A. H. WELCH.

GAS GENERATING APPARATUS.

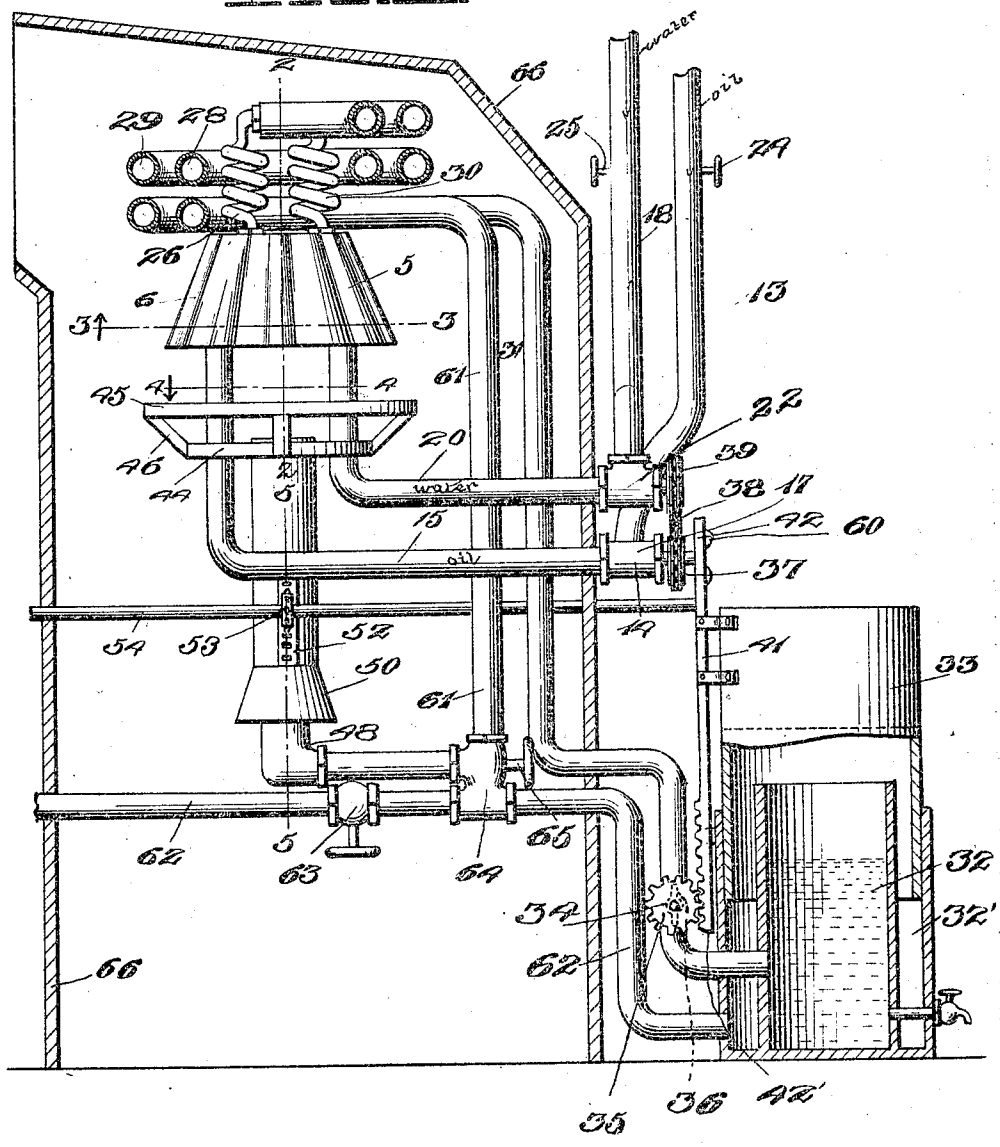
APPLICATION FILED FEB. 7, 1912. RENEWED DEC. 5, 1912.

1,051,177.

Patented Jan. 21, 1913.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

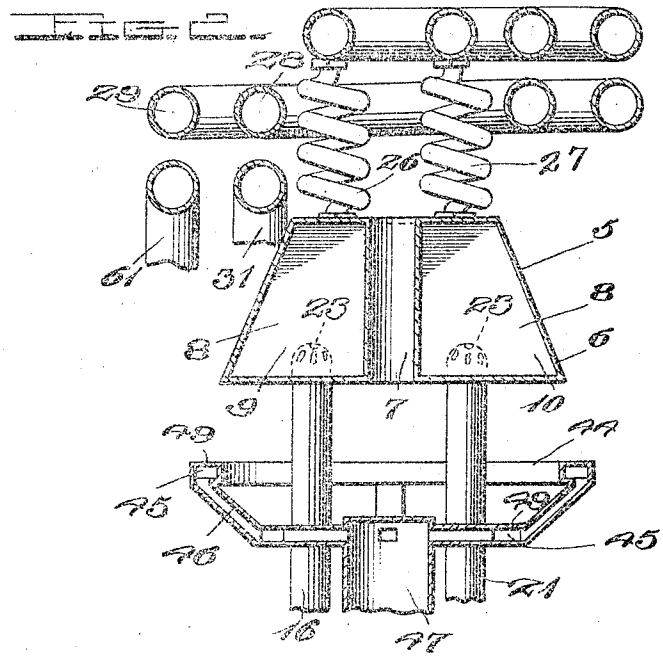
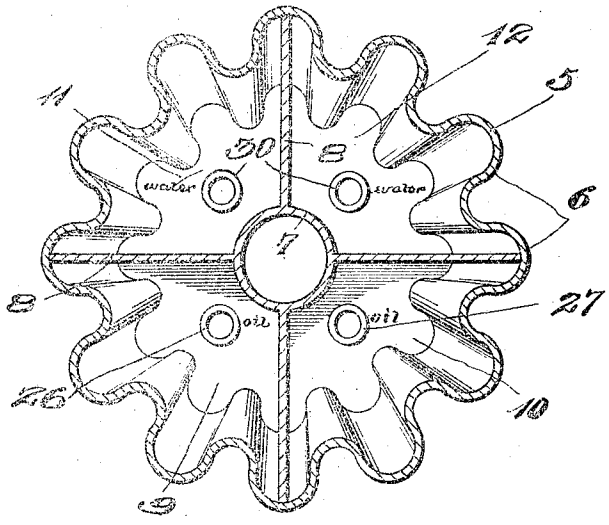


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

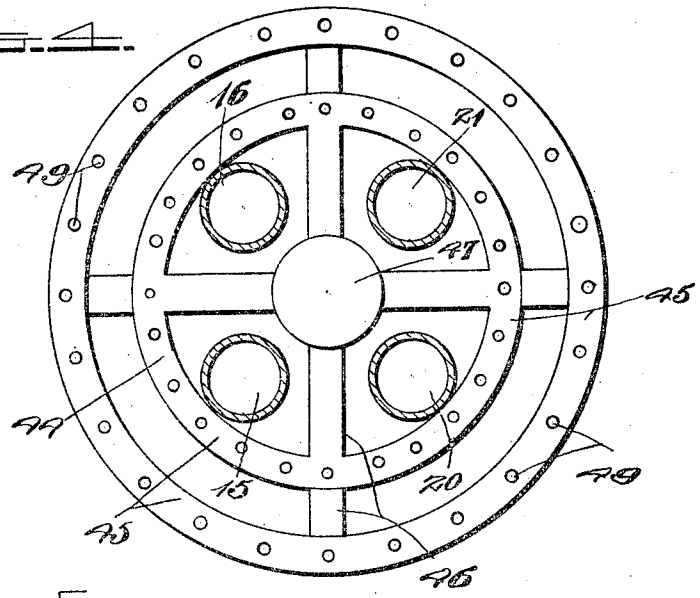


Fig. 5.

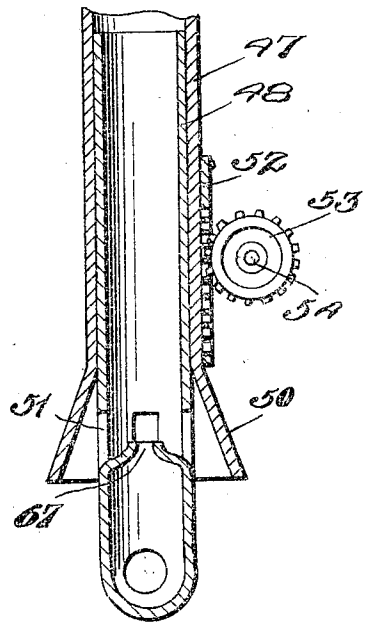
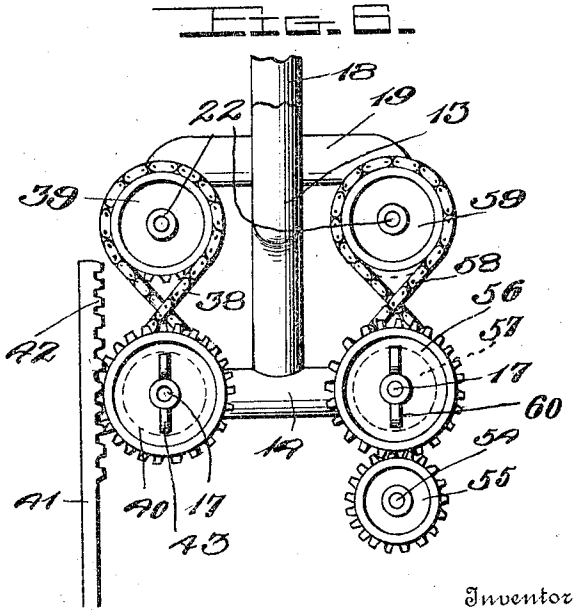


Fig. 6.



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GAS-GENERATING APPARATUS.

1,051,177. Specification of Letters Patent. Patented Jan. 21, 1913.

Application filed February 7, 1912. Serial No. 675,948. Renewed December 5, 1912. Serial No. 735,176.

To all whom it may concern:

Be it known that I, ANDREW H. WELCH, a citizen of the United States, residing at Anderson, in the county of Madison and State of Indiana, have invented certain new and useful Improvements in Gas-Generating Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in gasifying apparatus and has for its object to provide a device for converting a liquid fuel into gas, a more specific object being to provide improved means for insuring the perfect and complete conversion of the oil into a gaseous vapor.

Another object of the invention resides in the provision of a chambered body, means for supplying oil and water to the respective chambers, primary coils connected to the oil chambers to receive the gas generated therein, secondary gas receiving and conducting coils connected to the primary coils, and steam receiving coils connected to the water chambers and to said secondary coils.

Still another object of the invention resides in the provision of oil and water receiving chambers having steam and gas receiving coils connected thereto respectively, and a movable burner head associated with said body and movable toward and from the same in accordance with the desired generation of gas within said body.

Another object of the invention is to provide a chambered body and oil and water supply pipes connected to the respective chambers of said body, control valves in said supply pipes, a movable burner, and means for simultaneously actuating said valves to regulate the supply of oil and water to the body and adjust said burner with relation to said body.

A still further object of the invention resides in the provision of a gas generator having oil and water receiving chambers, a gas conducting pipe connected to a tank or reservoir, a primary superheating pipe connected to the oil chamber and to said conducting pipe, and means automatically actuated upon increase of pressure in the gas reservoir to simultaneously cut off the supply of oil and water to the generator.

Another object of the invention consists in the provision of a generator of frusto-conical form having an annular corrugated wall, and a burner movably disposed with relation to the generator whereby a proper degree of heat therein may be maintained for the vaporization of the oil irrespective of the increase or decrease of the oil supply thereto.

A final object of the invention is to provide an apparatus of the above described character whereby material economy may be effected in the use of oils as a fuel, said apparatus being of comparatively simple construction, efficient in practical operation and capable of manufacture at comparatively small cost.

With the above and other objects in view, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of a gasifying apparatus embodying the present invention, the secondary superheating coils being shown in section; Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1; Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1; Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 1; Fig. 5 is a detail vertical section taken on the line 5—5 of Fig. 1; and Fig. 6 is a detail elevation illustrating the means for simultaneously operating the oil and water control valves.

Referring in detail to the drawings 5 designates the generator which is of frusto-conical form as shown, the annular wall 6 thereof being deeply corrugated to provide a maximum heat radiating surface and also to provide draft channels for the flames from the burner which will be more fully hereinafter described. This generator is provided with a central vertical tube 7 connecting the top and bottom walls thereof, said tube forming an air passage through the center of the generator. Within the generator body between the periphery of this central tube and the corrugated wall 6 the radially disposed partition plates 8 are arranged and secured in any approved manner. These partition plates extend between the top and bottom walls of the generator and provide a plurality of air-tight compartments or chambers 9, 10, 11 and 12 respectively.

The chambers 9 and 10 of the generator

are supplied with oil from a suitable tank or reservoir (not shown), through the medium of the supply pipe 13. A transverse head 14 is connected to this oil supply pipe and to opposite ends of the head the auxiliary oil supply pipes 15 and 16 respectively are connected. The supply of oil to these auxiliary pipes is separately controlled by means of the valves 17 which are arranged in each end of the head 14. The pipes 15 and 16 are connected to the oil receiving chambers 9 and 10 respectively of the generator, said pipes extending through and being rigidly secured in the bottom wall of the generator body.

Water is supplied to the chambers 11 and 12 from a supply tank by means of the pipe 18 which extends therefrom. This water supply pipe is also provided with a transverse head 19 to which the auxiliary pipes 20 and 21 respectively are connected. The valves 22 are arranged in opposite ends of the head 19 to independently control the supply of water to said auxiliary pipes. The water and oil pipes are provided with nozzles which extend through the base wall of the generator body and into the chambers thereof as indicated at 23, said nozzles being adapted to discharge the water and oil in a fine spray upon the annular corrugated wall of the generator and upon the partition walls 8. Valves indicated at 24 and 25 are provided in the main oil and water supply pipes 13 and 18 respectively so that the flow of oil to said pipes from the supply tanks may be regulated as desired.

To the top walls of the oil receiving chambers 9 and 10 of the generator 5 the lower ends of the primary superheating coils 26 and 27 respectively are connected. The upper ends of these coils are connected to the larger secondary superheating and conducting coils 28 and 29 respectively. To each of the water chambers 11 and 12 of the generator a steam receiving coil 30 is connected at its lower end, the upper ends of the respective steam coils being connected to the ends of the secondary superheating coils 28 and 29 respectively. The secondary coil 29 is extended to provide a conducting pipe 31 which is connected to a gas tank 32 which includes the usual movable bell 33. In this conducting pipe adjacent to the tank 32 a valve 34 is arranged, the stem of which is provided with a pinion 35 on one end and a key 36 upon its other end. Upon the stem of the valve 17 which controls the supply of oil to the pipe 16 a sprocket 37 is fixed, and this sprocket is connected by means of a chain 38 to a similar sprocket 39 secured to the stem of the valve 22 which controls the water supply to the pipe 21. Upon the stem of the oil supply valve 17 a pinion 40 is also secured and with this pinion the teeth 42 on a rack bar 41 engage. This rack bar is fixed to the movable bell member 33 of the gas receiving tank and is also provided upon its lower end with a second series of rack teeth 42′ which mesh with the pinion 35 fixed upon the stem of the valve 34 in the gas conducting pipe 31. By means of these connections between the various valves, it will be readily seen that when a sufficient quantity of gas has been supplied to the tank 32 so that the pressure thereof raises the bell 33 almost to the limit of its upward movement, the rack teeth 42 and 42′ of the bar 41 simultaneously engage with the pinions 40 and 35 on the stems of the valves 17 and 34 respectively and cut off the supply of gas to the tank and also the supply of oil to the chamber 10 of the generator while the water supply to chamber 12 is cut off through the medium of the sprocket chain 38 which operates the controlling valve 22. The stem of the oil controlling valve 17 is also preferably provided with a key 43 so that the water and oil supply may be regulated as desired independently of the rack bar 41. The supply of gas to the tank 32 may also be cut off at any time by closing the valve 34 by means of the key 36.

A burner indicated generally by the numeral 44 is arranged beneath the generator 5. This burner includes the concentrically spaced inner and outer annular tubes 45 which are connected by means of the radially disposed tubular arms 46. These arms radiate from a central tubular stem 47 which is movably mounted upon a gas supply pipe 48 telescopically engaged within said stem. The oil and water supply pipes 15, 16, 20 and 21 are vertically disposed within the inner annular tube 45 and between the tubular arms 46. The annular tubular burner members 45 are provided with jet orifices 49 in their upper portions from which the flames arise and contact with the walls of the generator 5. The oil and water is also given a preliminary heating in its passage through the supply pipes which are disposed within the inner burner ring 45. To the lower end of the tubular stem 47 of the burner an outwardly and downwardly flared hood 50 is secured, said hood being disposed over the air intake openings 51 which are provided in the gas supply pipe 48. Upon the periphery of the stem 48 at its lower end a vertically disposed rack plate 52 is secured and with said plate a pinion 53 fixed upon one end of a rod 54 engages. To the other end of this rod a pinion 55 is fixed to mesh with a cog 56 secured on the stem of the valve 17 which controls the supply of oil to the pipe 15. A sprocket wheel 57 is also fixed upon this valve stem and is connected by means of the chain 58 to a similar sprocket wheel 59 which is fixed upon the stem of the valve 22 which controls the supply of water to the pipe 20. A key 60 is

also secured to the valve stem 17 whereby the same may be rotated to open or close the valves 17 and 22 and thereby regulate the supply of oil and water to the chambers 9 and 11 of the generator. It will be readily seen that when these valves are operated the burner is simultaneously raised or lowered through the medium of the pinion 53 which engages with the rack 52 carried by the stem 48. Thus when the oil supply is cut off, the burner is gradually lowered so that less heat is supplied to the generator 5, and when said valves are opened the movement of the burner is reversed so as to dispose the jet tubes thereof in closer relation to the body of the generator.

The secondary superheating coil 28 is extended to provide a conducting pipe 61 which is connected to the lower end of the gas supply pipe 48. A service pipe 62 is connected to the lower end of the gas tank 32 from which gas may be obtained for illuminating or other purposes, a suitable cut-off valve 63 being located in said service pipe. A short branch pipe 64 also connects the service pipe to the conducting pipe 61 and at their juncture a suitable valve 65 is provided whereby gas may be admitted from the service pipe 62 into the pipe 61 and hence into the lower end of the pipe 48. A metallic hood or casing 66 is preferably provided which entirely incloses the burner generator and superheating coils, said hood serving to cause a better draft and also acting to retain the heat.

In the operation of the apparatus, the valve 65 is first opened to admit gas from the tank 32 to the burner 44. A match or lighted taper is applied to the jet orifices 49 of the burner tubes to ignite said gas. Oil and water are simultaneously admitted to the respective oil and water chambers of the generator by opening the valves 24 and 25. The flame contacting with the bottom and side walls of the generator quickly heats the same and converts the oil and water which is sprayed from the nozzles 23 into vapor or steam, thereby facilitating the vaporization of the oil into gas. This gas escapes from the chambers 9 and 10 into the primary superheating coils 26 and 27 and is conducted thereby to the secondary superheating coils 28 and 29. The comparatively deep corrugations in the annular wall of the generator serve as draft channels whereby the flames from the burner are directed upwardly against the superheating coils to insure the complete vaporization of the liquid fuel. Steam is simultaneously conducted from the chambers 11 and 12 and injected into the ends of the secondary superheating coils 29. This steam and gas moves through the pipe coils and into the pipes 31 and 61, the gas in the pipe 31 being discharged into the tank 32. After the generation of the gas has thus been started, the valve 65 is closed so that the gaseous mixture from the coil 28 will flow through the pipe 61 and into the lower end of the pipe 48. This gas is supplied to the annular tubular members 45 of the burner 44. The manner in which the supply valves are simultaneously operated to control the supply to the chambers 10 and 12 and the burner simultaneously positioned with relation to the generator in accordance with the volume of such supply has been heretofore fully described. This automatic adjustment of the burner is of primary importance as it insures a substantially uniform heating of the walls of the generator and prevents imperfect vaporization of the liquid fuel when the supply is increased. As the gas passes upwardly through the pipe 48 air is drawn into said pipe through the openings 51 and mixed with the gas to insure its proper combustion. The air directing hood 50 is of sufficient depth to permit of the adjustment of the burner without effecting the admixture of the air with the gas to any material extent. By providing the central draft tube 7 in the generator 5, the flames are directed from the inner burner tube 45 through said draft tube and upon the inner surfaces of the steam and gas superheating coils. The tank or gasometer 32 consists of the usual inner and outer concentric walls whereby an annular gas receiving chamber 32′ is formed. The inner chamber is supplied with water and the conducting pipe 31 extends through the inner wall and communicates with said chamber. Thus the gas passes upwardly through the water and into the bell 33 and the annular chamber 32′. By injecting steam into the gaseous vapor, the particles of foreign matter which may have been present in the liquid fuel are carried through the conducting pipe and the deposition of the same upon the walls of the pipe whereby the same would become clogged is eliminated. These foreign particles are discharged into the water in the gasometer 32, such sedimentary matter being deposited upon the bottom wall of said water chamber. The service pipe 62 is connected to the outer wall of the gasometer and receives the purified gas from the annular chamber 32′. A suitable valve or draw-off cock is provided whereby the water may be withdrawn from the inner chamber of the gasometer. A mixing nozzle 67 is preferably arranged in the vertically disposed gas pipe 48 to discharge the gas under considerable pressure past the openings 51 in said pipe whereby the air is drawn through said openings and mixed with the gas as the same passes upwardly through said pipe into the tubes of the burner 44.

From the foregoing it is believed that the construction and manner of operation of my

improved gasifying apparatus will be fully understood. The device is highly efficient in practical operation and provides means whereby a constant gas supply may be automatically maintained at very little expense. As unrefined oils may be utilized as fuel in the operation of the burner, it will be appreciated that the cost of operation will thereby be greatly minimized. The apparatus will require but little care and attention on the part of the operator and as the various elements employed are of simple form, it will be obvious that the apparatus may be constructed at a comparatively small cost.

While I have shown and described the preferred construction and arrangement of the various parts, it will be understood that the invention is susceptible of considerable modification without departing from the essential feature or sacrificing any of the advantages thereof.

Having thus described the invention what is claimed is:—

1. In a gas generating apparatus, a generator having fuel and water receiving chambers, supply pipes connected to the respective chambers, a burner, a gas supply pipe therefor, control valves in the fuel and water supply pipes, and means to simultaneously operate the valve in the water supply pipe and regulate the supply of water to the generator and move the burner to position the same with respect to the generator.

2. In a gas generating apparatus, a generator having oil and water receiving chambers, supply pipes connected to the respective chambers, a burner surrounding said supply pipes and movable longitudinally thereof, a gas supply pipe for the burner, control valves for the oil and water supply, and means to simultaneously operate said valves and move the burner to position the same with respect to the generator.

3. In a gas generating apparatus, a generator and means for supplying liquid fuel thereto, said means including a controlling valve, a burner, a gas supply pipe therefor upon which the burner is longitudinally movable, a rack carried by the burner, actuating means for the fuel supply valve to open and close the same, and a pinion engaging said rack and operated by the actuating means to position the burner with respect to the generator as the supply of fuel is increased or decreased.

4. In a gas generating apparatus, a generator and a fuel supply pipe connected thereto, a control valve arranged in the supply pipe, a bodily movable burner, a gas supply pipe therefor and means for operating said valve to regulate the oil supply and simultaneously move said burner to position the same with relation to the generator.

5. In a gas generating apparatus, a generator having fuel and water receiving chambers, supply pipes connected to the respective chambers, a burner, a gas supply pipe therefor, control valves for the oil and water supply, and means to simultaneously operate said valves and move the burner to position the same with respect to the generator.

6. In a gas generating apparatus, a generator having fuel and water receiving chambers, supply pipes connected to the respective chambers, a gas supply pipe, a burner movably mounted upon said supply pipe, control valves for the oil and water supply, and means to simultaneously operate said valves and move the burner to position the same with respect to the generator.

7. In a gas generating apparatus, a generator and means for supplying liquid fuel thereto, said supply means including a controlling valve, a burner, a gas supply pipe therefor, means for movably mounting the burner upon said gas supply pipe, and means actuated upon the operation of the fuel supply controlling valve to move said burner and position the same with relation to the generator.

8. In a gas generating apparatus, a generator and means for supplying liquid fuel thereto, said supply means including a controlling valve, a burner, a gas supply pipe therefor, a rack carried by the burner, and means co-acting with said rack and actuated upon the operation of the fuel supply controlling valve to move the burner and position the same with relation to the generator.

9. In a gas generating apparatus, a generator and a fuel supply pipe connected thereto, a controlling valve in the supply pipe, a burner, a gas supply pipe for the burner, connections between the same and said generator, a tubular stem carried by the burner and longitudinally slidable upon the gas supply pipe, and means co-acting with said stem and actuated simultaneously with the operation of the fuel controlling valve to move said burner and position the same with relation to the generator.

10. In a gas generating apparatus, a generator and a fuel supply pipe connected thereto, a controlling valve in said supply pipe, a burner arranged beneath the generator and vertically movable with relation thereto, a gas supply pipe for the burner and connecting means between the same and said generator, a tubular stem carried by the burner longitudinally movable upon said gas supply pipe, a rack on said stem, and a pinion co-acting with said rack and actuated by the adjustment of the fuel controlling valve to move the burner and position the same with relation to the generator.

11. In a gas generating apparatus, a generator having oil and water chambers, supply pipes connected to the respective chambers of the generator, controlling valves in said supply pipes, a common operating

means for said valves to simultaneously regulate the supply of oil and water to the generator, a movable burner arranged beneath the generator, a gas supply pipe therefor, and means automatically actuated upon the adjustment of the supply controlling valves to move the burner and position the same with relation to the generator.

12. In a gas generating apparatus, a generator having oil and water receiving chambers, supply pipes connected to the respective chambers, a burner arranged beneath said generator, a gas supply pipe therefor, superheating coils connected to the oil and water chambers of the generator respectively, and a conducting pipe connected to said superheating coils and connected to the gas supply pipe of the burner.

13. In a gas generating apparatus, a generator having oil and water receiving chambers, supply pipes connected to the respective chambers, a burner, a gas supply pipe for the burner, gas and steam receiving coils connected to the oil and water chambers respectively of the generator, a pipe to which said coils are connected to receive the steam and gas and conduct the same to the burner supply pipe, and means for adjusting said burner with relation to the generator.

14. In a gas generating apparatus, a generator having oil and water receiving chambers, supply pipes connected to the respective chambers of the generator, a burner arranged beneath the generator, primary superheating coils connected to the oil and water chambers respectively, a gas supply pipe for the burner, and a secondary superheating coil to which said primary coils are connected, said secondary coil being connected to the gas supply pipe to supply the superheated gas to the burner.

15. A gas generating apparatus comprising a generator having a plurality of fuel and water receiving chambers, supply pipes for the respective chambers, a primary superheating coil for each of said chambers, a plurality of secondary superheating coils to each of which the primary coils from one of the fuel chambers and one of the water chambers of the generator are connected, a burner, and a gas supply pipe for the burner connected to one of said secondary coils.

16. In a gas generating apparatus, a generator of frusto-conical form having an inclined annular corrugated wall, a central draft tube connecting the upper and lower walls of said generator, a plurality of radial internal partitions between said tube and the annular wall dividing the generator into a plurality of oil and water receiving chambers, a burner arranged upon said supply pipes beneath the generator, superheating coils each connected to one of the oil and water chambers of the generator to receive steam and gas therefrom, the flame from the burner contacting with the walls of the generator and being drawn through said central draft tube to contact with the superheating coils, and a supply pipe connecting one of said superheating coils to the burner.

17. In a gas generating apparatus, a generator of frusto-conical form having an inclined annular corrugated wall, a central draft tube connecting the upper and lower walls of said generator, a plurality of radial internal partitions between said tube and the annular wall dividing the generator into a plurality of oil and water receiving chambers, a burner arranged around said supply pipes beneath the generator, superheating coils each connected to one of the oil and water chambers of the generator to receive gas and steam therefrom, and a supply pipe connecting one of said superheating coils to the burner.

18. In a gas generating apparatus, a generator having oil and water receiving chambers, a burner associated with said generator, a supply pipe for the burner connected to the oil chamber, fuel and water supply pipes connected to the respective chambers of the generator, a controlling valve arranged in each of said pipes, sprocket wheels fixed to each of the valve stems, and a chain traversing said sprocket wheels whereby the valves are simultaneously operated to increase or decrease the supply of oil and water to the respective chambers of the generator to the same extent.

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

ANDREW H. WELCH.

Witnesses:
J. W. COVINGTON,
TOM. PARKER.