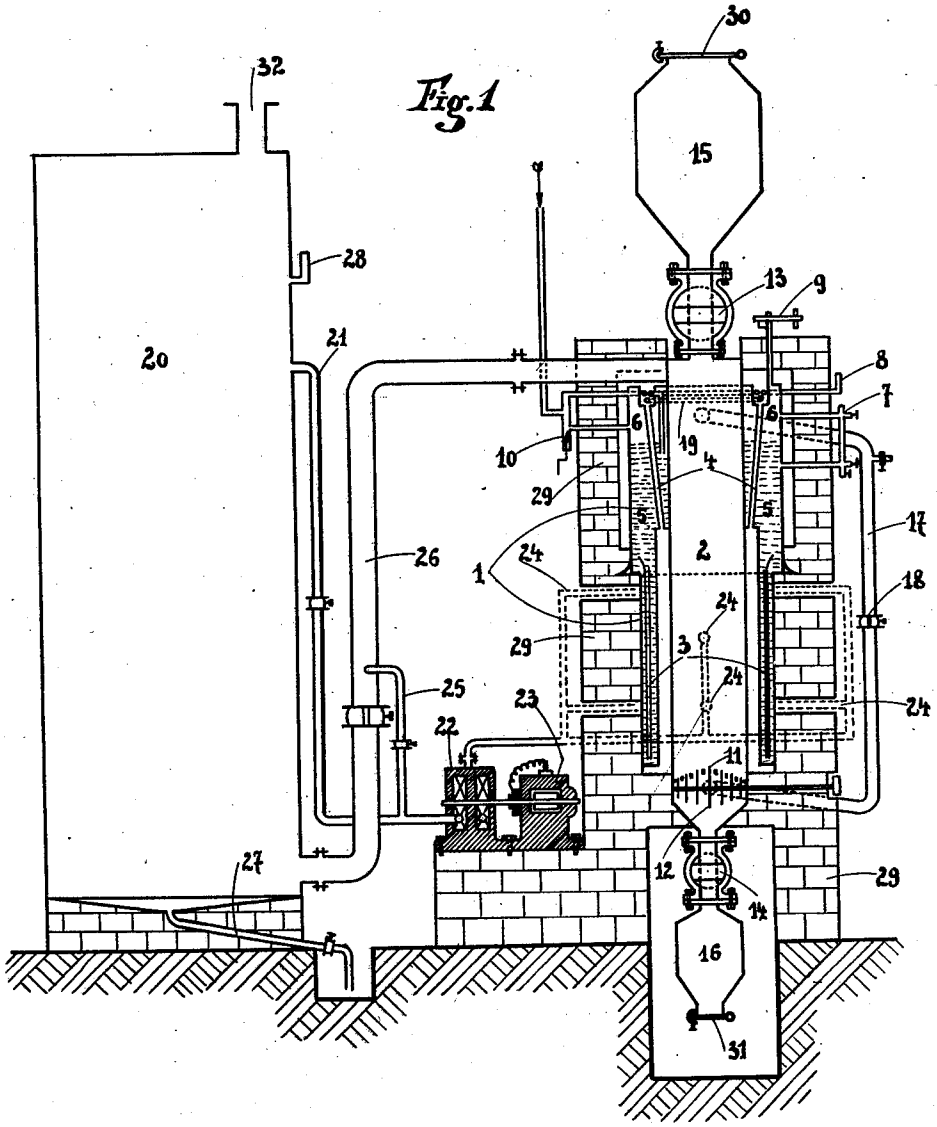
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GAS AND STEAM PRODUCER GENERATOR

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Fig. 1



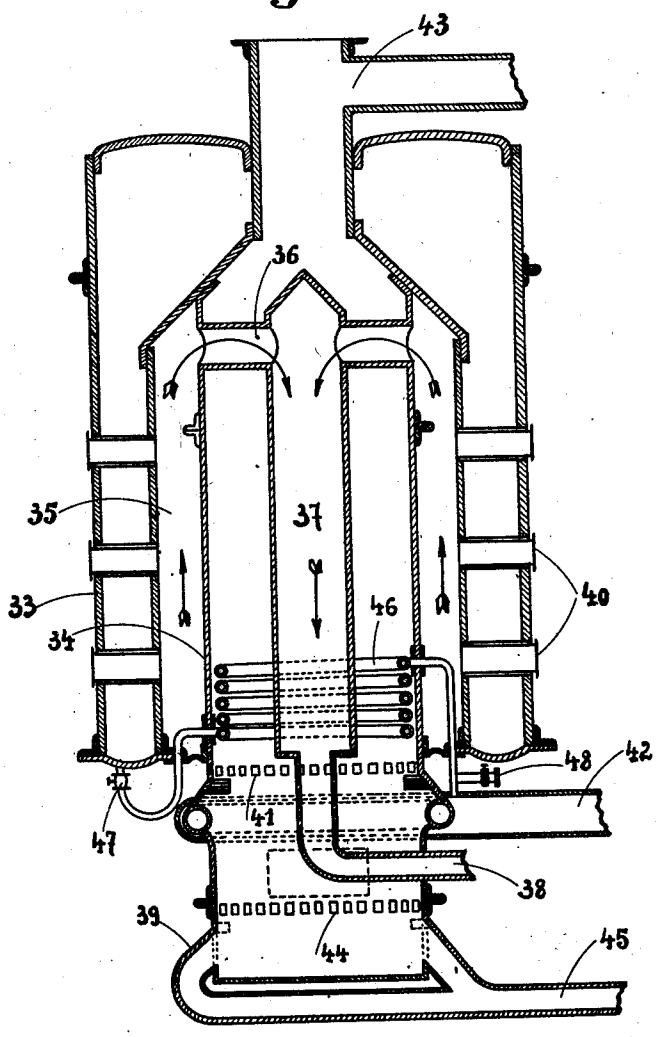
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GAS AND STEAM PRODUCER GENERATOR

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Fig. 2



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Patented Apr. 8, 1930

1,753,847

UNITED STATES PATENT OFFICE

JULIEN BELLAY, OF BRUSSELS, BELGIUM

GAS AND STEAM PRODUCER GENERATOR

Application filed August 1, 1927, Serial No. 209,917, and in Belgium August 11, 1926.

The present invention concerns a continuously working generator or producer, producing gas of varying composition, the particular construction of which enables the same to be used as a water gas generating apparatus only, or as a steam producer or as a water heater (boiler), or as a continuously working water gas, water heating and steam producing apparatus, by simply varying the dimensions of its component elements. In any case a permanent production is obtained.

The generator of the invention is essentially characterized by the combination, in one single apparatus, of a producer retort with a boiler, the boiler surrounding the retort or vice versa and the gas generated within the retort being utilized for heating the boiler, a fraction of said steam generated being used in turn for the production of the water gas within the retort.

Generally, the generator according to the invention, does away with the various devices used in the actual producers: scrubber, condenser, gas cleaner and the like.

The produced water gas may be used, according to the respective modifications of the dimensions of the boiler and retort, and according to the temperatures, by being transformed into motive power, or into pure gas (for manufacturing hydrogen, for instance, in well known devices), or into a heating means, either for producing within the boiler, steam or hot water for any known appliances.

In the accompanying drawing, shown by way of example:

Figure 1 is a vertical section of the apparatus.

Figure 2 is a vertical section of a modification of the apparatus.

In Figure 1, the annular or circular boiler 1 surrounds the cylindrical retort 2 concentrically disposed with respect to the boiler. The latter is for instance composed, in the accompanying drawing, of a lower row of boiler tubes 3 and an upper row of smoke tubes 4 crossing the water chamber 5 and the steam chamber 6 respectively.

It comprises the following controlling devices: water gauge 7, manometer 8, safety valve 9 and low pressure injector 10. The injector introduces the water, previously heated, within the water chamber, through a coil 19 surrounding the upper body part of the steam chamber.

The inner body of the boiler or generator forms a cylindrical retort 2, provided at its bottom with a grate 11 and fire hook 12. The retort is closed on top and bottom by means of hoppers with cocks, 13, 14 controlling respectively a fuel receptacle 15 and an ash pit 16.

The steam chamber 6 is in connection with the retort by means of a large steam conduit 17 opening underneath the grate and provided with a cock 18. The producer is supported upon and surrounded by a furnace made of refractory bricks 29 which maintains the heat and contains the optional heating device for the boiler.

The heating device comprises a cylindrical water gas reservoir 20, the volume of which corresponds to the amount of gas required for one starting of the apparatus, the pipes 21 forwarding the gas to a double compressor of air and gas 22 operated by a motor 23 and feeding the burners 24, disposed within the frame or furnace 29, made of refractory bricks. A feed regulating by-pass 25 is connected with the main duct 26, forwarding the gas to the reservoir 20. The latter is provided with a lower discharge duct 27 for water and a low pressure manometer 28. The gas discharging opening 32 provided with a gate valve is disposed at the top of the reservoir.

For starting an operation, the retort 2 and the fuel receptacle 15 are filled with coke or coal. The cocks of the hoppers 13 and 14 and the slides or joints 30 and 31 of the receptacle and ash pit are closed.

The gas reservoir 20 being filled with gas, the device 22 is operated and the retort is heated from outside by the burners 24, whereby the fuel is quickly brought to white heat and simultaneously the steam required for producing gas is obtained, the water tubes being arranged within the furnace proper and the heat passing through the tubes 4, the chambers 5 and 6 and the coil 19 becomes superheated, thereby providing a superheated

feeding. When the required temperature and amount of steam is obtained, the cock 18 is opened and the reaction in the retort begins instantaneously, producing the desired amount of gas. This latter flows through the pipe 26 to the reservoir 20 and is directed, through the discharge opening 32, to the devices where it is intended to be utilized. The feeding of the fuel is done without interrupting the production of gas and without any loss of heat or gas. The covers 30 and 31 being perfectly tight, it will do, for discharging the ashes into ash pit 16, to open the cock 14 and for feeding the retort 2, to open the cock 13. Then both said cocks are again closed and the retort is fed or discharged.

In order to start the producer-generator, the heating devices may be eliminated according to the appliances to which the said generator is destined. The burners 24 being fed by the gas produced within the retort, it may be understood that the amount of said gas (provided the dimensions of the boiler and retort are convenient and the regulating of the flowing through tube 17 being judiciously operated) may be limited to the necessary amount for only maintaining the normal working of the boiler (for instance, for central heating) or even the plant may be calculated for feeding it with water gas and heating it at the same time by the steam from the boiler.

The constructive form according to Figure 2 is a preferred very practical form of the generator according to my invention, in which the annular boiler 33 surrounds the retort 34, leaving between both an annular space 35. Said annular space 35 communicates by means of ducts 36, crossing the upper portion of the retort, with the central chamber 37 provided at the central part of the annular retort. The lower or bottom part of said central chamber of the retort ends in a duct 38 crossing the ash pit 39 of the generator and opening into a chimney or into a heat storage device.

The working of the device is similar to that of the device according to Figure 1, the burners 40, radially crossing the boiler, being fed by the gases evolved from the retort, the hot gases from said burners following the trajectory indicated by the arrows, through the space 35, the ducts 36, the space 37 and the duct 38. Thus they heat the boiler and the retort walls all along their periphery. Underneath the grate 41 of the furnace of the retort opens a duct 42 forwarding the steam discharged from the boiler. The discharge of the gases from the retort occurs through the duct 43. A starting device comprising, underneath the ash pit, a grate 44 fed with a particular class of fuel and through which compressed air proceeding from the duct 45 is blown, is provided. In the lower portion of the retort is provided a coil 46 carrying a cock 47 branched upon the lower part of the boiler, and opening into the tube 42. For starting, the cocks 47 and 48 are opened, so that the boiler water flows through the coil, becomes instantaneously vaporized therein and forwarded through the duct 42 underneath the grate of the retort furnace. The starting being over, said cocks should be closed.

The generator shown in Figure 2 is provided with the same accessory members as the generator illustrated in Figure 1; the drawing shows only the essential characteristic features.

What I claim to be new is:

1. A combined generator-producer for producing water gas, comprising in combination, a producer retort, a steam boiler concentrically disposed with respect to the retort and forming a free space between the boiler and retort, means for feeding the fuel to the retort, and means for removing the ashes and the like from the retort without interrupting the working, a connection between the steam chamber of the boiler and the bottom part of the retort for injecting steam within the fuel in the retort, a gas reservoir or tank for receiving the water gas evolving from the retort, a connecting duct between both retort and water gas reservoir, burners radially crossing the walls of the part which surrounds the free space between boiler and retort and opening into said space for heating the retort and boiler from outside, and means connecting the retort chamber and the burners for feeding the burners and starting the device.

2. A combined generator for producing water gas, steam and hot water, either simultaneously or not, comprising in combination, a producer retort, an outer annular steam boiler surrounding the retort, an annular space being left between boiler and retort, a central cylindrical pipe extending through the whole height of the retort, a discharge opening at the top and a grate at the bottom of the retort, boiler and retort heating burners radially crossing the walls of the boiler and opening into said annular space between boiler and retort, connections between burners and retort chamber for feeding the burners with the gases evolving from the retort, a connection between the steam chamber of the boiler and the bottom part of the retort for injecting steam within the latter, radial connecting pipes between the said annular space and the said central pipe in the retort, said pipes crossing the latter, a radial duct opening into the bottom part of said central duct for connecting the combustion gases issuing from the burners and flowing upwards through the said annular space, radial connecting pipes and downwards through the central pipes in the retort and means for

feeding the burners and starting the device, said means comprising a second grate underneath the retort grate and burning a particular fuel, a compressed air conduit opening underneath said grate for accelerating the combustion, a coil disposed at the bottom part of the retort, and connected at one end with the boiler bottom, at its other end with the connection between steam chamber of the boiler and bottom part of the retort, cocks at each end of said coil whereby the heat of the fuel on the second grate instantaneously vaporizes the water in the coil, the resulting steam entering the retort underneath the retort grate for producing water gas, a gas reservoir or tank, a duct connecting the retort chamber to said tank, and a discharge opening on top of said tank for leading the water gas to the devices intended to be operated by same.

In testimony whereof I have hereunto set my hand.

JULIEN BELLAY.