H. A. BRANCH.

Method of Utilizing Tar and Coke Dust in the Manufacture of Gas.

No. 215,564. Patented May 20, 1879.

Fig: 1.

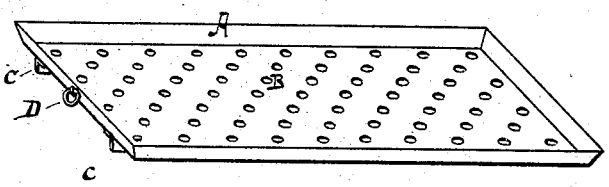


Fig: 2.

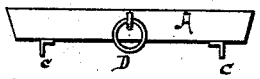
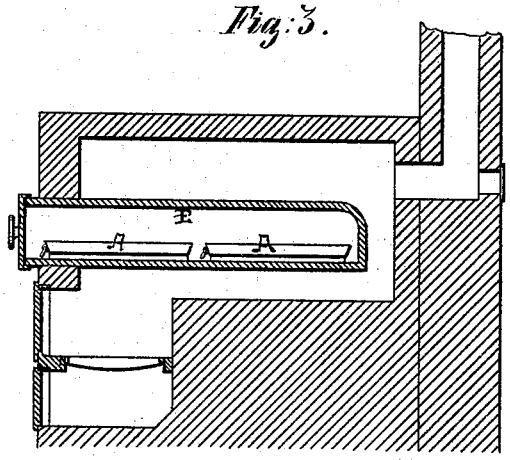


Fig: 3.



WITNESSES

Edw. Hale

Jesse "Coe" Jr.

INVENTOR

Henry A. Branch

Per W. E. Dayton

Attorney

UNITED STATES PATENT OFFICE.

HENRY A. BRANCH, OF HILLSDALE, MICHIGAN.

IMPROVEMENT IN METHODS OF UTILIZING TAR AND COKE-DUST IN THE MANUFACTURE OF GAS.

Specification forming part of Letters Patent No. **215,564**, dated May 20, 1879; application filed July 22, 1878.

To all whom it may concern:

Be it known that I, HENRY A. BRANCH, of Hillsdale, Hillsdale county, State of Michigan, have invented a certain new and useful Improvement in the Method of Utilizing the Tar and Coke-Dust Products of Coal-Gas Manufacture by the Production of Gas therefrom, of which improvement the following is a full, clear, and exact description, reference being made to the accompanying drawings, in which—

Figure 1 is a perspective view of a shallow pan adapted to support a proposed mixture within a retort. Fig. 2 is an end elevation of the same, and Fig. 3 is a vertical longitudinal section of a retort in a bench, and containing said pan or pans.

My invention has for its object to provide such a method of reducing to gas and fuel the coal-tar and coke-dust or screenings which form residual products of coal-gas manufacture, as may be conveniently and profitably pursued in connection with such manufacture. I might, therefore, properly call my invention an improvement in the art of making illuminating-gas from coal, the purpose of which is to increase the yield of gas from coal, and to render more valuable the residual product.

My invention consists in mixing the coal-tar in the condition in which it comes from the tar-well or hydraulic main with coke screenings or dust, and subjecting the mass to heat within a retort, said mass being introduced in a thin compact body presenting a large surface to the heat, and supported clear of the retort, in order that distillation may at first be delayed to give time to close the retort and thus prevent escape of the gas, but that it may subsequently be both rapid and complete to secure the largest yield and a better fuel, and also in order to facilitate its withdrawal from the retort after distillation in solidified form convenient for use as fuel.

I have found that the relative proportions in which crude coal-tar may be mixed with coke-dust to afford the best yield of gas from the tar and the best fuel in the compound residual product are about four gallons of tar to one bushel of screenings. Carefully mixed in substantially these proportions a mass is formed in which the tar is distributed over the surfaces of the coke particles, and absorbed by them in such manner that the mass itself is porous, though it be well compressed, allowing the gas to freely escape when properly heated, and at the same time forming, after distillation, a unitary body having great heating-power as fuel, and convenient for handling for that purpose. Somewhat less tar may be used, as from three to four gallons to the bushel of coke; but for economical reasons, as well as for the purpose of obtaining a better fuel, I prefer not to use less than three gallons.

In order to profitably distill the gas from coal-tar its entire yield should be saved, and it should be prevented from sticking to the retort. It should also be exposed within the retort in such manner as to distill as rapidly as possible after once properly heated. With these and other objects in view, I present the mass within the retort in a thin body having large relative surface, and support the same by any suitable means clear from actual contact with the retort-surface. For this purpose I have employed shallow pans similar to that shown in the drawings and marked A. This pan has numerous perforations, B, in the bottom, and is also provided with longitudinal metal strips *c*, secured to the bottom, by which the body of the pan is supported an inch or two above the bottom of the retort E. In this pan the mixture is placed, at the point where prepared, to a depth of four to six inches, and preferably compacted, and the whole is bodily introduced into the heated retort. By reason of the space between the mass and the retort-surface distillation is not immediately active. Two or more of the pans or masses may, therefore, be introduced and the retort closed before any considerable quantity of gas has escaped. After the retort is closed and the mass is heated distillation is especially rapid and thorough in consequence of the elevation and form of the mass, practically all portions being equally exposed to the heat, and egress being equally afforded on all sides to the gas. Distillation is therefore rapid, uniform, and complete when once in progress, and, being delayed as described, the entire yield is saved and conveyed to the holder; and a less important result is obtained from thus supporting the mass clear of the retort, consisting in the perfect ease with which it may

be withdrawn from the retort after distillation is complete. When tar or any mixture thereof is thrown upon the retort-bottom, or is otherwhere brought in contact therewith, it clings with great tenacity, and is very difficult of removal. A coke-dust and tar mixture thus thrown in is, moreover, completely pulverized in withdrawing it, so as to be practically in no better form for fuel than is coke-dust alone.

By supporting the mass clear of the retort, as above described, it may be withdrawn with the utmost facility, and the retort is left in condition to be again charged without delay, while the residuum is in solidified form, (easily broken, if whole,) adapted to be used as fuel in the bench-furnace. Even the quality of the fuel product is improved by reason of the manner in which the mixture is presented within the retort, since, in the case of this mixture, no less than in that of coal, rapid and perfect distillation invariably leaves a better residual fuel. It may be also stated that the fuel is greatly improved by reason of the large proportion of tar mixed with the coke-dust, which, as explained, both enters the pores and clings to the surface of the coke particles, and thus contributes to give the coherent form to the residuum, as well as to furnish by itself a larger body of intensely combustible material. The distinctive character of this residuum as a product is attested by the fact that it has about double the heating power of coke, both giving more intense heat and lasting much longer when burned under the same furnace conditions.

I do not claim the metallic pan described, nor do I limit myself to its use, as other means of supporting the mass may be employed.

Obviously, the supports *c* may be of clay or other material, and they may be permanently or removably located in the retort.

By the distinctive process above set forth the yield of gas from coal-tar is largely greater than can be obtained therefrom by throwing the mixture of tar and coke-dust loosely into the retort; and by securing its entire yield the aggregate product of a given amount of coal is increased upward of three per cent. As the gas obtained from the tar is of extreme richness, the addition of this percentage to the main product of the coal increases the candle-power thereof from twenty per cent. to twenty-five per cent. In most works, therefore, the use of tar in the practicable and simple method above pointed out will obviate the use of other enrichers, thus saving an important outlay, and turning to valuable account residual substances at present of little worth. No modification of the gas-works wherein these substances are produced, or of any part of them, being required in order to effect their utilization by the system herein described, the latter commends itself no less for its convenience of application than for the great saving and profit effected thereby.

It is obvious that, so far as my process is concerned, it is immaterial whether coke-dust, coal-screenings, and other comminuted substances be employed with which to mix the tar; but, of course, the solid residual or fuel product will vary with the substances used.

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

The method of utilizing the tar and coke-dust residual products of coal-gas manufacture for producing gas and fuel, which consists in mixing the crude tar with coke-dust and introducing the mass into a heated retort in a thin body, supported clear of the retort-surface by any suitable means, whereby the distillation of gas therefrom is at first delayed and subsequently accelerated in consequence of the form and position of the mass, and whereby also, after distillation of the gas, the residual mass may be readily withdrawn from the retort in solidified form, adapted for fuel.

HENRY A. BRANCH.

Witnesses:
E. J. MARCH,
S. D. BISHOFF.