H. W. C. TWEDDLE.

PROCESS AND APPARATUS FOR MANUFACTURING GAS.

No. 181,499. Patented Aug. 22, 1876.

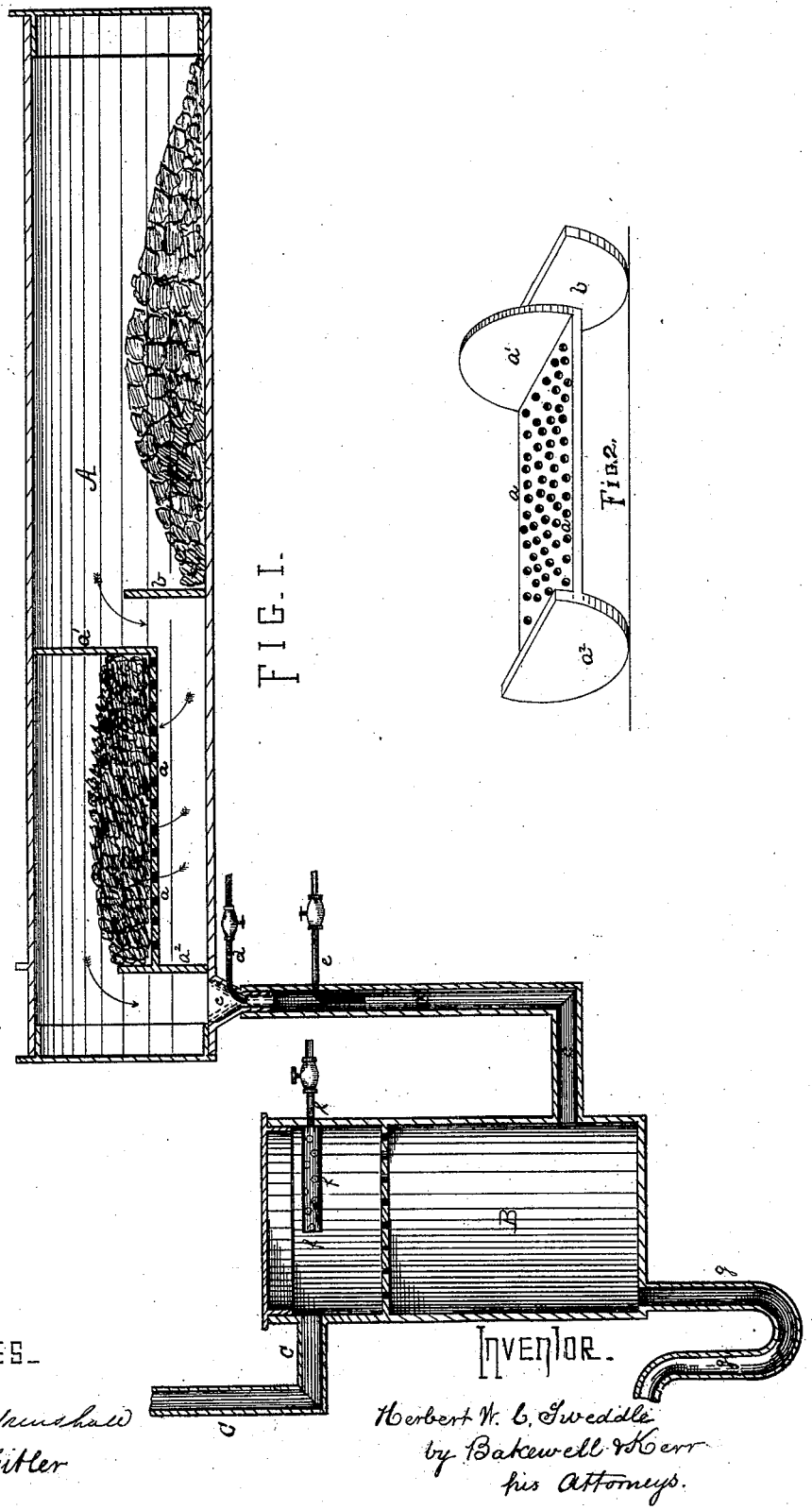

FIG. 1.

Fig. 2.

WITNESSES.

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IMPROVEMENT IN PROCESSES AND APPARATUS FOR MANUFACTURING GAS.

Specification forming part of Letters Patent No. **181,499**, dated August 22, 1876; application filed March 13, 1876.

To all whom it may concern:

Be it known that I, HERBERT W. C. TWEDDLE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Manufacture of Gas; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a sectional view of a retort and accessories, which may be employed in carrying out my invention. Fig. 2 is a detached view of a basket used in connection with the retort.

Like letters refer to like parts wherever they occur.

My invention relates to processes and apparatus for the manufacture of gas from coal.

The method commonly practiced in the manufacture of coal-gas is to first heat the retorts to the requisite degree, and then introduce the charge, and permit distillation to take place for four or five hours, or until the charge is exhausted, after which the retorts are drawn and recharged. The stand-pipe is located near the mouth of the retort, and the gases are drawn directly from the retort, an exhaust being usually employed for that purpose. By such a method the best results are not attainable, for the reason that when the charge is introduced it rapidly absorbs the heat of the retort, reducing the temperature so low as to produce a slow distillation inimical to the production of gas, but favorable to the formation of tar. As a consequence, the gas that first passes over is surcharged with tarry and oily matters, which clog the stand-pipe and condense in the hydraulic main. As the distillation is continued the gas becomes poorer and poorer, for the reason that the slow distillation which first took place to a great extent exhausted without utilizing the gas-producing elements.

Recognizing these objections to the common method, various modifications have been suggested and tried—as, for instance, dividing up the retort into sections by partitions, which prolonged the travel of the gas, and caused it to pass consecutively through the several quantities or divisions of the charge, and retained it in the retort for a longer period; the use of outer and inner retorts to obtain uniform distribution, perfect circulation, and intimate contact of the gases with the hot surfaces of the retorts—but such methods increased the pressure in the retort, and are obviously objectionable. It has likewise been suggested to introduce the charge in successive divided quantities to re-enforce, as it were, the exhausted portions of the charge; but it is evident that what results in the common practice will likewise occur under this modification, though perhaps in a less degree. Finally, the passing of the gas from a bench of retorts through a superheating-retort filled with coke, brick, and various substances has been suggested and applied, and this latter method is, so far as I am aware, the nearest approach to the present invention; but, by such a method, each retort does not work off its own charge, and produce a rich uniform gas; it simply transfers to a common retort or reservoir the tarry and oily matters of the first part or slow distillation. This latter method results in the formation of carbon in the superheating-retort and stand-pipes, and the formation of tarry matters, perhaps lessening but certainly not avoiding the main objections urged against the common method. In fact, so little has been accomplished by the apparatus and methods heretofore devised and suggested, that the old and well-known method of producing coal-gas is still the method universally followed.

I will now proceed to describe the devices employed by me, and in connection therewith my process, so that others skilled in the art to which it appertains may apply my invention.

In the drawing, A indicates a retort, which may be the only one employed, according to the amount of gas to be produced, or one of a bench or series. The rear third or fourth part of the retort is occupied by what I term a "basket," as it may be made of metal and detachable, but is preferably built of brick or tile, in the form of an arch platform or false bottom, *a*, which will support coke or like substance placed thereon, and form a channel or conduit for the entrance of gas beneath. This platform or false bottom *a* is perforated,

as shown, and bounded at each end by a partition-wall, a^1 a^2, the rear wall a^2 terminating just below the top of the retort, or perforated, if preferred, to permit the escape of gas to the exit-pipe *c*. Directly in front of partition a^1 is a barrier, *b*, which prevents the charge from closing the conduit beneath the platform *a*.

c is an exit-pipe, (or downtake,) provided with a steam-jet, *d*, and, directly below the same, a water-jet or spray pipe, *e*, by means of which the exhaust may be controlled, and the gas freed from any light carbonaceous matter, thus keeping the exit-pipe clean. This pipe may proceed from side or top. Exit-pipe *c* communicates directly with a spray or similar washer, B, interposed between the exit-pipe and the usual stand-pipe C. B is a washer or condenser, provided above with a spray-pipe, *f*, and below with a trap-pipe, *g*. Said washer receives the gas on its way to the stand-pipe, and washes out all pitchy or carbonaceous particles not previously removed by the first or exit pipe, spray, and condenser, thus preventing anything but fixed gas passing to the stand-pipe C, and preventing clogging.

No scrubber is shown in the drawing; but it is understood, of course, that the usual or any approved scrubber and condenser may be employed.

The operation of these devices is as follows: The retort being filled, the first charge may be worked off in the usual manner, (the steam-jet being regulated to the required exhaust,) after which the resulting coke is pushed back or charged onto platform *a*, and a fresh charge of coal introduced into the front part of the retort. The first gas or product of slow distillation, in its passage through and over the red-hot coke on platform *a*, has its oily and tarry matters arrested and decomposed within the retort. The exhaust located near the connection of the exit-pipe and retort induces and controls the flow of gas, and the spray-condenser immediately below the steam-jet assists the exhaust, and at the same time washes out any pitchy matters that might otherwise become attached to and clog the exit-pipe.

By thus retaining the tarry products of the distillation within the retort, and subjecting them to the action of the red-hot coke, it will be found that a greater quantity of illuminating-gas is obtained, depending upon the quality of the coal, or other matter employed.

I have thus far described my process in connection with the apparatus shown; but it is evident other devices may be substituted for those shown, (and preferred,) and that some specified may be dispensed with entirely—as for instance, the basket may be omitted, and the first charge, when coked, be pushed directly back. In the process the rear of the retort may be charged with coke, before the first charge is introduced, if preferred.

The same body of coke placed on platform *a* may be frequently used without being changed. The size of the body of coke will depend to some extent on the coal used, a richer coal requiring a greater body of coke than a poor gas-producing coal.

If petroleum, benzole, or petroleum residuum, or other rich bodies are used, the body of coke in the rear end of retort must be made larger and more compact. Where poor coals are used that do not yield much tar, passing over the coke is only necessary. In any event the charge of coke in the rear of the retort must be adapted to the coal or body distilled. No tar, but simply a heavy pitch and carbonaceous matter is produced. The gas product will be increased from ten per cent. to thirty per cent. without being deteriorated. At moment of charging the retort by increasing the steam-jet, and producing a greater vacuum in retort, a saving of the gases, which would otherwise be discharged from the mouth of the retort, is effected.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The process of manufacturing illuminating-gas, which consists in passing the gas generated from the charge of coal in a retort through or over a body of coke located in said retort between the charge and exit pipe, and subsequently subjecting the gas thus produced to the action of a water-jet or spray before its escape from the exit-pipe of the retort, substantially as herein specified.

2. In combination with a retort of the ordinary form, the perforated basket *a* a^1 a^2, and the barrier *b*, interposed between the charging orifice and the gas-exit, substantially as and for the purpose specified.

3. In combination with a gas-retort, having the basket *a* a^1 a^2 interposed between the charging-orifice and the gas-exit, the exit-pipe *c*, provided with the steam-jet *d*, and the water-jet *e*, substantially as and for the purpose specified.

In testimony thereof I, the said HERBERT W. C. TWEDDLE, have hereunto set my hand.

HERBERT W. C. TWEDDLE.

Witnesses:
JAMES I. KAY,
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