

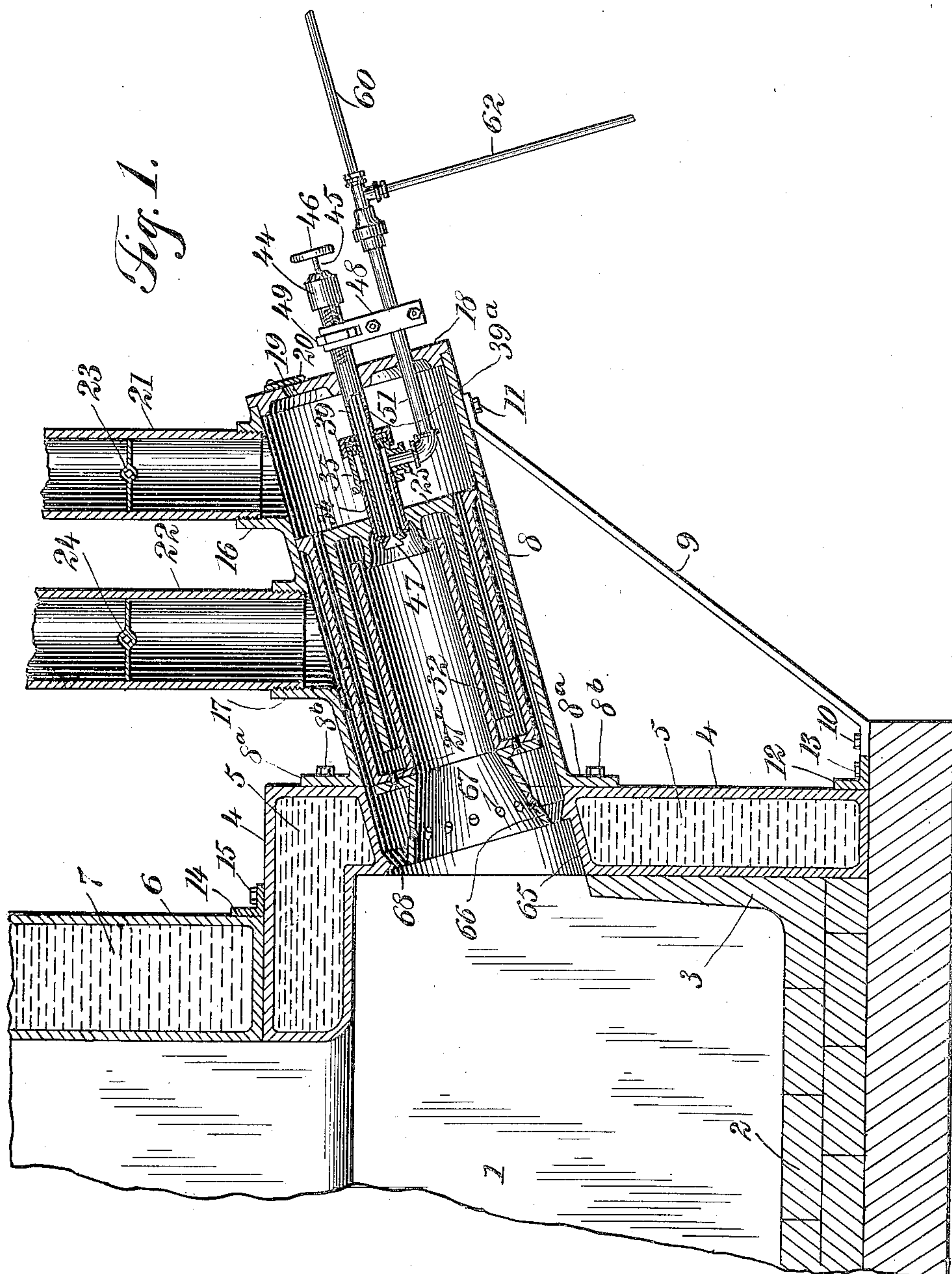
No. 818,256.

PATENTED APR. 17, 1906.

W. KEMP.  
BURNER FOR HYDROCARBON VAPORS.

APPLICATION FILED OCT. 3, 1903.

2 SHEETS—SHEET 1.



WITNESSES:

*A. B. Mattingly,*  
*W. Harrison*

INVENTOR

*William Kemp*

BY

*Mumma*

ATTORNEYS



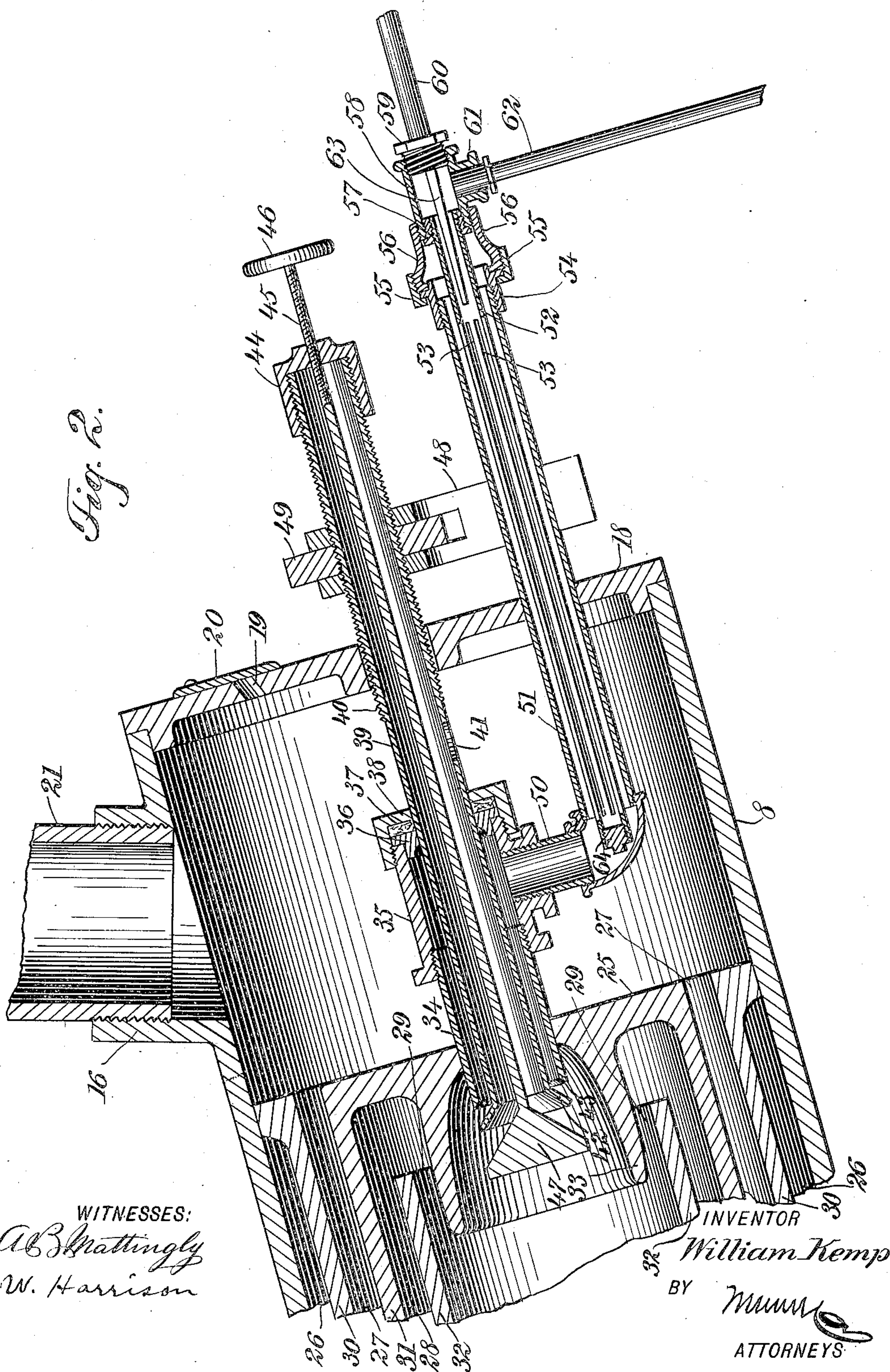
No. 818,256.

PATENTED APR. 17, 1906.

W. KEMP.  
BURNER FOR HYDROCARBON VAPORS.

APPLICATION FILED OCT. 3, 1903.

2 SHEETS—SHEET 2.





# UNITED STATES PATENT OFFICE.

WILLIAM KEMP, OF TUCSON, ARIZONA TERRITORY, ASSIGNOR, BY  
DIRECT AND MESNE ASSIGNMENTS, TO THE KEMP HYDRO-CARBON  
FURNACE COMPANY, A CORPORATION OF NEW YORK.

## BURNER FOR HYDROCARBON VAPORS.

No. 818,256.

Specification of Letters Patent.

Patented April 17, 1906.

Application filed October 3, 1903. Serial No. 175,582.

*To all whom it may concern:*

Be it known that I, WILLIAM KEMP, a citizen of the United States, and a resident of Tucson, in the county of Pima and Territory of Arizona, have invented new and useful Improvements in Burners for Hydrocarbon Vapors or the Like, of which the following is a full, clear, and exact description.

My invention relates to burners, and admits of general use, but is peculiarly applicable to burners of a type for use in connection with hydrocarbon vapors or the like, and is preferably employed in connection with furnaces for smelting ores.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a view in vertical section, showing my invention as applied to a furnace for smelting ores; and Fig. 2 is an enlarged vertical sectional view showing the position of the burner mechanism proper.

The furnace is shown at 1 and is lined at its bottom with brick 2, being provided with an inner wall 3, the top of which is somewhat thinner than its bottom. The water-jacket 4, filled with water 5, is surmounted by another water-jacket 6, filled with water 7. The burner-casing is shown at 8 and is provided with flanges 8<sup>a</sup>, secured in position by means of bolts 8<sup>b</sup>. A brace-rod 9 is provided with bolts 10 11 for the purpose of securely holding the burner-casing in position. The lower end of the brace-rod rests against a foot 12, secured in position by means of a bolt 13. A similar foot 14 is provided with a bolt 15 and serves to secure the water-jacket 6 firmly in position upon the water-tight jacket 4. The upper portion of the burner-casing 8 is provided with necks 16 17, and the outer end of the casing is closed by a head 18, provided with a peep-hole 19, and over this peep-hole is a drop-door 20. In the necks 16 17 are mounted the air-supply pipes 21 22, provided, respectively, with gates 23 24. Mounted within the burner-casing 8 is a cylindrical body or baffle-cup 25, a number of annular channels 27 28 being formed in the body by means of the several cylindrical members or walls 30 31 32, and an annular inwardly-projecting bead 33 is formed or mounted upon

the cylindrical head of the body 25. A tube 34 passes through an opening therefor in the head of the body or baffle-cup 25 and is connected with a cylinder 35. This cylinder is provided at its outer end with a ring 36 of the shape in cross-section shown in Fig. 2, and against this ring bears a packing 37, secured in position by a cap 38, thereby constituting a stuffing-box. A tube 39, mounted in the head 18, is provided for a suitable distance from its outer end with threads 40 and is also provided with a duct at 41 and with a flaring portion 42 at its inner end or extremity, the outer face of which is parallel with the beveled edge 43 of the tube 34, the inner portion of said tube 39 passing through said tube 34, as shown, and said flaring portion 42 constituting a valve for either regulating or cutting off the vapor mixture passing toward the furnace from between the tubes 39 and 34 by properly manipulating the adjusting device hereinafter referred to. A threaded cap 44 closes the upper end of the tube 39, and working in this cap is a threaded portion of a stem 45, revoluble by means of a hand-wheel 46, mounted on the outer end of said stem. Upon the inner end of the stem 45 is mounted a conical valve 47, and by turning the hand-wheel 46 the valve 47 may be moved into and out of proximity to the flared surface 42 of the tube 39, which serves as a valve-seat. A clamp 48, provided with a threaded member 49 for engaging the threads 40 on the tube 39, is secured upon a tubular member 51, passing through an opening therefor in head 18 and connected at its inner end with a neck 50, supporting and being in communication with the cylinder 35. Mounted within the tubular member 51 is an inner tubular member 52 of smaller diameter, provided with longitudinal slots 53, these slots being disposed radially. The duct 41 by permitting air to flow freely into the tube 39 prevents the destruction of the tube and other parts of the burner, and this same action assists in heating the air passing through the tube 39 to unite with the vapor mixture passing from the space between said tube and tube 34 into the cylindrical hollow body or baffle-cup 25.

A threaded sleeve 54 is secured upon the outer end of the tubular member 51, and a ring 55 encircles the sleeve 54, and mounted within this ring is another ring 56, which is



threaded for the purpose of making a secure engagement with the ring 55. A sleeve 57 is mounted upon the outer end of the inner tube 52, and between the sleeves 56 and 57 is another sleeve 58, closed by a cap 59, connected with a steam-pipe 60. By means of a neck 61 the sleeve 58 is in communication with a pipe 62, which serves to supply hydrocarbon vapor to the interior of said sleeve 58, thence to the tube 52. A nozzle 63, having a general tapering form, is connected with the cap 59 and virtually constitutes the terminus of the steam-pipe 60, said nozzle extending within the tube 52 for a suitable distance from the outer end of the latter. The other end of the inner tube 52 is closed by a screw-plug 64.

The water-jacket 4 is provided with an aperture 65, the walls of which are disposed obliquely, as shown in Fig. 1. An air-jacket 66 of flaring form is disposed partially within the burner-casing 8 and partially within the aperture 65 in the water-jacket. This air-jacket is provided with holes 67 and forms an annular aperture 68, through which the air divides and passes. The object of the air-jacket is to protect the metal-work against the heat of the flame, and the air thus used in absorbing heat is used for oxidizing sulfur and the like in the treatment of cotton matte.

My invention is used as follows: When the air is turned on through the pipes 21 22, the draft being regulated at will by means of the gates 23 24, steam passes through the pipe 60 and the nozzle 63 to the inner tubular member 52 and in its escape from the nozzle produces an aspirating effect, thereby raising the hydrocarbon liquid through the tube 62 and causing hydrocarbon vapor to pass radially outward through the slots 53, thence through the neck 50 to the cylinder 35, thence between the tubes 34 and 39 and through the annular bead 33 to the inner cylinder or member 32. The air from the pipe 21 passes into the casing 8, and the greater bulk of this air then passes through the annular channel 27 to the free end of cylindrical member 31, thence back to the free end of cylindrical member 32, (through channel 28,) and finally out through space 29 between wall 32 and bead 33. A portion of the air passes upwardly through the duct 41 and to the left through the tube 39, going outward past the flange 42 and the valve 47. This air is admixed with vapor passing outwardly from between the tubes 39 and 34, the admixture taking place within the bead 33 and being driven to the left through the inner cylindrical member or wall 32 directly to the furnace. The combustion takes place within the bead 33 and the inner cylindrical member 32. The portion of air passing into the channel or passage 27 goes to an annular bottom 27<sup>a</sup> of the body or baffle-cup 25 and is there baffled thereby, returning to a point immediately adjacent to

the cylindrical head of the body, and is then admixed with the hydrocarbon vapor and steam, the cylindrical members 30 and 32 thus serving as a baffle-cup, the cylindrical member 31 being a dividing-partition for causing the air to pursue a sinuous path from one end of the cup to the other, then back to a point near the bead 33. The air following this sinuous path is heated before being admixed with the hydrocarbon vapor and with the gases of combustion as they are produced. Air from the pipe 22 passes downwardly and around the cylindrical or annular member 30, being thereby heated, and this air then passes directly to the flame. By absorbing heat it accomplishes a twofold object—to wit, it promotes better combustion and also tends to prevent the baffle-cup from being unduly heated. This air in passing through the air-jacket 66 is redistributed in a sense and is divided, a portion passing directly into the furnace and another portion passing toward the axis of the burner and in the general direction of the furnace. The air thus passing through the jacket, and thereby becoming heated, serves to protect the metal-work from undue heating and also enters the flame at a higher temperature than would otherwise be the case.

The outer tubular member 51, the inner tubular member 52, provided with the slots 53, and the nozzle 63 constitute a mixing-tube, as above described.

I find that the results obtained by this furnace are greatly improved in consequence of the baffle-cup formed of the inner and outer cylindrical members 30 32 and the cylindrical web 31 for guiding the air through the same. By properly manipulating the nut 49 in clamp 48 it is apparent that tube 39 may be adjusted to operate the flaring portion or valve 42 at the inner end of said tube.

It will be understood that the lower ends of the cylinders 32 and 30 may be practically integral with the so-called "annular bottom" 27<sup>a</sup> therebetween, while the upper ends thereof are open, as shown. The intermediate cylinder 31 is separate from the others of course, and its upper end may be practically rigid with the part (head) designated at 25, having the tube 34 extending therethrough and into the inwardly-projecting bead 33. In this way the tubular structure referred to may be supported relatively to the members cooperating therewith.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

In a burner for hydrocarbon vapor and the like, the combination of a casing, a baffle-cup within the casing, comprising inner and outer cylinders having a space between the two closed at one end and open at the other, together with an intermediate cylinder, closed at the end thereof adjacent to the open end



of said space and open at the closed end of the space; means for delivering hydrocarbon vapor to said inner cylinder, and means for supplying air to and through said baffle-cup, the  
5 closed end of said intermediate cylinder having an annular bead extending within the open end of said inner cylinder.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM KEMP.

Witnesses:

L. W. WAKEFIELD,  
HARRY L. HEFFNER.