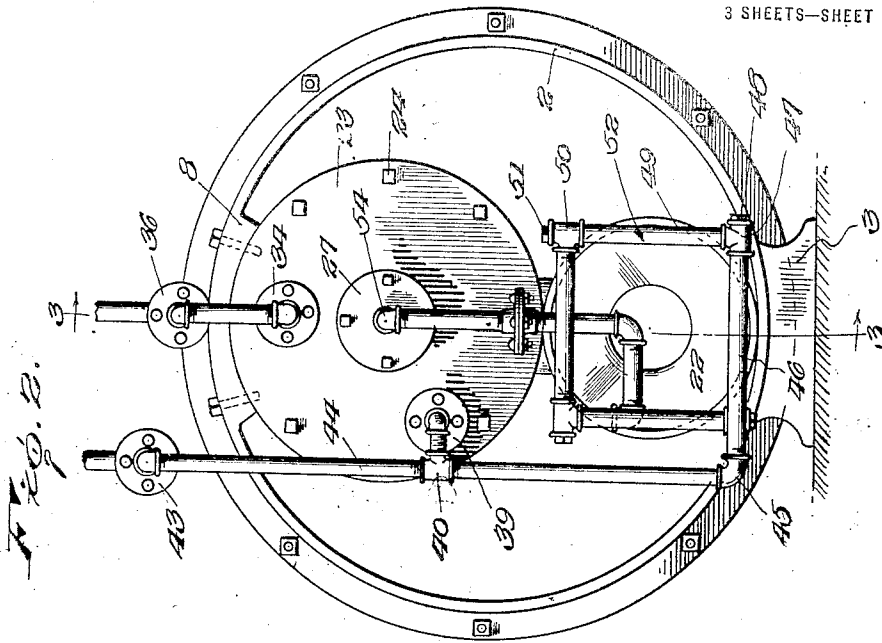
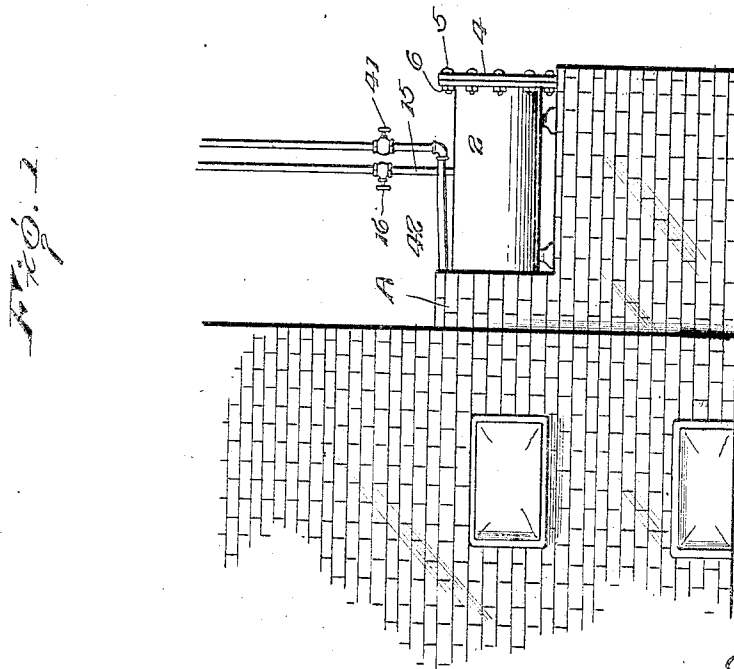


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METHOD AND APPARATUS FOR BURNING FUEL OILS.
APPLICATION FILED MAR. 15, 1920.

1,386,091.

Patented Aug. 2, 1921.

3 SHEETS—SHEET 1.



INVENTOR.

C. E. Chapman.

BY

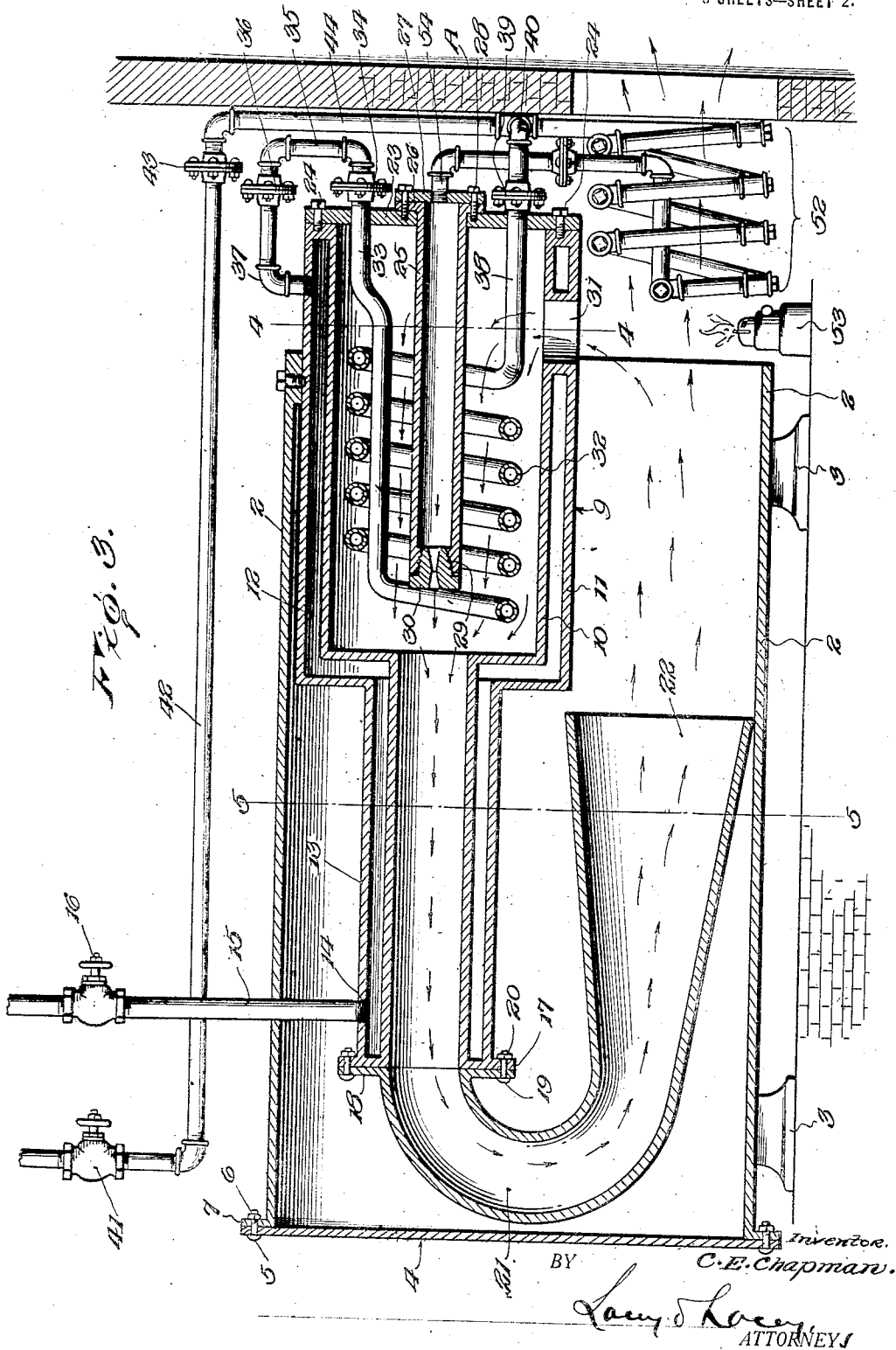
Looney & Looney
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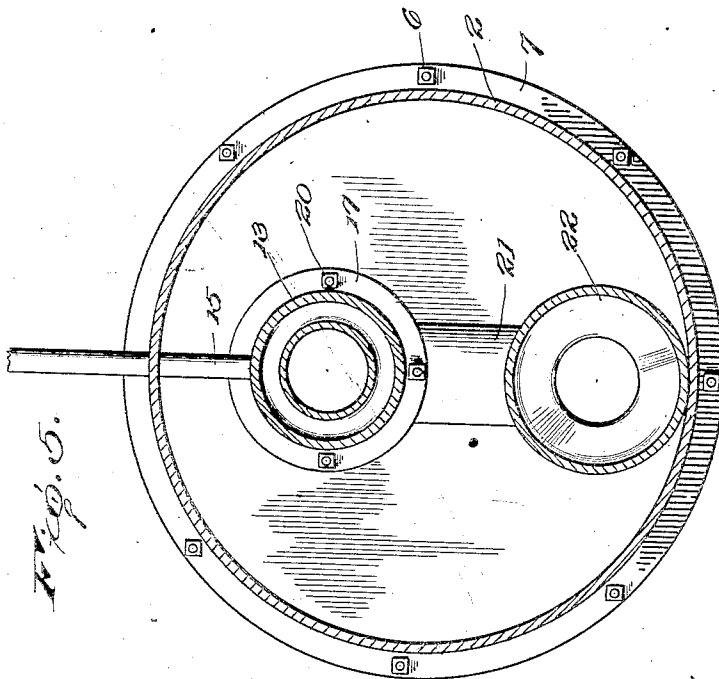
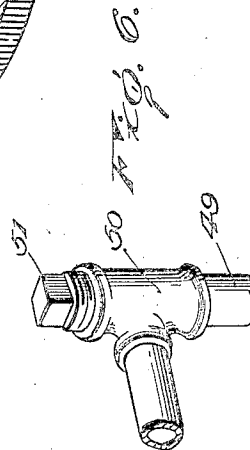
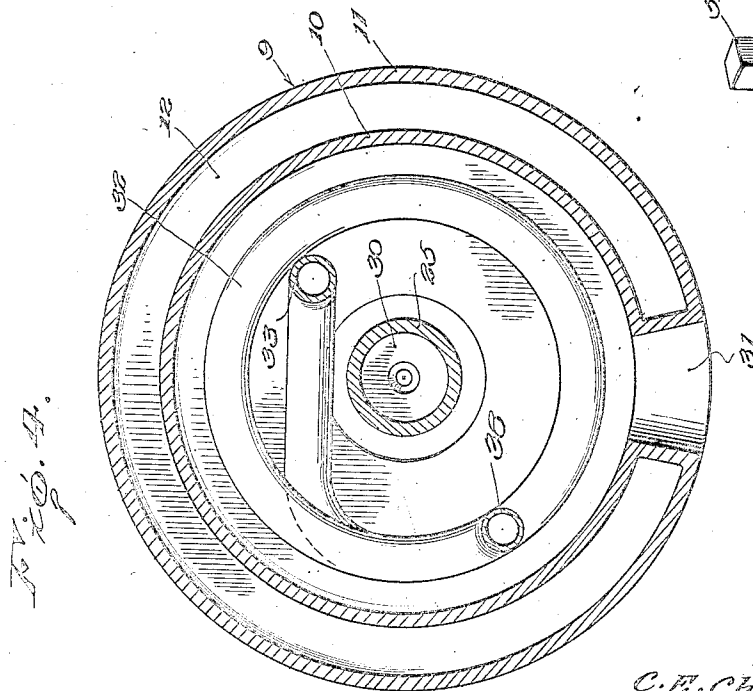


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3 SHEETS—SHEET 3.



INVENTOR.
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UNITED STATES PATENT OFFICE.

CHARLES E. CHAPMAN, OF FORT EDWARD, NEW YORK, ASSIGNOR OF ONE-HALF TO
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METHOD AND APPARATUS FOR BURNING FUEL-OILS.

1,386,091.

Specification of Letters Patent.

Patented Aug. 2, 1921.

Application filed March 15, 1920. Serial No. 365,770.

To all whom it may concern:

Be it known that I, CHARLES E. CHAPMAN, a citizen of the United States, residing at Fort Edward, in the county of Washington and State of New York, have invented certain new and useful Improvements in Methods and Apparatus for Burning Fuel-Oils, of which the following is a specification.

This invention relates to a method and apparatus for burning hydro-carbon oils.

More particularly stated, the invention provides a method and apparatus for burning the heavier hydro-carbon oils, such as crude oil and the like with a blue flame, in such manner that there is practically no residual asphaltum, thus indicating that substantially complete combustion of the oil is effected.

The invention has as another object, the provision of a method and apparatus for burning oil whereby the oxygen required to consume the oil is supplied in a jet of steam which initially heats and finally atomizes the oil ready for burning, thereby providing a system which is absolutely independent of any air supply.

Another object of the invention resides in the provision of a burner in which the initial heating of the oil is effected by means of a steam jacketed retort which, in addition to the heating of the oil, also prevents the flame from burning out the walls of the retort.

The invention further provides a method of preparing and burning crude oil in which the oil under pressure is led through a retort initially heated by steam and subsequently heated by the flame from the burner, and wherein the steam, after the burner is started, is superheated and commingles with the crude oil under pressure where the mixture thus formed is finally atomized and burned.

In the drawings:

Figure 1 is a front elevation of a portion of a furnace or oven having the burner applied thereto and entering the side thereof,

Fig. 2 is a front view of the burner,

Fig. 3 is a section on the line 3—3 of Fig. 2,

Fig. 4 is an enlarged section on the line 4—4 of Fig. 3,

Fig. 5 is an enlarged section on the line 5—5 of Fig. 3, and

Fig. 6 is a detail perspective of one of the

T's used in fabricating the secondary heating coil.

In detail:

The burner may be located, as shown, at a point on the exterior wall A of a boiler, furnace, core oven or the like and the mouth of the burner aligns with an opening 1 at the most advantageous point in the wall A.

The burner consists of a shell like body 2 of substantially cylindrical form and having the feet 3. At the rear the said cylindrical body 2 is closed by a back plate 4 suitably held in place by bolts 5 and nuts 6 passing through the peripheral flange 7 of the cylindrical body 2.

At the upper forward portion of the cylindrical body 2, as clearly shown in Figs. 2 and 3, there is formed a projection 8 which has a curved face adapted to receive the body portion of a retort tube 9 having the walls 10 and 11 spaced from each other to provide the steam space or jacket 12, the forward portion of said retort tube being large and the rear portion 13 being reduced in size. The rear portion of the retort tube, or that is to say, the reduced portion thereof as indicated at 13, is tapped as at 14 to receive a steam pipe 15 having a valve 16 controlling the admission of steam thereto. The extreme rear end of the retort tube portion 13 carries a flange 17 to which is bolted a flange 18 secured by bolts 19 and nuts 20, said flange 18 being one terminus of a curved horn 21 having the bell mouth 22 terminating just below and at the rear of the enlarged portion of the retort tube 9 so that flame emitted from the bell mouth 22 plays against the underneath portion of the retort tube 9 and, after the burner is started, has a superheating effect on the steam passing through the steam jacket 12.

The forward end of the retort tube 9 is closed by a head 23 secured in place by bolts 24 and the said head is centrally bored in alinement with the axis of the retort tube 9 and such central bore receives an injector tube 25 having a flange opening 26 closed by a plate 27 and with bolts 28 passing through the plate 27, flange 26 and entering the head 23. The inner end of the injector tube 25 is threaded, as indicated at 29, and receives an aspirating nozzle 30 which discharges directly into the smaller portion 13 of the retort tube 9 and exhausts the interior

of the larger portion of said retort tube 9, serving to draw flame up through an opening 31 at the forward portion of the retort tube 9, for a purpose to be hereinafter set forth. Disposed concentrically with respect to the larger portion of the retort tube 9 and encircling the injector tube 25 are the convolutions 32 of the superheater coil which has one end 33 connected through the medium of the flange joint 34, pipe 35, flange joint 36 and elbow 37 with the jacket space 12 of the retort tube 9 at approximately the forward end thereof. The outlet end 38 connects with the flange joint 39 leading to a T 40 forming a mixing point for commingling the oil and steam, the oil entering through a valve 41 in a pipe 42 connecting with a flange joint 43 in a vertical riser pipe 44 in the forward portion of the device and finally terminating in the elbow 45 leading into a pipe length 46 which enters a T 47 closed at one end by a plug 48 and having the other opening thereof connected with a pipe length 49 which enters a similar T 50 having the opening alining with the pipe 49 closed by a plug 51, such arrangement being continued to form a secondary superheater coil 52 through the commingled oil and steam passes, said secondary superheater coil 52 being directly in the path of discharge of the flame from the bell nozzle 22 so that it is directly heated by the flame at practically the hottest point thereof. Attention is here directed to the fact that each length of pipe constituting the sections of the secondary superheater coil 32 has an opening directly alining with such length of pipe inclosed by a plug due to the T arrangement, as indicated in Fig. 6, and thus providing for easy cleaning of such coil to relieve it of accumulations which may form during the starting of the burner. For starting purposes only a pilot lamp 53 may be placed beneath the burner in the space between the superheater coil 52 and the edge of the cylindrical member 2 but may be removed after the burner is started.

The operation of the burner is as follows: In initially starting the burner the pilot lamp is placed as indicated at 53 in Fig. 3 and the oil is started flowing by opening the valve 41, oil being supplied at a pressure of approximately 150 pounds to the square inch while steam at the same pressure is admitted through the valve 16, pipe 15 and orifice 14 to the jacket space 12 of the retort tube 9 which heats the retort and incidentally acts as a cooling medium after the burner is started. The steam leaves the jacket space 12 through the elbow 37 and enters the convolutions 32 of the superheater coil which it leaves through the pipe 38 and enters the mixing T 40 where the oil and steam form practically a vapor and pass on to the secondary superheater coil 32, the

steam carrying the oil along at high velocity and at substantially the temperature of the steam, the oil having been previously heated before entering the valve 41 so as to decrease its viscosity and make it fluid enough to readily pass through the piping. The commingled steam and oil pass out through the nipple 54 entering the tube 25 and leave the tube through the aspirating nozzle 30 in a substantially nebulous cloud which enters the retort tube 13 passes around the bend of the horn 31 and ignites at the mouth of the bell 22; the flame then passing beneath the retort tube 9 and around the secondary superheater coil 52 and into the furnace through the opening 1 in a long blue torch-like flame of intense heat readily consuming all the carbon in the oil and thus providing practically perfect combustion, the high velocity of the steam and oil serving to carry all of the matter that would ordinarily deposit in the apparatus operating at lesser temperature and less velocity into the combustion zone where it is consumed. Immediately on the start of the burner the pilot 53 is removed or extinguished and the action of the aspirator nozzle 30 exhausts the interior of the retort tube 9 and draws a portion of the flame up through the opening 31 and around the convolutions 32 of the initial superheater coil, thus raising the coil and injector tube 25 to a very high temperature and maintaining such temperature through the reduced portion of the retort tube and throughout the length of the horn 21.

After the burner is started, it will be seen that the flame closes the opening 31 and entirely traverses the space between the bell mouth 22 of the horn 21 and the opening 1 in the wall of the furnace or the like and thus the only oxygen obtained for the promotion of combustion is that derived from the admission of steam with the oil.

While, in the foregoing, I have described one specific embodiment of the invention, it is nevertheless to be understood that in carrying the invention into practice I may resort to any and all modified forms of the apparatus which may be adapted for carrying out the herein described succession of steps forming the method whereby complete combustion of the oil is effected.

I claim:

1. The herein described method of burning fuel oils consisting in commingling oil with steam under pressure, nebulizing the product in a steam jacketed retort, circulating a portion of the heated products of combustion through such retort during nebulization, and practically excluding air.

2. The herein described method of burning fuel oils consisting in commingling oil with superheated steam under pressure, nebulizing the product in a steam jacketed

retort, circulating a portion of the heated products of combustion through such retort during nebulization, and practically excluding air.

3. The herein described method of burning fuel oils consisting in commingling oil with steam under pressure, nebulizing the product in a steam jacketed retort, utilizing a portion of the products of combustion for superheating the steam and oil prior to nebulization and for decomposing a portion of the steam.

4. The herein described method of burning fuel oils consisting in commingling oil with steam under pressure, nebulizing the product in a steam jacketed retort, utilizing a portion of the products of combustion for superheating the steam and oil prior to nebulization and for decomposing a portion of the steam and furnishing an atmosphere supporting combustion of the nebulized product.

5. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including nebulizing means discharging in the retort chamber, and means connecting the oil supply and the discharge from the superheater coil.

6. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth located beneath the retort chamber, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including nebulizing means discharging in the retort chamber, and means connecting the oil supply and the discharge from the superheater coil.

7. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, and nebulizing means discharging into the retort chamber.

8. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell shaped mouth located beneath the retort chamber, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, and nebulizing means discharging into the retort chamber.

9. The herein described apparatus for burning fuel oil comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, the other

end being open to the products of combustion, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, and nebulizing means discharging into the retort chamber.

10. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, a superheater coil within said chamber and receiving steam from the jacket thereof, an oil supply including a secondary superheater coil receiving steam from the first coil, and nebulizing means discharging into the retort chamber and receiving commingled oil and steam from the secondary superheater coil.

11. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, the other end being open to the products of combustion, a superheater coil within said chamber and receiving steam from the jacket thereof, an oil supply including a secondary superheater coil receiving steam from the first coil, and nebulizing means discharging into the retort chamber and receiving commingled oil and steam from the secondary superheater coil.

12. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell shaped mouth located beneath the retort chamber and the said chamber being open to the products of combustion, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, and nebulizing means discharging into the retort chamber.

13. The herein described apparatus for burning fuel oil comprising a steam jacketed retort chamber open to the products of combustion and provided with a discharge horn having a bell mouth, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil in the path of the flame from the burner, and receiving steam from the first coil and oil, and nebulizing means discharging into the retort chamber.

14. The herein described apparatus for burning fuel oils comprising a retort chamber jacketed for cooling and open to the products of combustion and provided with a discharge horn having a bell mouth, a superheater coil within said chamber and receiving steam from the jacket thereof, an oil supply including a secondary superheater coil in the path of the flame from the burner and receiving steam from the first coil, and nebulizing means discharging into the retort

chamber and receiving commingled oil and steam from the secondary superheater coil.

- 15 15. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell mouth, a superheater coil within said chamber and receiving steam from the jacket thereof, an oil supply including a secondary superheater coil in the path of the flame from the burner and receiving steam from the first coil, and nebulizing means discharging into the retort chamber and receiving commingled oil and steam from the secondary superheater coil.
- 10 16. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell shaped mouth located beneath the retort chamber, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, nebulizing means discharging into the retort chamber, and a casing closed at one end and mounting the steam jacketed retort chamber with its associated discharge horn.
- 15 16. The herein described apparatus for burning fuel oils comprising a steam jacketed retort chamber provided with a discharge horn having a bell shaped mouth located beneath the retort chamber, a superheater coil receiving steam from the jacketed retort chamber, an oil supply including a secondary superheater coil receiving steam from the first coil and oil, nebulizing means discharging into the retort chamber, and a casing closed at one end and mounting the steam jacketed retort chamber with its associated discharge horn.

In testimony whereof I affix my signature.

CHARLES E. CHAPMAN. [L. s.]