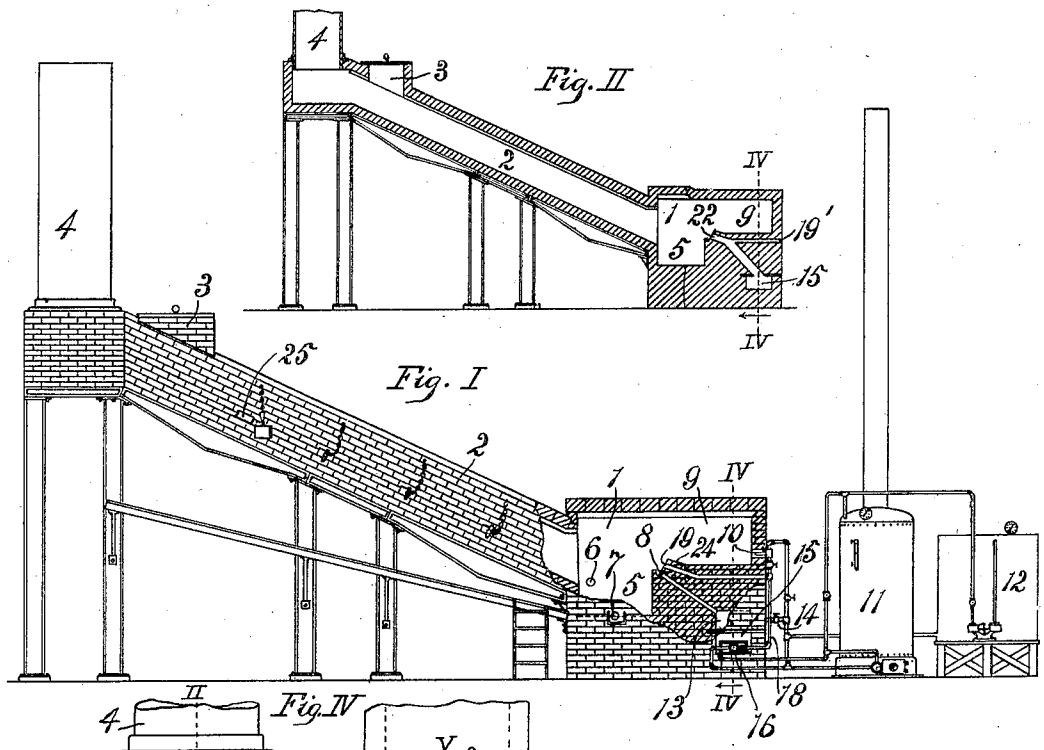
No. 790,864. PATENTED MAY 23, 1905.

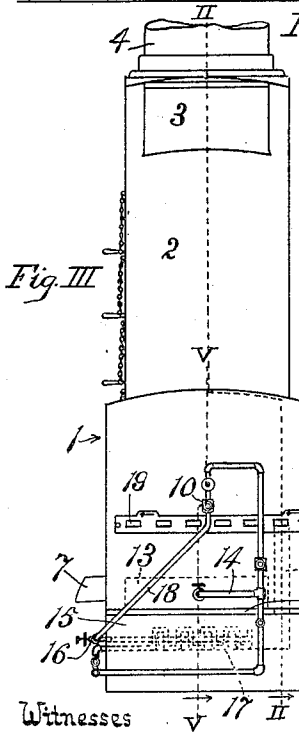
J. H. ANDERSON.

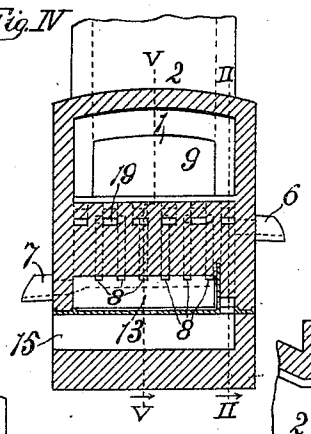
FURNACE.

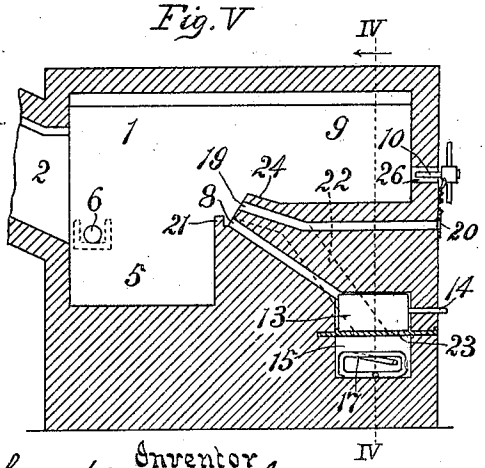
APPLICATION FILED SEPT. 12, 1901.

2 SHEETS—SHEET 1.









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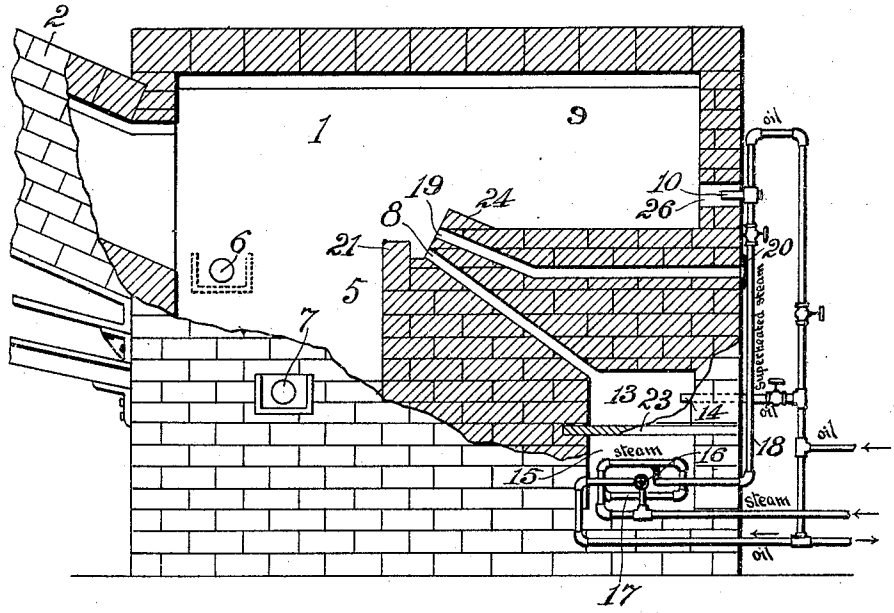
2 SHEETS—SHEET 2.

Fig. VI



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No. 790,864. Patented May 23, 1905.

UNITED STATES PATENT OFFICE.

JOHN H. ANDERSON, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO CALIFORNIA INDUSTRIAL COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 790,864, dated May 23, 1905.

Application filed September 12, 1901. Serial No. 75,227.

To all whom it may concern:

Be it known that I, JOHN H. ANDERSON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Furnaces, of which the following is a specification.

An object of this invention is to produce superior means for the combustion of vapors and gases.

A further object is to provide superior means for producing combustion of hydrocarbon oils.

A further object is to produce a furnace in which great economy is secured by means of combustion produced from hydrocarbon oils.

By my invention I produce an oxyhydrocarbon flame of great volume and extremely high temperature.

My invention comprises a furnace constructed to introduce jets of combustibles into a fire-space and to introduce oxygen into the space between said jets, whereby the oxygen and combustibles are caused to intermingle and combine to produce a most effective combustion. Preferably the furnace is constructed to introduce converging jets of combustibles into the fire space or chamber, thereby tending to produce a vacuum in the tapering space behind the point of junction of the converging jets, and an air-inlet is provided to admit atmospheric air to supply the vacuum, whereby the operation is automatically effected by atmospheric pressure. Said furnace is also preferably constructed to vaporize or gasify fuel and to introduce jets of the resultant combustible products into the fire-space and to introduce oxygen into the space between said jets.

The gasification of the combustibles is preferably produced in two ways—viz., first, by vaporizing or gasifying petroleum oils in a retort which discharges its vaporous or gaseous products into the fire-space of the furnace, and, second, by means of a fuel-injector operated by highly-superheated steam and by subjecting such steam-produced vapor to an intense heat of the furnace before combustion is completed in order to produce a high tension of the vaporized product, whereby the same is practically converted into gas before reaching the fire-space.

My invention may be carried out in various ways, and I do not propose to limit myself to any specific construction of the furnace, but to employ any form of construction which will embody my invention and secure the desired results.

The accompanying drawings illustrate my invention.

Figure I is a side elevation, partly in section, showing a furnace embodying my invention. Fig. II is a section of the same on irregular line II II, Figs. III and IV. Fig. III is an end view of said furnace. Fig. IV is a cross-section on line IV IV, Figs. I, II, and V. Fig. V is a fragmental longitudinal section on line V V, Figs. III and IV. Fig. VI is an enlarged side view, partly broken away, of the lower end of the furnace.

1 indicates a fire-box.

2 indicates an inclined outlet communicating with the fire-box and affording a passage for the heat and flame from the fire-box.

3 indicates an opening into the outlet, and 4 a smoke-stack.

5 indicates the receptacle in the fire-box for the material being operated upon. 6 and 7 are outlets from the receptacle. One or more passages 8 are arranged to supply hydrocarbon gas or vapor to the fire-box under considerable tension.

9 indicates a chamber forming a rear extension of the fire-box 1.

10 indicates means for introducing a volume of combustibles into the fire-space of fire-box 1. Such means preferably consist in an oil injector or burner operated by steam or air under pressure.

11 indicates a steam-boiler to supply steam to the injector or burner 10.

12 indicates an oil-supply.

13 indicates a retort supplied with oil through a pipe 14.

15 indicates a retort heating-furnace below

the retort 13, and 16 indicates a hydrocarbon-burner discharging into the retort-furnace 15.

17 indicates means within the retort-furnace 15 for superheating steam taken from the boiler 11.

18 indicates a superheated steam-pipe to supply the injector 10 with superheated steam, thus discharging into the fire-box 1 through the extension-chamber 9 thereof a blast of highly-heated vaporized oil. The passages 8, leading from the retort 13, slant upward toward the path of the blast produced by the oil burner or injector 10. The retort 13, inclined passages 8, and the oil burner or injector 10 operate as means for directing converging jets of combustible gas or vapor into the fire-space of the furnace. Suitable means are provided for supplying air to the space between the converging jets discharged from the inclined passages 8 and the oil burner or injector 10. Preferably air-passages 19, leading from the end of the furnace and opening into the fire-box between the chamber 9 and the passages 8, are provided for this purpose. The air-passages are preferably formed nearly horizontal and at such a slight distance from the bottom of the chamber 9 that the air is heated to a very high temperature before passing into the fire-box 1 by coming in contact with the walls, which are red-hot from the intense heat generated within the furnace. This will add very materially to the effectiveness of the inflowing jets of air in the process of combustion without detracting materially from the capacity or effectiveness of the furnace in other respects.

20 indicates means for controlling the flow of air through the passages 19.

21 indicates a deflector in front of the passages 8 to direct upward into the path of the steam-and-oil jet from the burner 10 hydrocarbon vapors or gases coming from the retort 13.

22 indicates a flue leading from the retort and steam superheating-furnace 15 and opening into the furnace fire-box 1, thereby supplying to said fire-box 1 the products of the retort-furnace 15 more or less consumed. An air-passage 19′, corresponding to the other air-passages, is provided, communicating with the flue 22 to supply atmospheric air to said products, thus to complete the combustion.

23 indicates the bottom of the retort 13. This is preferably formed of cast-iron or other heat-conducting refractory material that will hold the oil which is fed into the pipe 14 in sufficient quantities to supply the hydrocarbon vapors or gases for the fire-box 1.

24 indicates an upward deflection of the floor of chamber 9 to slightly contract the mouth of the steam and vapor chamber.

25 indicates side openings into the outlet 2.

26 indicates an air-inlet to supply a greater or less quantity of air to the chamber 9.

In practice to start the furnace into operation the oil-burner 16, supplied with steam from boiler 11 and with oil under pressure from tank 12, will be started into operation, thus superheating the steam in coil 17 and heating the oil in the retort 13, thereby producing a vapor which will flow up through the passage 8. The oil-burner 10 is put into operation and the gases and vapors thus introduced into the fire-space of fire-box 1 through the passages 8 and the injector oil-burner 10 will be ignited. The tension of the steam and of the vapors produced in the retort 13 will cause the jets of steam, vapor, and gases to tend to produce a vacuum at the mouths of the air-inlets 19, so that the atmospheric air will rush through the passages 19 and will expand under the action of the heat produced by the combustion in the fire-box and will thereby mix and mingle with the vapors and gases, causing an approximately perfect combustion to be set up. A fire of intense heat is thus produced within the fire-box 1 and extends up the inclined outlet.

The amount of air admitted through the air-passages 19 will be regulated by the damper 20 or other suitable means, thus to supply the exact amount of oxygen required for the kind of fire desired for the operation to be performed.

The outlet forms a continuation of the fire-space of fire-box 1.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A furnace having a fire-space, an outlet and an extension-chamber opening into said fire-space, a retort discharging at the junction of said fire space and chamber, means for heating the retort, a fuel-injector to direct a jet through said chamber into the fire-space, and an air-inlet discharging between the injector and the retort discharge.

2. A furnace formed with a retort in the body thereof, a steam-coil below said retort, a plate above said steam-coil forming the bottom of the retort, means for feeding oil to said retort, the body of the furnace being provided with a duct leading from said retort and with a fire-space into which said duct opens upwardly at an angle, an injector-burner arranged to direct its blast convergently toward the path of the gas passing from said duct, and air-inlet means opening into the fire-space between the path of the injector-burner blast and the path of the gas from said duct.

3. A furnace formed with a fire-space and a rearward extension from the upper part of said fire-space, an air-duct extending in the body of the furnace below said extension and opening at the end of said extension into the fire-space, an injector oil-burner arranged to direct its flame above the floor of said extension and above the air-duct forwardly into the fire-space, the body of the furnace being provided with a gas-inlet leading upwardly and forwardly beneath the air-duct and discharg-

ing into the fire-space convergently toward the blast from the injector-burner.

4. A furnace furnished with a fire-box having an outlet and an extension-chamber opening into the fire-box, the floor of said chamber being upwardly deflected at its mouth, means to supply a blast of combustibles to the fire-box below the mouth of the chamber, means to supply a blast of combustibles to the chamber, and means to supply oxygen between the blasts of combustibles.

5. A furnace provided with a fire-space and an outlet leading therefrom, a burner for the furnace, a retort communicating through inclined passages with the fire-space at a distance from the burner, and air-passages extending from the front wall of the furnace substantially to the discharge-outlets of the inclined passages and lying adjacent to the bottom of the furnace, whereby the air is heated in passing through said passages.

6. A furnace provided with a fire-space and an outlet leading therefrom, a retort communicating with the fire-space, the passage therefrom being inclined, a substantially horizontal burner, and means for introducing air to the fire-space between the passage and the burner.

7. A furnace provided with a fire-space and an outlet leading therefrom, a burner, a retort communicating with the fire-space at a distance from the burner through an inclined passage, and an air-conduit leading into the fire-space between the passage and the burner and adjacent to the passage.

8. A furnace provided with a fire-space and an outlet leading therefrom, a burner, a retort communicating with the fire-space at a distance from the burner, an air-conduit leading into the fire-space adjacent to the passage from the retort-chamber, and means adjacent to said passage for deflecting the current from the retort-chamber and from the burner.

9. A furnace provided with a fire-space and an outlet leading therefrom, a horizontal burner, a retort communicating with the fire-space through a passage at a distance from the burner, an air-conduit leading into the fire-space above and adjacent to said passage, and a deflector in front of said passage for deflecting the material from the passage up into the flames from the burner.

10. A furnace provided with a fire-space and an outlet leading therefrom, a horizontal burner, a retort communicating with the fire-space through an inclined passage at a distance from the burner, an air-conduit leading into the fire-space at an angle above and adjacent to said passage, a deflector in front of the outlet from the passage and a deflector above the outlet from the conduit in position to be engaged by the material from the burner.

11. A furnace comprising a fire-box, a rear extension of the fire-box having a floor elevated above the fire-box and provided with an inclined portion on its floor between the extension and the fire-box, a burner in position to inject combustible matter against said inclined portion, a retort, and upwardly-inclined passages communicating with the furnace to the rear of the inclined portion aforesaid, some of which passages communicate with the retort and the others with the open air.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 4th day of September, 1901.

J. H. ANDERSON.

Witnesses:

JAMES R. TOWNSEND,

JULIA TOWNSEND.