W. SCRIMGEOUR.

CRUCIBLE FURNACE.

APPLICATION FILED JAN. 7, 1908.

932,501.

Patented Aug. 31, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

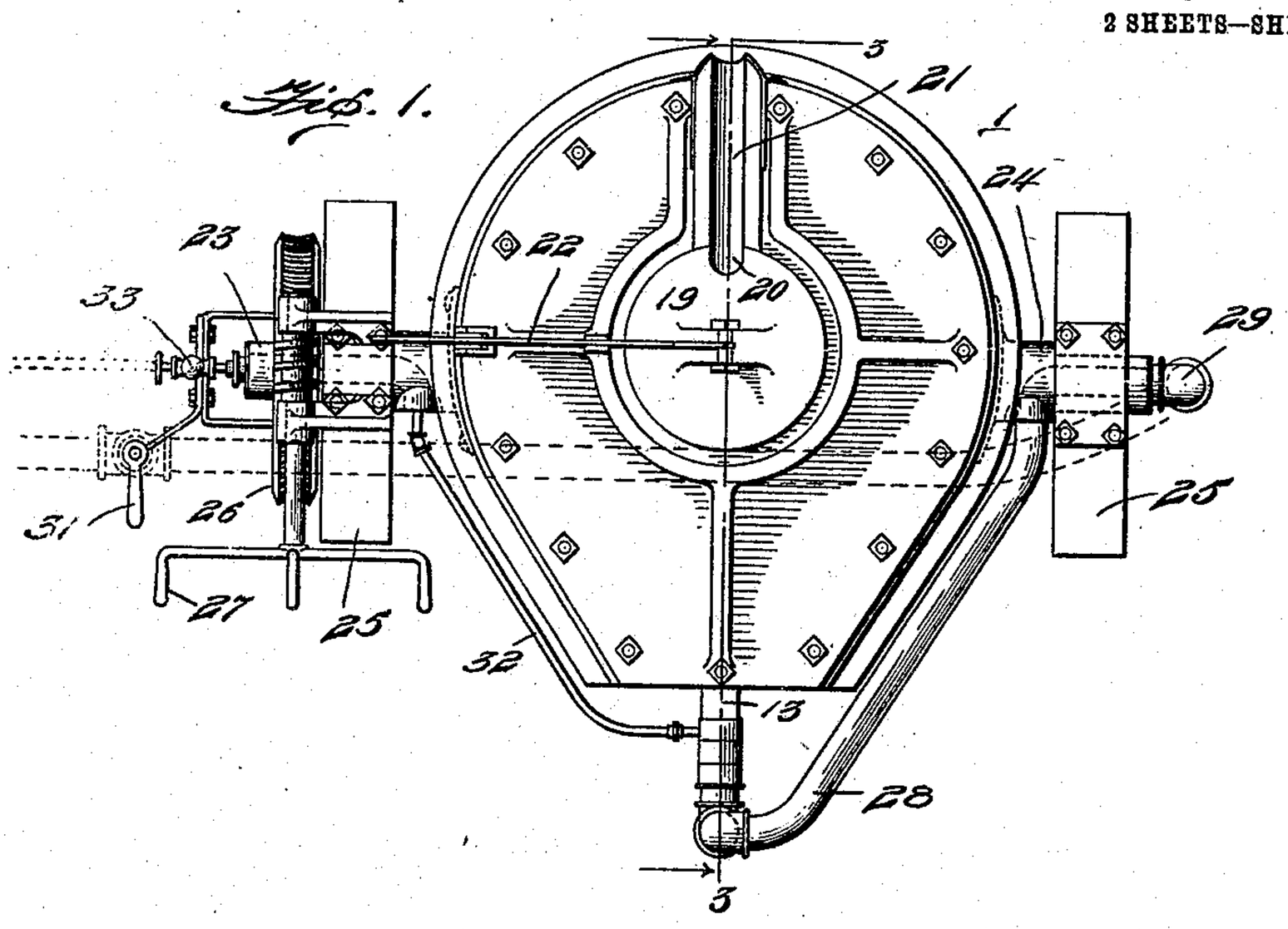
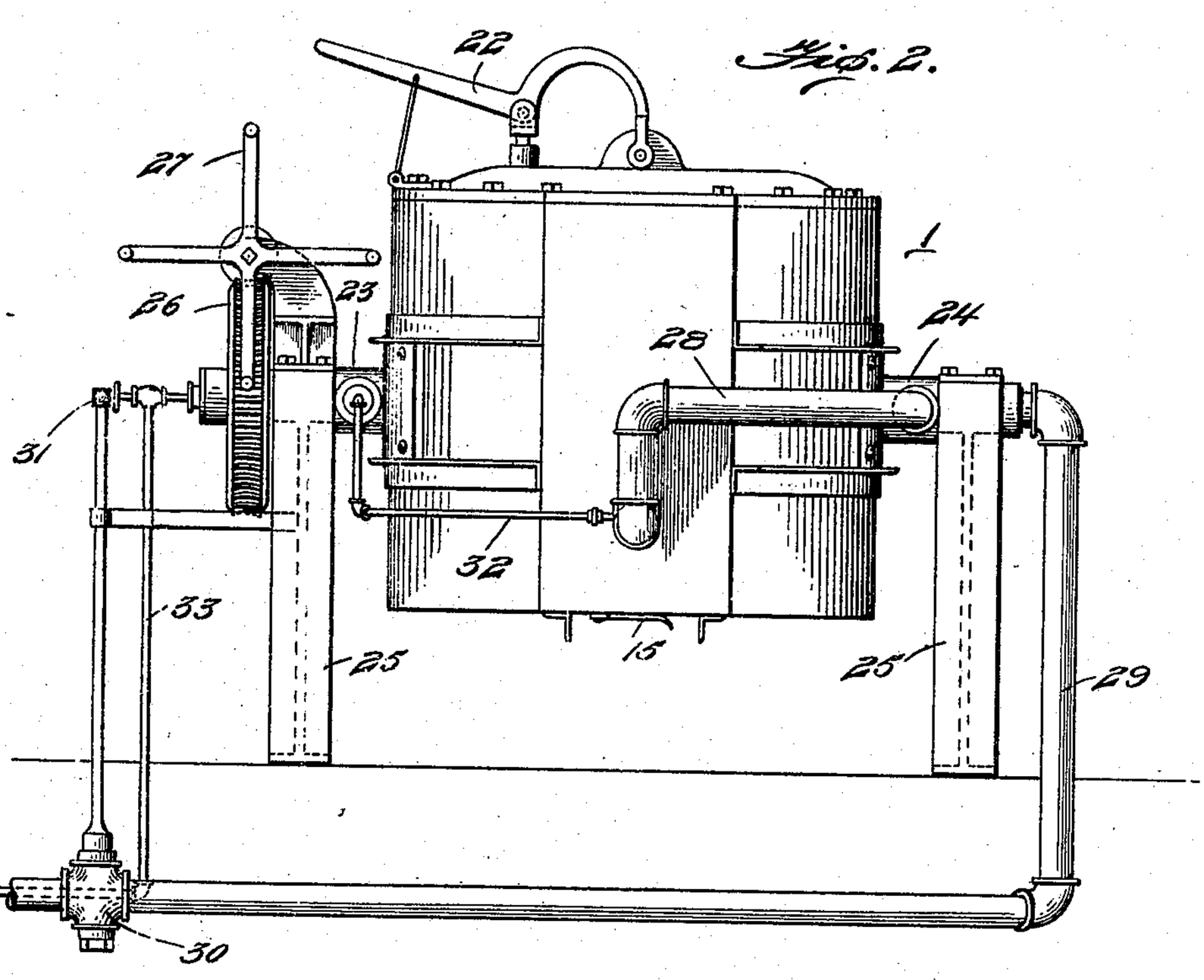


Fig. 2.



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 3.

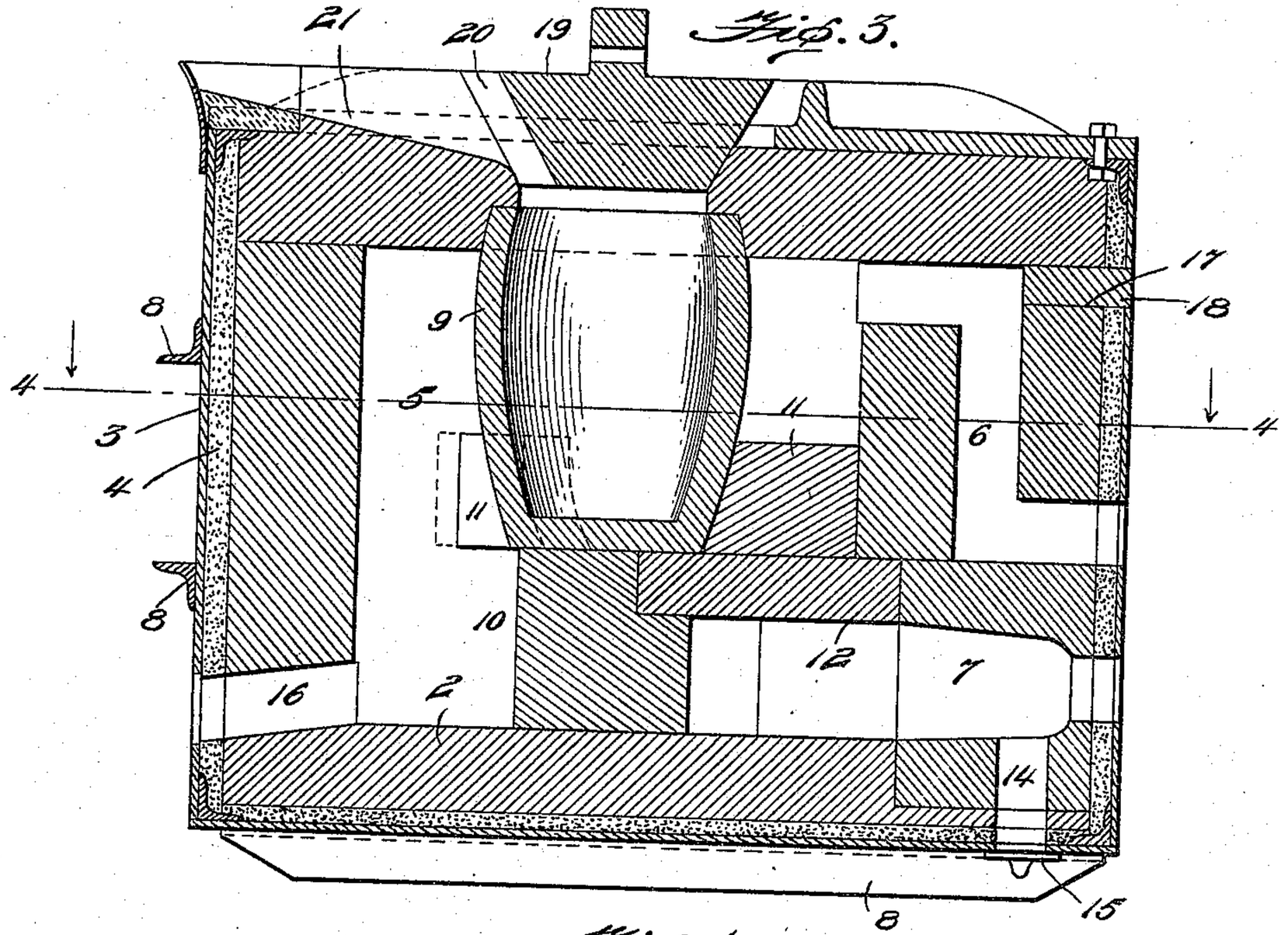
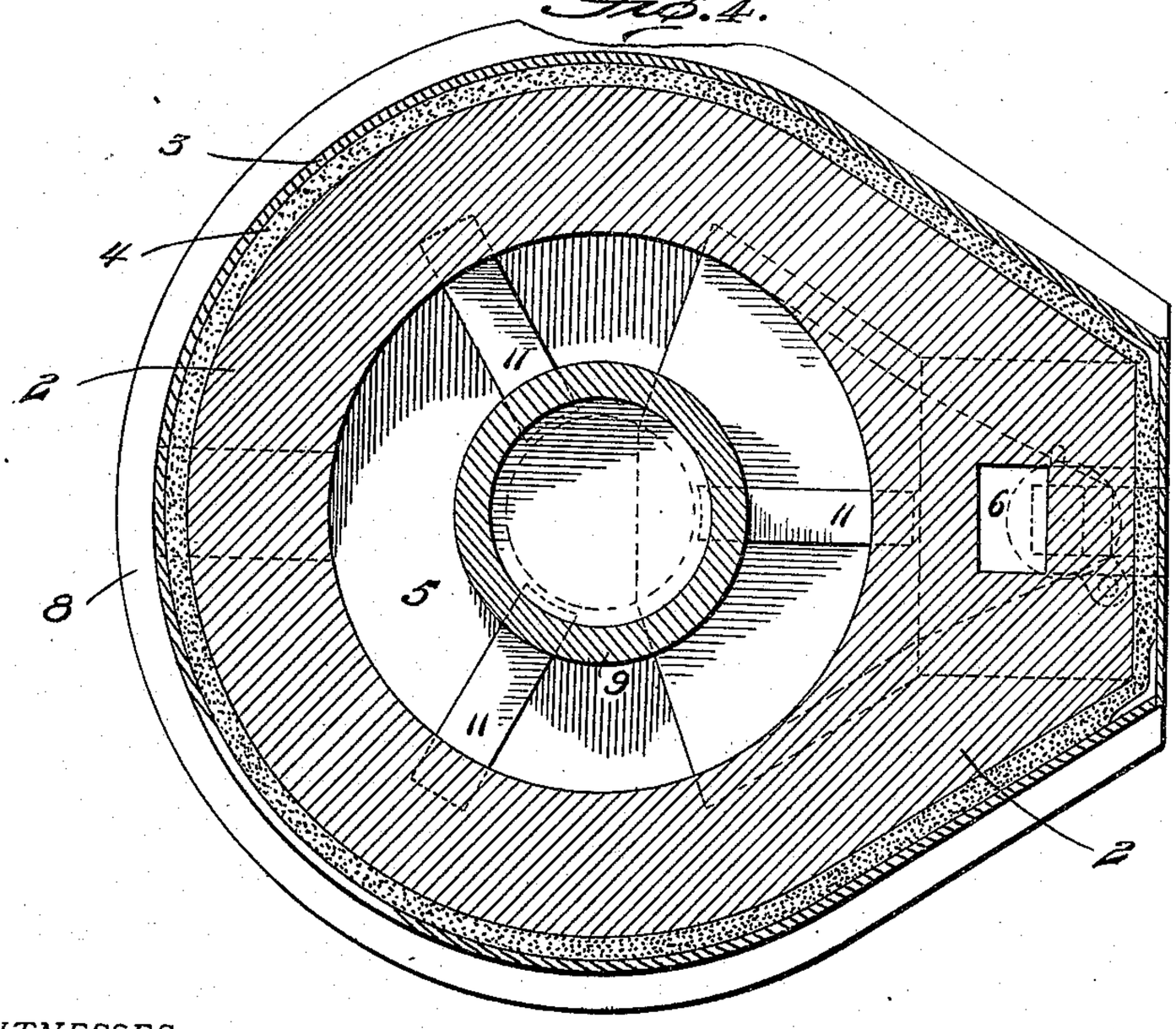


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CRUCIBLE-FURNACE.

932,501. Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed January 7, 1908. Serial No. 409,681.

To all whom it may concern:

Be it known that I, WILLIAM SCRIMGEOUR, a citizen of the United States, residing at Portsmouth, in the county of Norfolk and State of Virginia, have invented certain new and useful Improvements in Crucible-Furnaces, of which the following is a specification.

The object of this invention is to provide an improved crucible furnace particularly adapted for use with hydrocarbon or like fuels. The construction comprises a furnace casing mounted for oscillation, one or more crucibles supported in the furnace chamber within the casing, and a burner in operative relation with the casing and movable therewith. In the preferred construction a combustion chamber is provided in communication with the lower portion of the furnace chamber, and the waste products of combustion are discharged from the upper portion of the furnace chamber through a vent flue or flues so disposed that the products of combustion serve to heat the combustion chamber or to maintain its temperature. The casing is mounted on trunnions and may be tilted or oscillated as required; preferably the trunnions are hollow and serve as conduits for the fuel and for the steam or air required for its combustion, the construction being such that the burner may be mounted upon the casing and operated if desired in any position of the furnace.

For a full understanding of my invention reference is made to the accompanying drawings, wherein—

Figure 1 is a plan view of a preferred form of crucible furnace having a single crucible; Fig. 2 is a rear elevation of the same; Fig. 3 is a central vertical section on a somewhat larger scale on line 3—3 of Fig. 1, and Fig. 4 is a horizontal section on line 4—4 of Fig. 3.

Referring to the drawings, 1 represents the furnace casing which may comprise an inner refractory lining 2, an outer metal sheath 3 and an intermediate filling 4 of asbestos or other refractory material of low heat-conductivity. As shown the furnace is ovoid in contour, and is provided with a cylindrical furnace chamber 5, the thickened or rear section of the lining 2 affording a passage for the vent flue 6 for the waste products of combustion, and also permitting the provision of a relatively large combustion chamber 7.

8 represents angle bars for reinforcing the construction.

The crucible 9 is centrally supported within the chamber 5 upon a refractory block or brick 10, and is held in position by radial supports 11, shown as three in number, these supports serving not only as stays for the crucible in all positions of the furnace but also to interrupt the flow of the heated products of combustion and to prevent rotation thereof.

The combustion chamber 7 is disposed below and to the rear of the crucible, a refractory block or brick 12 supported by the block 10 and the lining of the furnace chamber forming its roof. The combustion chamber flares inwardly toward the furnace chamber 5 as indicated in dotted lines in Fig. 4, the burner 13 (Fig. 1) being mounted in operative relation with its contracted end.

14 represents an ignition port disposed beneath the combustion chamber 7, this port being normally closed by a cover-plate 15.

16 represents a port opening into the lower portion of the furnace chamber, this port being closed during the normal operation of the furnace but capable of serving as an outlet for the products of combustion during the preliminary heating; a port serving a similar purpose and communicating with the upper portion of the furnace chamber is indicated at 17, the closure therefor being represented at 18.

19 is the cover of the crucible, preferably recessed for pouring as indicated at 20, the recess 20 registering with the run-way or spout 21.

22 is a hand-lever for manipulating the cover 19.

The furnace is mounted on hollow trunnions 23, 24 supported in standards 25, and may be tilted by means of a worm-gear 26 actuated by a hand-wheel 27.

The hydrocarbon burner 13, which may be of any desired type, communicates by means of a fixed air or steam pipe 28 with the hollow trunnion 24, whence connection is made through pipe 29 with a source of air or steam under suitable pressure, the supply being controlled by a cock 30, the handle 31 of which is disposed at a point accessible to the operator.

32 represents the fuel supply pipe for the burner, communicating with the hollow trunnion 23, a valved pipe 33 being provided for the supply of fuel, usually a liquid hydrocarbon.

The pipes 29 and 33 are provided adjacent

their respective trunnions with any approved type of couplings permitting rotation.

The furnace above described presents many advantages in practice, among which may be mentioned the fact that the burner may be secured to the casing or adjusted therein, and the tilting of the furnace does not necessitate the disturbance of this adjustment; moreover the application of heat may be continued during the pouring operation or during any interruption of this operation. After pouring, the furnace may be inverted and the heating continued until the slag or cinder is completely discharged from the crucible. The provision of the combustion chamber 7 insures substantially complete utilization of the fuel and a high efficiency of operation. The refractory block 10, centrally disposed in the furnace chamber and directly in the path of the flame serves to properly distribute the heat. The rotation or gyration of the highly heated gases, by which their heating effect is measurably reduced, is effectually prevented by the radial bricks 11, these serving also to support the crucible and prevent its displacement during pouring. As stated above the position of the vent flue 6 adjacent the combustion chamber is essential to the highest economy and efficiency of work.

A further advantage of construction resides in the protection afforded by the conformation of the roof of the furnace. It will be observed that the furnace roof closely surrounds the upper margin of the crucible and engages therewith, and that no vent or aperture is afforded around the crucible for the escape of heated products. This construction is advantageous in that it avoids all corrosion or fusion of the upper margin of the crucible thereby greatly prolonging its life, and also protects the operator during the pouring from any heat other than that due to the molten contents of the crucible; the roof furthermore serves to support the crucible in all positions of the furnace.

It will be understood that while I have shown provision for a single burner, any required number of burners may be provided in a single furnace in accordance with the requirements of practice; in case several burners are employed, a combustion chamber and a vent flue adjacent the same will preferably be disposed in connection with each burner.

I claim:

1. A crucible furnace comprising a furnace casing mounted for oscillation, a crucible supported within said casing, a combustion chamber leading to the interior of said casing, a hydrocarbon burner in operative relation with said combustion chamber and movable with said casing, and a vent adjacent said combustion chamber.

2. A crucible furnace comprising a furnace casing mounted for oscillation, a crucible supported above the bottom of said casing, refractory bricks radially disposed within the casing for supporting said crucible and preventing rotation of the heated products of combustion, a hydrocarbon burner in operative relation with said combustion chamber and movable with said casing, and a vent adjacent said combustion chamber.

3. A crucible furnace comprising a furnace casing mounted for oscillation, a crucible supported above the bottom of said casing, a combustion chamber communicating with the lower portion of said casing, a vent adjacent said combustion chamber, and a hydrocarbon burner in operative relation with said combustion chamber and movable with said casing.

4. A crucible furnace comprising a furnace casing mounted for oscillation, a crucible supported above the bottom of said casing, a combustion chamber communicating with the lower portion of said casing, a vent flue communicating with the upper portion of said furnace chamber and venting at a point adjacent said combustion chamber, and a hydrocarbon burner in operative relation with said combustion chamber and movable with said casing.

5. A crucible furnace comprising a furnace casing mounted for oscillation, a crucible supported within said casing, a substantially horizontal combustion chamber leading to the central portion of said casing near the bottom thereof, a hydrocarbon burner in operative relation to said combustion chamber and movable with said casing, and a vent adjacent said combustion chamber.

In testimony whereof, I affix my signature in presence of two witnesses.

WILLIAM SCRIMGEOUR.

Witnesses:
C. P. TOWNSEND,
N. P. LEONARD.