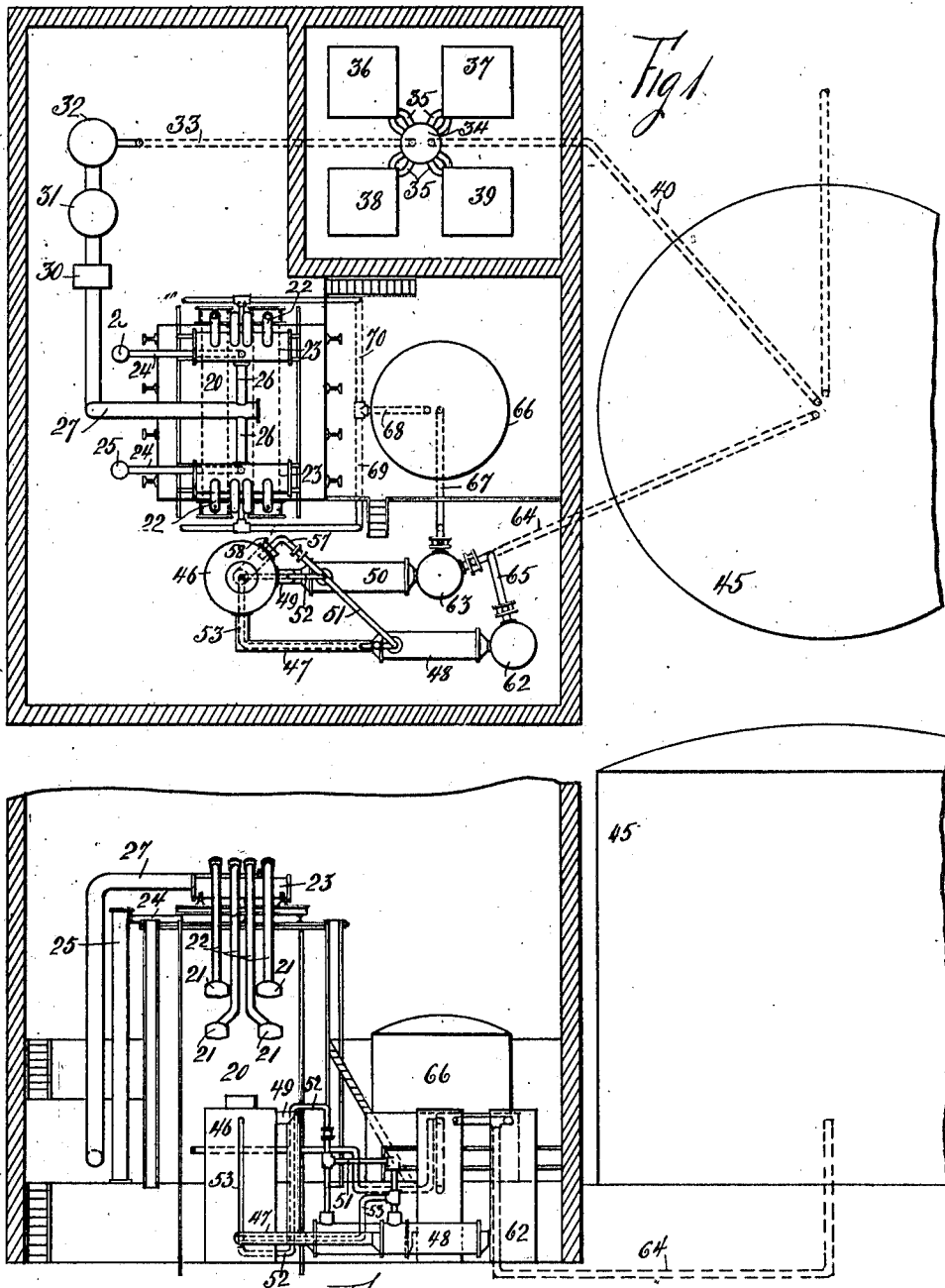


G. A. BRONDER.
 PROCESS OF MAKING A GAS MIXTURE.
 APPLICATION FILED FEB. 9, 1910.

992,106.

Patented May 9, 1911.

2 SHEETS—SHEET 1.



Witnesses:
W. H. Crook
John J. Millin

Fig 2

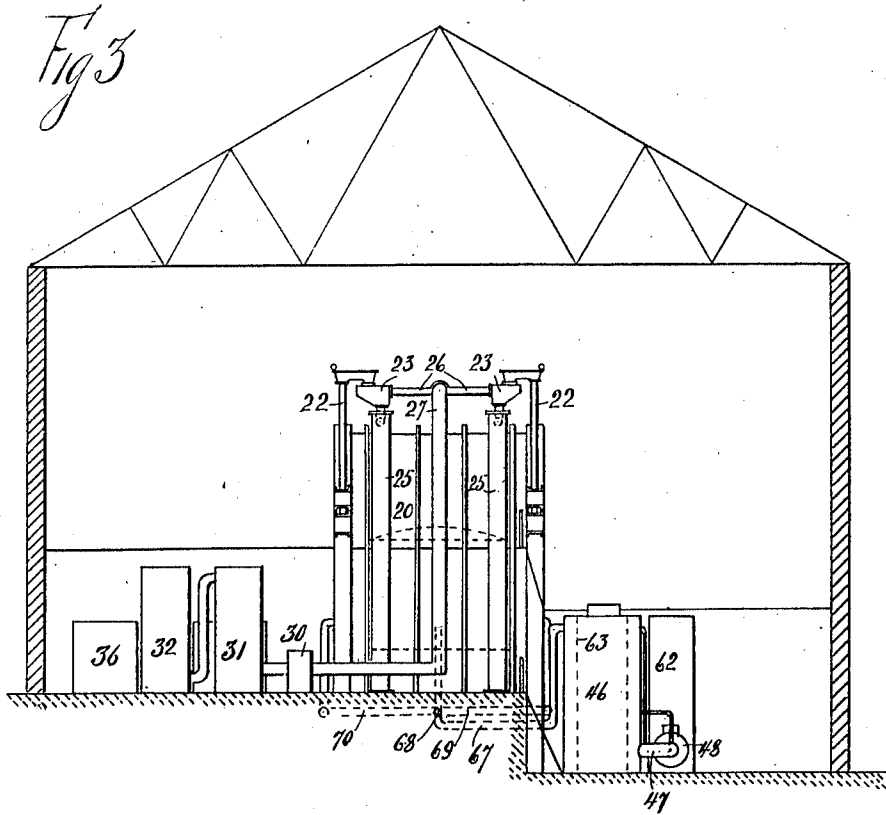
Inventor
Gaston A. Bronder
 By his Attorney
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UNITED STATES PATENT OFFICE.

GASTON A. BRONDER, OF BROOKLYN, NEW YORK.

PROCESS OF MAKING A GAS MIXTURE.

992,106.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed February 9, 1910. Serial No. 542,938.

To all whom it may concern:

Be it known that I, GASTON A. BRONDER, a citizen of the United States, and a resident of the borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Processes for Making Gas Mixtures, of which the following is a specification.

The invention relates to a gas mixture, and its object covers the steps to produce both the separate gases comprising the mixture from a unit of coal and the product obtained from the mixture of the gases.

Specifically the product obtained results from the mixture of what is commercially known as illuminating gas and hydrogen or water gas.

One form of apparatus for carrying out the process is illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of the apparatus. Fig. 2 is a front elevation of the same, and Fig. 3 is a side elevation.

For the purpose of explanation all the steps to produce illuminating gas, water gas and producer semiwater gas as herein recited.

Illuminating gas is generally generated by introducing bituminous coal into hermetically sealed retorts which are heated by means of coke, coal, tar, producer gas or other heating agent. The gas generated in the retorts is treated, in washers, scrubbers, coolers and purifiers to obtain its proper composition, after which it is led to the ordinary gas holder. During these steps and taking 200 lbs. of coal as a unit, about 1000 cubic feet of illuminating gas of a caloric value of 620. British thermal units per

cubic foot are obtained, with a residuum of 133 lbs. of coke, and a portion of tar ammonia, naphthalene and some other elements.

Water gas containing largely equal parts of hydrogen and carbon-monoxid, is produced by charging gas producers with coke, heating the same to incandescence and then forcing super-heated steam through the latter either in an upward or downward direction. The gas on leaving the producer contains a small percentage of tar and in my process is led through a boiler wherein it is

cooled from 1500° Fahr. to 600 Fahr. The heat given off is used for the generation of steam which can be used for any purpose. The gas is then forced through a scrubber and cleaner containing a bed of cold coke, and water percolating downwardly therein through said cold coke. The water and cold coke separates the tar and dust from the gas, after which it is ready for the gas holder. Taking the 133 lbs. of coke obtained as a residuum from the original 200 lbs. of coal as a unit, 3000 cubic feet of water gas are produced from said coke having a caloric value of 323 B. T. U. per cubic foot.

Producer semiwater gas is produced with the same appurtenances as described for the water gas by the injection of a mixture of steam and air through the said 133 lbs. of ignited and highly heated coke, which is forced through the coke in an upward direction. This gas after passing through the boiler wherein its temperature is reduced from 1500° Fahr. to 600 Fahr. as described for the water gas, is led to a holder from which it is taken as required. I have now provided steps for making from the original 200 lbs. of coal illuminating gas, water gas and producer semi-water gas.

Taking twelve minutes as a unit of time the successive steps to generate the water gas and the producer gas may be recited as follows.

By the combined steam and air treatment of highly heated or incandescent coke in an upward direction for 3 minutes generates producer or semiwater gas, super-heated steam treatment of incandescent coke in a downward direction for 3 minutes.

During the production of producer semiwater gas and water gas just described the products obtained are as follows: From the 133 lbs. of coke representing the residuum of the 200 lbs. of coal, 3000 cubic feet of water gas are produced with a caloric value of 323 B. T. U. per cubic foot as already stated, and 2100 cubic feet of producer semiwater gas with a caloric value of 140 B. T. U. during the blow as it is called or the treatment of the coke with steam and air.

Now the specific novel step of my inven-

tion is to make a mixture of the 1000 cubic feet of illuminating gas first obtained from the 200 lbs. of coal with a caloric value of 620 B. T. U. per cubic foot, and the 3000 cubic feet of water gas having a caloric value of 323 B. T. U. per cubic foot, making a mixture of gas of 4000 cubic feet with a caloric value of about 400 B. T. U. per cubic foot. This mixture of gas is a commercial product cheaply made and useful for power and heating purposes. The 2100 cubic feet of producer semiwater gas obtained is a by-product and can be used for firing the retorts when treating the original coal, for heating the boilers in the plant, and for other purposes. The said mixture of illuminating gas and the water gas has various beneficial and novel properties. It is in the first place compressible to a high degree, and but a small amount of water is condensed therefrom with low temperatures, in fact low temperatures affect it but little. Water gas can hardly be detected by the sense of smell, but my mixture has a strong odor and can easily be detected by smell.

Referring more particularly to the accompanying drawings in which is illustrated one form of apparatus adapted to be utilized in carrying out the process, the numeral 20 designates a retort stack which is provided with the retorts 21, the said retorts communicating with upwardly extending stand pipes 22 leading to the mains 23. Piping 24 connects the mains 23 with the tar towers 25. Piping 26 connects the said mains with the coal gas main 27. The latter leads to the exhaustor 30, the condenser 31 and scrubber and washer 32. The gas main 33 leading from the scrubber is somewhat reduced in diameter and leads to the center valve 34. Piping 35 connects the said center valve with the purifier boxes 36, 37, 38, 39. From a compartment in the center valve extends the piping 40 to the main gas holder 45.

A gas generator 46 is located in front of and adjacent to the retort stack 20 so that hot coke from the latter can gravitate into the said generator.

A conduit 47 for hot gases extends from the lower end of the generator and connects with the boiler 48. A conduit 49 extends from the upper end of the generator 46 and connects with a second boiler 50. The domes of the two boilers are connected by the piping 51. Piping 52 extends from the piping 51, runs through the conduit 49 and thence into the lower end of the gas generator. Piping 53 extends from the piping 51, runs through the conduit 47 and from thence to the upper end of the gas generator. Piping 57 extends from the piping 51 to the air duct 58 which latter leads to the lower end of the generator 46. The boilers 48 and 50 are respectively connected with the condens-

ers and scrubbers 62 and 63 respectively. Piping 64 runs from the condenser and scrubber 63 to the gas holder 45 and piping 65 connects the scrubber 62 with the piping 64.

A producer gas holder 66 is located adjacent to the retort stack and piping 67 connects the condenser and scrubber 63 with the said gas holder 66.

An outlet pipe 68 extends from the holder 66 and connects with the branch pipes 69 and 70 that lead to the furnaces of the gas retorts.

To operate the plant to make the novel gas mixture, soft gas coal is charged into the retorts 21, where it is heated by means of semiwater gas furnished by the pipes 69 and 70. The coal gas generated is conducted through the stand pipes 22 thence into the mains 23, where the tar is extracted which latter flows into the tar towers 25. The coal gas then travels through the mains 27 by means of the exhaustor 30, and is then forced through the condenser 31, scrubber and washer 32. From the latter the gas led to the center valve 34 and from the latter the gas passes through the purifying boxes 36 to 39 on its way to the holder 45.

The whole residuum of coke in the retorts 21 is discharged into the gas generator 46 where it is brought to a state of incandescence by injecting air therethrough.

When generating water gas the incandescent coke in the generator 46 is alternately subjected to jets of superheated steam by means of the piping 52 and 53.

The water gas produced travels through the conduits 47 and 49. The conduit 49 leads the water gas through the boiler 50, condenser and scrubber 63, from which latter it enters the holder 45. The conduit 47 leads the water gas to the boiler 48, condenser and scrubber 62, and from the latter is also led to the holder 45.

When it becomes necessary to revivify the bed of coke after producing a charge of water gas, a mixture of air and steam is introduced into the generator. Semiwater gas is thereby produced which is led through the conduit 49, boiler 50, condenser and scrubber 63, pipe 67, and into the semiwater gas holder 66. From the latter holder, as before mentioned, the semiwater gas is led to the retorts.

Having described my invention what I desire to secure by Letters Patent and claim is.

The herein described process of generating gas, which consists in distilling a definite quantity of coal in a retort, washing and purifying the coal gas thereby obtained, collecting the washed and purified coal gas in a holder, heating the entire residuum of coke obtained from the retort to a state of incan-

5 descence, alternately forcing superheated steam and air through the incandescent coke to obtain alternate charges of water gas and semiwater gas, washing the water gas and mixing it with the coal gas in the holder, and conveying semiwater gas to the retort for heating the same.

Signed at the borough of Manhattan, in the county of New York and State of New York, this 8th day of February, A. D. 1910. 10
GASTON A. BRONDER.

Witnesses:

A. A. DE BONNEVILLE,
M. H. COOK.