D. DAVISON.

PROCESS AND APPARATUS FOR DECARBONIZING GAS RETORTS.

No. 169,628. Patented Nov. 9, 1875.

Fig. 1.

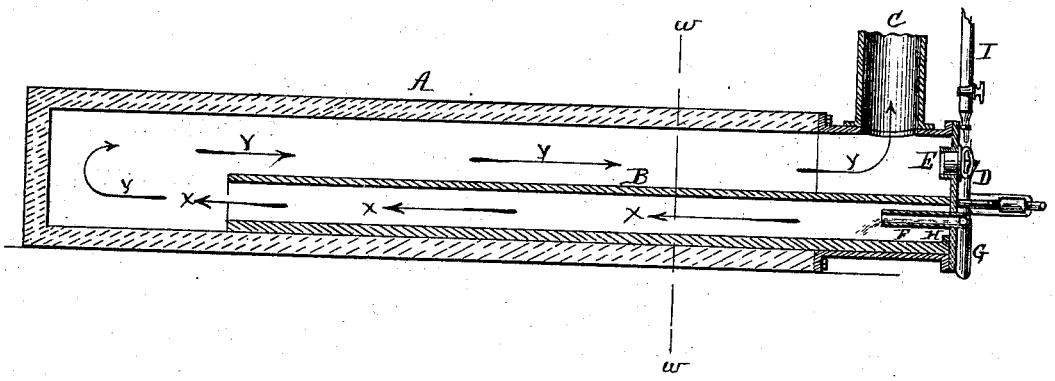


Fig. 3.

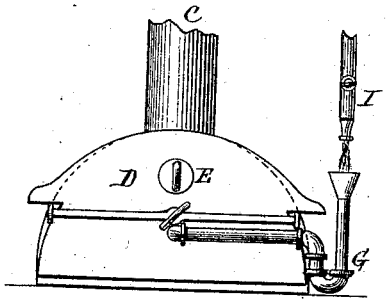
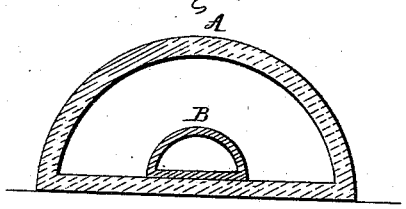


Fig. 2.



Witnesses:

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IMPROVEMENT IN PROCESSES AND APPARATUS FOR DECARBONIZING GAS-RETORTS.

Specification forming part of Letters Patent No. **169,628**, dated November 9, 1875; application filed November 11, 1874.

To all whom it may concern:

Be it known that I, DARIUS DAVISON, of the city, county, and State of New York, have invented certain Improvements in Process and Apparatus for Decarbonizing Gas-Retorts, of which the following is a specification:

Figure 1 is a longitudinal vertical section of an ordinary retort, together with inner retort and other appliances adapted to the carrying out of my invention. Fig. 2 is a cross-section of the same on the line *w w*. Fig. 3 is a front view, showing the lid for closing the mouth of the retort, with external fixtures applicable to my invention.

My invention relates to certain improvements in decarbonizing gas-retorts and utilizing the products of such process; and it consists in the process of making gas for illuminating purposes during and by the operation of periodically decomposing or burning out the fixed carbon which deposits and hardens in mass in the interior of retorts used to make illuminating-gas from coal and other substances, and causing the gas thus produced to pass into the hydraulic main and holder for use, in the usual way, not allowing it to escape into the air, as is the usual practice, and thus be wasted.

I will now proceed to more fully describe the effects, objects, construction, and operation of my invention.

Similar letters of reference indicate corresponding parts.

A is an ordinary retort; B, small interior retort, made of fire-clay or iron, open at both ends, and placed loose in and upon the bottom of the retort A when in use, and so that it may be readily removed from the retort A after the latter has been decarbonized. C is a part of the ordinary stand pipe; D, the lid to close the mouth of the retort and make it substantially gas-tight by the usual luting, said lid also serving to close the front end of the small retort B, with luting placed on the lid to make a gas-tight joint between the latter and the front end of the retort B, the front end of the retort B being placed on a line with the front end of the mouth-piece, so that when the lid is closed in its place the lutings will be compressed to a gas-tight joint both on the front edges of the mouth-piece and the front edges of the retort B. E is a small stopper in the lid D, to be closed gas-tight with luting, so as to be conveniently removed, in order to ascertain the condition of the retorts inside from time to time, so as to avoid the necessity of removing the lid D; also, to ascertain the state of heat and decomposition of carbon in the retort, and when the requisite decarbonization is completed. F is a tube running through the lid D into the retort B, to conduct water or any liquid or vapor into the retort B, for the purposes hereinafter described. G is a siphon or trap-pipe, exterior to the lid, being in connection with, and a continuation of, the tube F, to prevent the escape of any gas through that aperture, and to receive and cause to flow by gravity into the retort B any water or liquid substance, in quantity and kind required to accomplish the object of its introduction therein; H, a small raised portion on the front end of the bottom of the retort B, to prevent any liquid caused to flow into the latter from running back in contact with the luting, and by softening it to cause a leak at that point. I is the lower end of any suitable pipe, fitted with a stop-cock to regulate and direct the flow of liquid into the trap-pipe G, from and connected with any suitable vessel, elevation, or head of liquid, to cause it to flow through the trap G into the retort B. The arrows *x x* show the direction of the vapor formed from the liquid allowed to flow into the retort B. The arrows *y* indicate the direction of the gas generated from the vapor within the retort B in its passage through the retort A, and in contact with the hot surfaces thereof and the fixed incandescent carbon on the inside surfaces of the retort A.

The usual practice in gas-works for periodically decomposing the fixed carbon deposited on the inside surfaces of retorts is, to take a stopper out of the top of the stand-pipe or bridge-pipe, and, partly closing the mouth of the retorts, allow any required amount of air to circulate by suitable means through the retort, and thence by the draft up the stand-pipe, and thus waste in the open air the inflammable carbonic-oxide gas so produced. This wastes the heat of the furnace, and throws the retorts thus decarbonized or burned out out of use for making gas of any kind to pass

into the gas-holder, to increase the volume of gas therein.

Under my invention water, or vapor of water, or any other liquid substance, may be introduced into retorts of a bench, or a series of benches, from any suitable head or force, by a series of connecting-pipes running along the front of the bench or benches, with continuous connections that can be made directly to the pipe G and lid D, applied to any retort, or retorts without any disconnections or openings to the atmosphere intervening between any head or force of such supply and the inner end of the tube F. The flow of liquid or vapor, in that case, to each retort should be regulated by a suitable stop-cock in the pipe leading to the trap-pipe G at any convenient place; or any suitable separate movable receptacle can be used to supply a head for the liquid required to be supplied to each retort or bench of retorts, to run into the same by gravity or otherwise.

By decarbonizing or burning out gas-retorts, with the retorts and all the apparatus connected therewith, and with the hydraulic main and gas-holder all secured gas-tight, or substantially so, just as when gas is made therein from coal or other substances, and introducing water or vapor of water into the retorts as and by any of the means hereinbefore described, the following effects or results are produced: The water allowed to flow through the tube or pipe F into the retort B by falling on the hot bottom surface of the same is immediately vaporized, and passes through the retort B, out at the open back thereof, the same being highly heated in its passage, and flowing into the back end of the retort A in a heated condition, sufficient to decompose it, and to allow the oxygen gas of the decomposed water to combine with and decompose the incandescent fixed carbon in the hot retorts, and thus form inflammable carbonic-oxide gas, and liberate the hydrogen of the water thus decomposed into a gaseous state, both of which gases pass through the retort into the stand-pipe at the mouth of the retort; thence into the hydraulic main and gas-holder, adding a large volume of combustible gas thereto, that by any ordinary practice is wholly wasted.

In using this process to increase the volume of gas made, a somewhat larger percentage of rich luminous burning carbonaceous material would have to be used in other retorts than is required in the present practice to keep the large volume of gas thus produced at the required standard of candle-power.

A retort or bench of retorts, or a series of benches of retorts of the ordinary kind in use, can be fitted and operated, as hereinbefore described, to make gas for illuminating purposes from any suitable liquid carbonaceous substance, for public gas-works or for local use.

By the use of this invention and process of decarbonizing or burning out retorts in gas-works fuel is economized, all the retorts in a gas-works that are heated can be made to produce gas nearly constantly, the aggregate amount of gas from any given quantity of coal will be largely increased in volume at no expense, and thereby the average cost of production of all the gas made will be materially and profitably reduced.

I do not confine my invention to the particular construction, combination, and use of the parts herein described, as the same may be varied to suit circumstances; but a distinguishing characteristic and leading advantage of my invention for decarbonizing retorts consist in effecting the decarbonization with the whole apparatus in a closed or gas-tight condition, so that the gas produced in decomposing the fixed carbon in the retorts is not wasted, as heretofore, but is utilized to great advantage by being forced into the holder to increase the volume of luminous gas therein.

What I claim is—

1. The lid D, having a stopper, E, and a tube, F, extending into the secondary retort B, in combination with a fluid-conducting pipe, I, the retort B, and the ordinary gas-retort and stand-pipe, the lid D covering the front ends of both retorts by luted gas-tight joints on each, substantially as described, for the purpose herein specified.

2. The process of periodically decarbonizing gas-retorts while the same and their connections with the gas-holder are all operated substantially gas-tight, whereby the fixed carbon therein is burned out, and the carbonic-oxide and hydrogen gases produced during such operation forced into the gas-holder for use, substantially in the manner and for the purpose herein described.

In testimony that I claim the foregoing I have hereunto set my hand.

DARIUS DAVISON.

Witnesses:

JAMES L. NORRIS,

JOS. L. COOMBS.