H. H. WILSON.

BOILER FURNACE.

APPLICATION FILED JULY 16, 1910.

997,529.

Patented July 11, 1911.

2 SHEETS—SHEET 1.

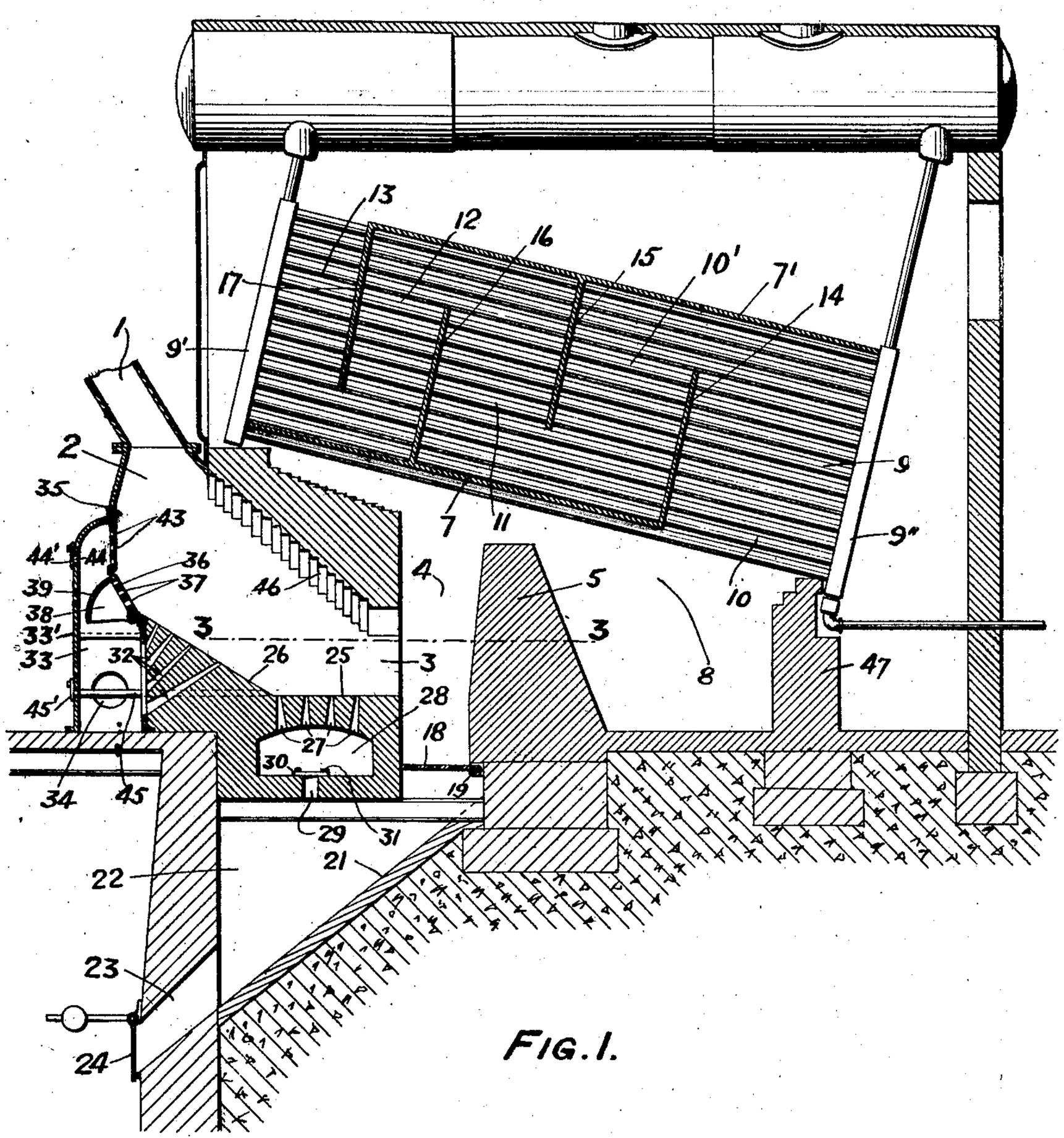

FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 2.

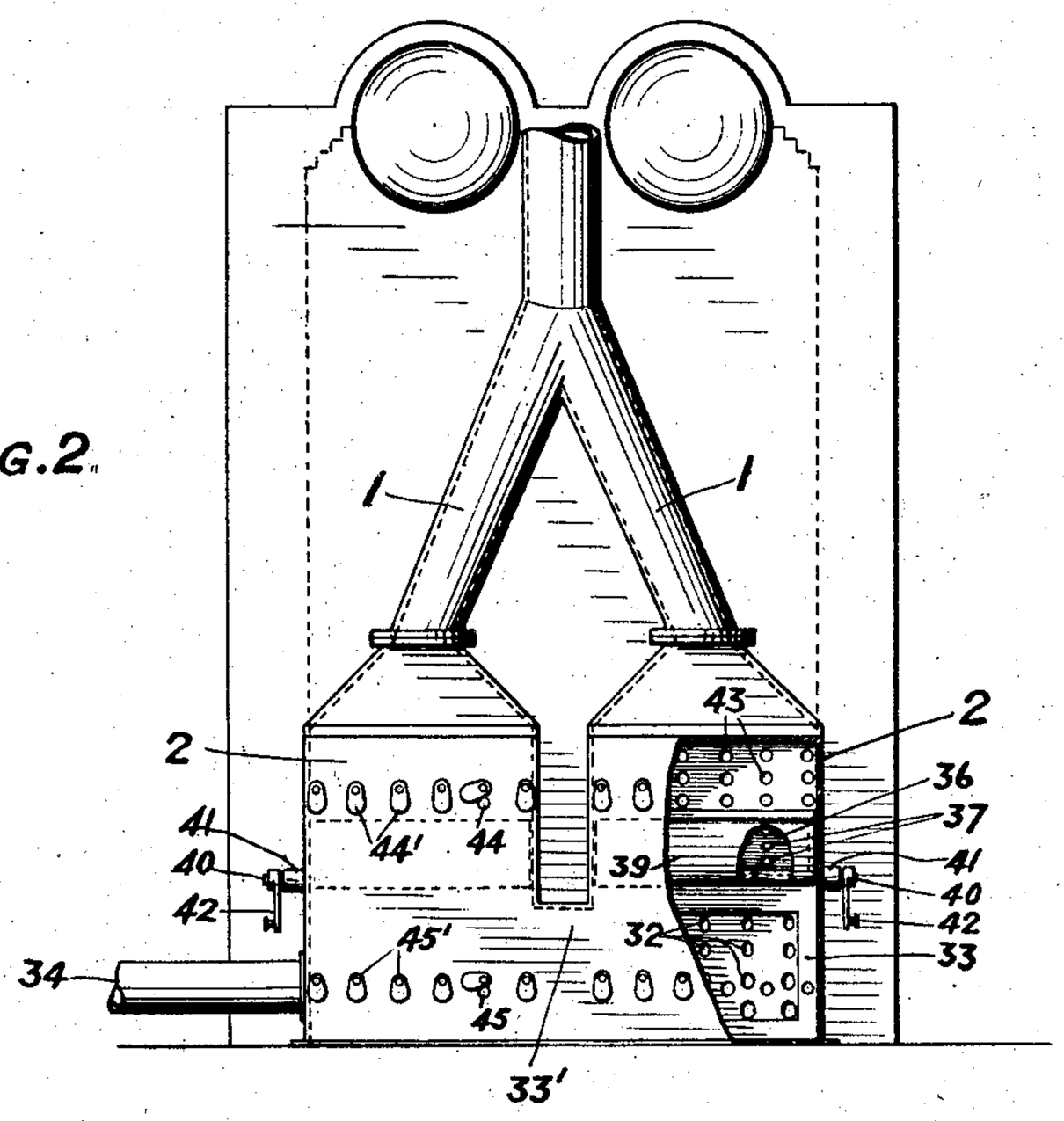
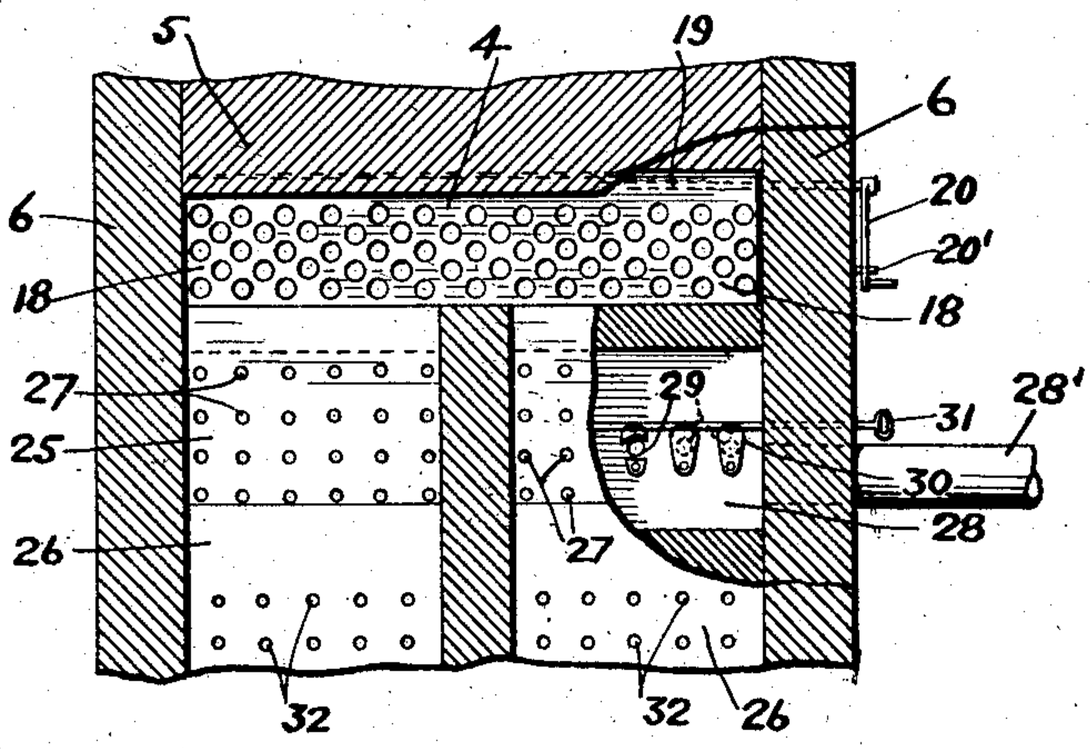


FIG. 3.



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UNITED STATES PATENT OFFICE.

HEARLEY HOWELL WILSON, OF ALTOONA, PENNSYLVANIA.

BOILER-FURNACE.

997,529. Specification of Letters Patent. Patented July 11, 1911.

Application filed July 16, 1910. Serial No. 572,309.

To all whom it may concern:

Be it known that I, HEARLEY HOWELL WILSON, a citizen of the United States, residing at Altoona, in the county of Blair and State of Pennsylvania, have invented an Improved Boiler-Furnace, of which the following is a specification.

My invention is a boiler furnace having improved means for the production and combustion of gas, whereby there is effected a desired control of the fuel and air with complete combustion and high boiler efficiency, complete combustion of the smoke producing hydrocarbon gases is obtained before impact upon the heating surfaces of the boiler, complete combustion of the fuel is secured without the usual ash pit losses due to sifting of fine coal as in overfeeding grates, no metal parts are required in the construction of the portions of the furnace subject to the high temperature, and maintenance charges are reduced due to the stable character of the construction.

The characteristic features of my improvements, by which the foregoing and other desiderata are obtained, will more fully appear in the following description and the accompanying drawings in illustration thereof.

In the accompanying drawings, Figure 1 is a sectional elevation of apparatus embodying my improvements, Fig. 2 is a front elevation of the same with parts shown in section, and Fig. 3 is an enlarged sectional view, taken on the line 3—3 of Fig. 1, with parts broken away.

In the apparatus, as illustrated in the drawings, chutes 1 deliver fuel through the tops of the respective gas producers 2 having the respective outlets 3 for discharging the products of distillation and combustion. The outlets discharge to a passage 4 formed in the rear of the producers by the bridge wall 5 extending between the furnace walls 6. The gaseous products, rising in the passage 4, are deflected by the baffle 7 over the bridge wall 5 into the top of the chamber 8, whence they flow transversely to the boiler tubes 9 through the gradually contracting passes 10, 10′, 11, 12 and 13, the latter being formed by the parallel baffles 7 and 7′ and the baffles 14, 15, 16 and 17 disposed transversely thereto. The solid products discharged into the passage 4 fall upon the grate 18 which is supported by the hinge 19 and held up by the engagement of a lever 20 thereon with a pin 20′; the grate being disposed above the inclined floor 21 of an ash pit 22 which discharges through a port 23 having a door 24.

Each gas producer has a hearth comprising a substantially horizontal rear section 25 adjacent to the passage 4 and an inclined forward section 26 rising from the horizontal section. The section 25 has therein the ports 27 connecting the air chamber 28 with the interior of the producer body, air being supplied to the chamber by the passage 28′. This chamber is connected by the ports 29 through the bottom thereof with the ash pit 22, the ports being controlled by the rocking valves 30 which are operated simultaneously by the rod 31. The section 26 has therein the diverging ports 32 connecting the air and steam chamber 33 with the interior of the producer body, the chamber having the inlet passage 34. The front wall 35 of each producer has therein, within the chamber 33, a fuel pusher and agitator comprising a plate 36 containing ports 37, wings 38 connected with the edges of the plate 37, and a cylindrical segment 39 connected with the tops of the plate and wings; the agitator having the journals 40 revoluble in the bearings 41 and rocked by the arms 42 fixed to the journals. The front wall 35 has, within the chamber 33 and above the agitator, the further ports 43 communicating with the upper zone of the producer body. The casing 33′ has the openings 44, normally closed by the valves 44′, by which a rod can be inserted and passed through the ports 43, to clear them and poke the fuel above the agitator. Tubes 45, having their outer ends closed normally by the valves 45′, extend through the chamber 33 and the hearth section 26 parallel to the surface of the hearth section 25, these tubes permitting the insertion of rods for clearing the flat hearth section of clinkers. Arches 46, extending transversely or from side to side and inclining downwardly from front to rear, roof the producers, the several producers used per furnace making the arch span comparatively small and less liable to destruction.

In operation, coal is supplied constantly through the chute 1 to keep the body 2 constantly filled with fuel. As the coal descends in the producer, the upper zone has distributed therethrough air combined with steam, which is supplied from the passage 34 to the chamber 33 and delivered there-

from through the ports 43; the coal in the upper zone being heated so that volatile gases are evolved. Air combined with steam is also introduced from the chamber 33 through the ports 37 of the agitator and the ports 32 of the hearth to further the distillation and the evolution of monoxid gases in the lower zones, the agitator being rocked to push the now incandescent fuel forward. As any remaining coke with the ash and refuse passes over the hearth section 25, air is distributed therethrough from the chamber 28, the coke is consumed, and air is combined with gas produced in the earlier stages of the operation to support its combustion in the chambers 4 and 8 and the succeeding furnace passes. In the event of the fuel being pushed forward too rapidly, with the delivery of coke upon the grate 18, the valves 30 are opened and air is allowed to flow from the chamber 28, by way of the ports 29 and chamber 22, through the grate, by which the combustion of the coke is completed, the refuse therefrom being dumped into the ash pit.

The usual limitations upon the operation of forcing a boiler, which result from the limitations upon the fuel and air supply, are avoided by the foregoing improvements, whereby any desired amount of fuel and air can be used, with the production and combustion of the desired amount of gas, which permits the boiler to be forced to a high limit. As the flue draft is not required for drawing the air through the fuel, its force can be utilized for drawing the gases through the passes by which they are directed into contact with the heating surfaces of the boiler, permitting the use of smaller passes and higher velocities with consequently greater heating efficiency. The production of the gases is not only under control but they are delivered in such place and condition that the maximum energy can be obtained therefrom and utilized.

Having described my invention, I claim:

1. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet for the products of combustion at the bottom thereof, a stationary hearth section having ports therein adjacent to said outlet, an inclined stationary hearth section having ports therein between said hearth section first named and said inlet, means whereby the supply of air to the different ports can be independently controlled and an oscillating agitator between said inclined hearth section and said inlet.

2. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet for delivering products of combustion therefrom, a hearth having angularly disposed fixed sections, a roof extending over said hearth, an agitator between said inlet and hearth adapted for pushing fuel in said chamber across said hearth, a chamber, and ports connecting said chambers between said inlet and agitator.

3. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet for delivering products of combustion therefrom, a hearth having a substantially flat section adjacent to said outlet and an inclined section beneath said inlet, an oscillating agitator above said inclined hearth section, an air chamber beneath said substantially flat hearth section, ports connecting said air chamber with said chamber first named, an air and steam chamber, ports connecting said last named chamber with said first named chamber, a pass to which said products of combustion are delivered, a grate in said pass, and a passage whereby said second named chamber delivers air through said grate.

4. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet for products of combustion at the bottom thereof, an arch extending downwardly between said inlet and outlet, a substantially flat hearth section having ports therein adjacent to said outlet, an inclined hearth section having ports therein between said flat section and said inlet, ports between said inclined hearth section and said inlet, a chamber connected with said chamber first named by said ports through said flat hearth section, and a chamber connected with said chamber first named by said ports through said inclined hearth section and said ports between said inlet and said inclined hearth section.

5. A distillation and combustion chamber having an inlet at the top thereof, an outlet at the bottom thereof, an arch inclined downwardly from said inlet toward said outlet, a hearth having a substantially flat bottom section adjacent to said outlet and an inclined section between said inlet and said flat section, a second chamber, ports connecting said second chamber with said first chamber and tubes extending through said second named chamber and said inclined hearth section to permit access to said flat hearth section.

6. A chamber having a fuel inlet, an outlet for discharging gaseous products of combustion therefrom, a horizontal hearth extending inward from the outlet having air ports passing upward therethrough to supply air to support combustion thereat, an inclined hearth leading upward from said horizontal hearth, an oscillating agitator and fuel feeder contiguous to the upper end of the inclined hearth, and means for effecting distillation in a zone adjacent to the fuel inlet, said means being situated between said inclined hearth and said fuel inlet.

7. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet at the other end for delivering prod-

ucts of combustion therefrom, a horizontal hearth extending inward from the outlet, an inclined hearth leading upward from said horizontal hearth, a fuel agitator and pusher contiguous to the upper end of the inclined hearth, a chamber contiguous to said agitator and said inclined hearth, ports leading from said last named chamber on both sides of said agitator into said combustion chamber, a chamber beneath the horizontal hearth, and ports leading from said last named chamber through said horizontal hearth.

8. A distillation and combustion chamber having a fuel inlet at the top thereof, an outlet for delivering products of combustion therefrom, a horizontal hearth extending inward from the outlet, an inclined hearth leading upward from said horizontal hearth, a fuel agitator contiguous to the upper end of the inclined hearth, a chamber contiguous to said agitator and said inclined hearth, ports leading from said last named chamber on both sides of said agitator into said combustion chamber, a chamber beneath the horizontal hearth, ports leading from said last named chamber through said horizontal hearth, a pass into which said outlet opens, a grate in said pass, and means for supplying air from the chamber below the horizontal hearth upward through said grate.

In witness whereof I have hereunto set my hand this 14″ day of July 1910, in the presence of the subscribing witnesses.

HEARLEY HOWELL WILSON.

Witnesses:
A. C. COTTON,
S. E. HEDDING.