

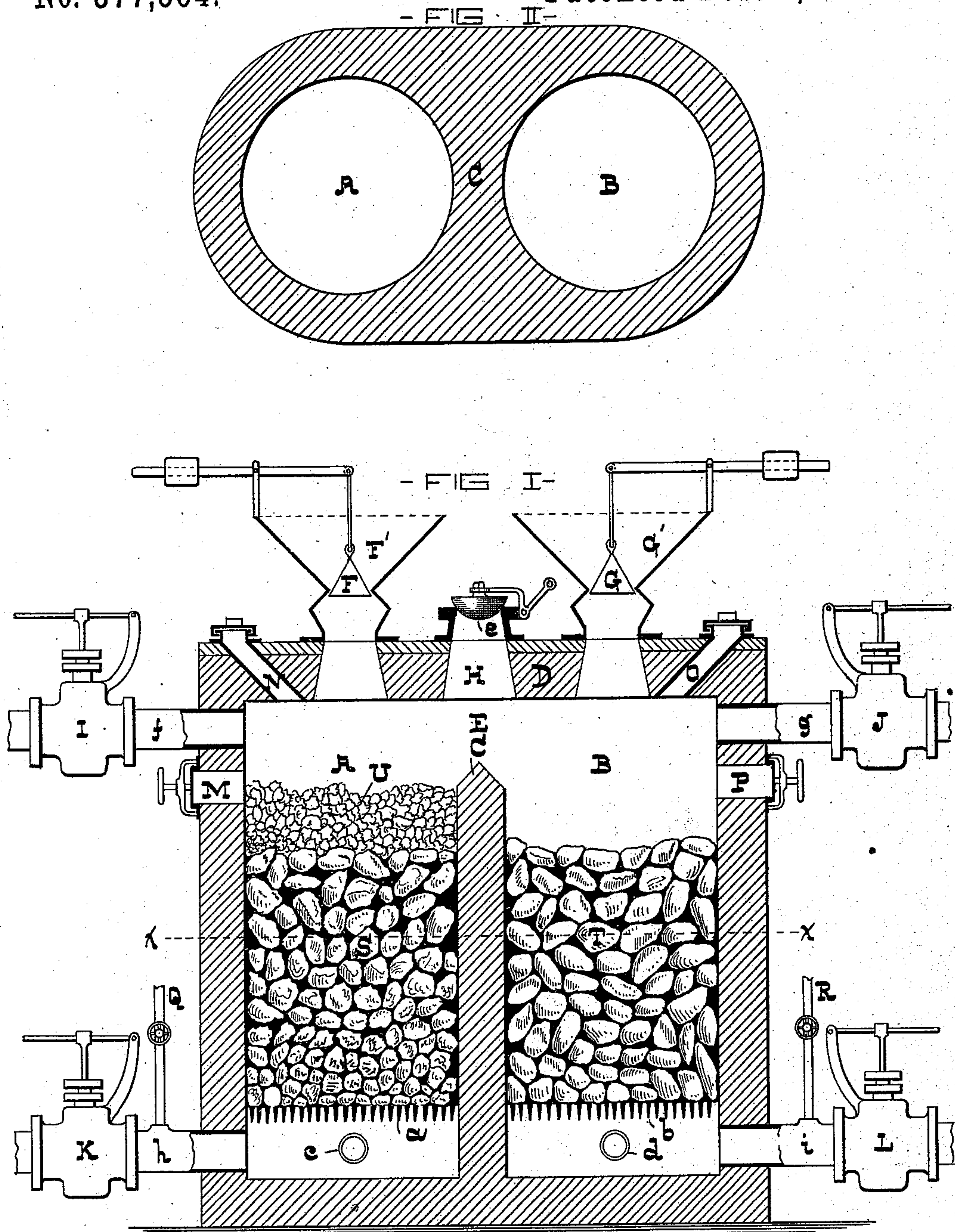
(No Model.)

F. C. KNIESE.

PROCESS OF MANUFACTURING WATER GAS.

No. 377,564.

Patented Feb. 7, 1888.



Dan'l. Fisher

Frank. Hodges

Fredrick Charles Kniese

by G. H. W. Howard
attys.

UNITED STATES PATENT OFFICE.

FREDERICK CHARLES KNIESE, OF BALTIMORE, MARYLAND.

PROCESS OF MANUFACTURING WATER-GAS.

SPECIFICATION forming part of Letters Patent No. 377,564, dated February 7, 1888.

Application filed March 29, 1887. Serial No. 232,844. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK CHARLES KNIESE, of the city of Baltimore and State of Maryland, have invented an Improved Process of Manufacturing Water-Gas and of Enriching the Same by Means of Bituminous Coal, of which the following is a specification.

In carrying out my improved process I provide a series of generators, preferably two in number, and charge them with coke which is heated to incandescence. A body of bituminous coal is then placed on the incandescent coke in one of the generators and steam introduced to the lower part of the generator to effect its disassociation, the water-gas passing upward through the body of bituminous coal, and thence in a carbureted condition over the incandescent coke in the other generator to a discharge-pipe leading to the wash-box and the purifying apparatus. This process is continued until the temperature of the coke in the first generator is reduced to a point at which it ceases to be available for the production of water-gas, after which steam is passed through the second generator and the water-gas thereby produced carried over the partition between the two generators and downward through the body of bituminous coal and the coke underneath to a discharge-pipe leading, as did the other, to the purifying apparatus. By this means the bituminous coal is subjected to the action of intensely-heated water-gas from two opposite directions—viz., from underneath and from the top—and in consequence of this alternate action all the bituminous matter in the coal is combined with the water-gas. The coke in the two generators is now reheated and the operation, as before described, carried on with the second generator as the primary one.

In the further description of the invention which follows reference is made to the accompanying drawings, forming a part hereof, and in which—

Figure I is a sectional elevation of the apparatus preferably employed in carrying out the improved process, and Fig. II a section plan of Fig. I, taken on the dotted line *xx*.

Similar letters of reference indicate similar parts in both figures.

In the said drawings, A and B are the two generators separated by the partition C. These

generators are built of brick-work and incased in iron, so as to resist intense heat, and they are provided with grates *a* and *b* and blast-pipes *c* and *d*, through which air under pressure is delivered to below the grates. This partition does not extend to the top of the generators, but terminates at a point somewhat below the upper wall, D, in order to form the connecting-aperture E.

F and G are bells situated in hoppers F' and G', of ordinary description, adapted to deliver bituminous coal to the generators, and between these hoppers is situated the main escape-opening H, having a valve, *e*, which is common to both generators.

I, J, K, and L are stop-valves in the main gas-pipes *f*, *g*, *h*, and *i*, which pipes lead to the purifying apparatus. (Not shown.)

M, N, O, and P are stoke-holes having suitable caps through which access may be had to the interiors of the generators.

Q and R are steam-pipes extending from some source of supply to the main gas-pipes *h* and *i*.

S and T are beds of coke in the generators A and B, and in the generator A is shown a body of bituminous coal, U, which had been introduced through the hopper F'.

Supposing that the generators A and B are charged with ignited coke and the valves I, J, K, and L closed, the valve *e* in the main escape-opening H is opened and air forced through the coke in both generators until it is brought to incandescence. The valve *e* is now closed and the air-blast stopped, after which the bell F in the hopper F' is opened and the charge of bituminous coal contained in the said hopper admitted to the generator A and upon the bed of incandescent coke therein. Steam is now admitted through the steam-pipe Q to the main gas-pipe *h*, and thence through the grate *a* to the bed of coke S. The steam in passing through the bed of coke is disassociated and, as water-gas in a highly-heated condition forced through the bed of bituminous coal U from the under side thereof and carbureted. The valve J in the main gas-pipe *g* being opened before the introduction of steam to the generator, the carbureted water-gas passes through the aperture E and over the bed of incandescent coke T in the generator B to the gas-pipe *g*, and thence to the wash-box and purifier.

(Not shown.) This portion of the process is continued until the temperature of the coke in the generator A has fallen below the point at which it is available in the production of water-gas, and then the valve J is closed and the one, K, opened. Steam is next admitted to the pipe *i*, and the water-gas produced in its passage through the incandescent coke in the generator B carried through the aperture E to the top of the bituminous coal in the generator A, and passes through it, and also through the bed of coke below, to the gas-pipe *h*, and thence to the purifier. (Not shown.) By this means the bituminous coal is twice subjected to the action of highly-heated water-gas, and from opposite directions, so as a greater proportion of carbon is taken up by the water-gas than heretofore.

The main gas pipes are now closed and the escape-valve *e* reopened, after which the coke in both generators is reheated by means of the air-blast, as before described. The generator B is now used as the primary one and a charge of bituminous coal introduced thereto, when the gas-making operation is repeated.

It will be understood that the coke produced from the bituminous coal in the gas-making operation supplies the deficiency caused by the consumption of that in the heating process, and a uniform height of coke in the generators is thereby maintained.

It will be necessary to break up the newly-made coke in the generators before it is in condition to form a portion of the heating-bed, and this operation is easily accomplished by means of suitable bars entered through the stoke-holes before alluded to.

With my invention, as described, it will be seen that I am enabled to subject the charge of coal to the action of heated water-gas for a greater length of time than heretofore, as I exhaust the heat of one bed of coke and then bring into operation the second bed, which has been held in reserve in an incandescent state. Further, the coal being operated on by the heated water-gas alternately from the under and the upper side, much better results are obtained as regards enriching the water-gas than by processes in use before my invention.

I claim as my invention—

The process of manufacturing water-gas and of enriching the same by means of bituminous coal, herein described, which consists in first blasting to incandescence two independent bodies of coke, then depositing on one of the said bodies a charge of bituminous coal, then passing steam through the said body of coke, and its disassociated elements through the charge of coal laid thereon, and conducting the product obtained to a wash-box and a purifier, continuing the said process until the coke becomes too cool to be available for the production of water-gas, and then passing steam through the other body of incandescent coke and its disassociated elements to the other side of the charge of coal and downward through the same and the coke underneath to a wash-box and purifier, substantially as and for the purpose specified.

FREDERICK CHARLES KNEISE.

Witnesses:

WM. T. HOWARD,
DANL. FISHER.