member 12 below and the damper 41' opened, as indicated in broken lines in Fig. 1. The kindling and other fuel is then placed in the fire-pot and the fire started and when sufficiently brisk to indicate an effective draft being created in the chimney the damper is closed, whereupon the combustion gases take the course represented by the arrows in the several views. The fire is allowed to continue to receive air through the grate for some time or until the fire has thoroughly heated the entire charge of fuel so that the air passing through the fuel will commingle and assist the rise of the combustion gases being liberated by heat and when such a mixture arrives in the chamber within the hood it is in an inflammatory condition and uniting with the air which is admitted through the tubular member 28, is consumed. This condition is allowed to proceed but a short

while when the grate member 17 is manipulated to reduce the openings through which air would pass through the grate and the major portion of the air for combustion is admitted through the said tubular member. According to such conditions, the fuel burns from the top downward, that is to say, the more volatile gases are first driven off and consumed, then the residual combustible gases and coke is burned in turn, effecting a fire which may be regulated to be moderate or of extreme heat according to the demand. The air for heating purposes enters the base through the pipe 48 or as heretofore explained and being acted upon by the heat radiated from the various hot surfaces with which it contacts ascends into the space beneath the casing cap 43 whence it is distributed through the pipes 46 to the places where employed. In thus flowing from the casing the heated air traverses the trough 42 and takes up moisture to temper the air prior to its delivery. As is evident from an inspection of the drawings, the air in its movement from the supply pipe 48 to the delivery pipes 46 flows over and about the various surfaces of the apparatus from which it derives its heat.

By reason of the fact that the hub 18 of the grate member 17 depends from the plane of the said grate member and passes through the hub portion of the grate member 14 the hub 18 serves as a gudgeon in the bearing provided in the hub of the grate member 14, whereby the member 17 may be readily rocked when it is desired to shake down the ashes. Also, the said hub does not project above the plane of the grate member 17, and consequently presents no obstruction to the free use of a poker above the member 17 for the purpose of loosening up ashes. Also the hub 18 affords a socket or seat for the tubular member 28, and the said member 28 partially rotates with the grate member 17, and, consequently, breaks down the bank of ashes at the middle of the bed of coals. Inasmuch as the lower end of the tubular member 28 opens directly into the ash-pit air is conducted from the ash-pit up through the center of the grate members and the bed of coals and is liberated in the combustion zone above the bed of coals. This has the effect of preventing an excessive draft of air from passing up directly through the coals, as the surplus air will pass up through the tubular member 28 and enter the combustion zone. Thus it does not necessarily follow that the coals must be supplied with an excessive draft of air to keep them alive, and at the same time supply the proper column of air to the products of combustion.

Having described my invention what I claim as new and desire to secure by Letters-Patent is:—

In a furnace, a grate member having a

depending hub, a tubular member fixed in
said hub and provided with openings at its
upper and lower ends, and a second grate
member having a hub portion in which the
5 hub of the first said grate member is
 journaled.

In testimony that I claim the foregoing

as my own, I have hereto affixed my sig-
nature in the presence of two witnesses.

FRANK S. LANG.

Witnesses:

PIERRE BARNES,
E. H. ALVORD.