

H. C. BOWEN.
Method of Determining the Temperature and Progress
of Distillation in Gas-Retorts.

No. 224,866.

Patented Feb. 24, 1880.

Fig: 1.

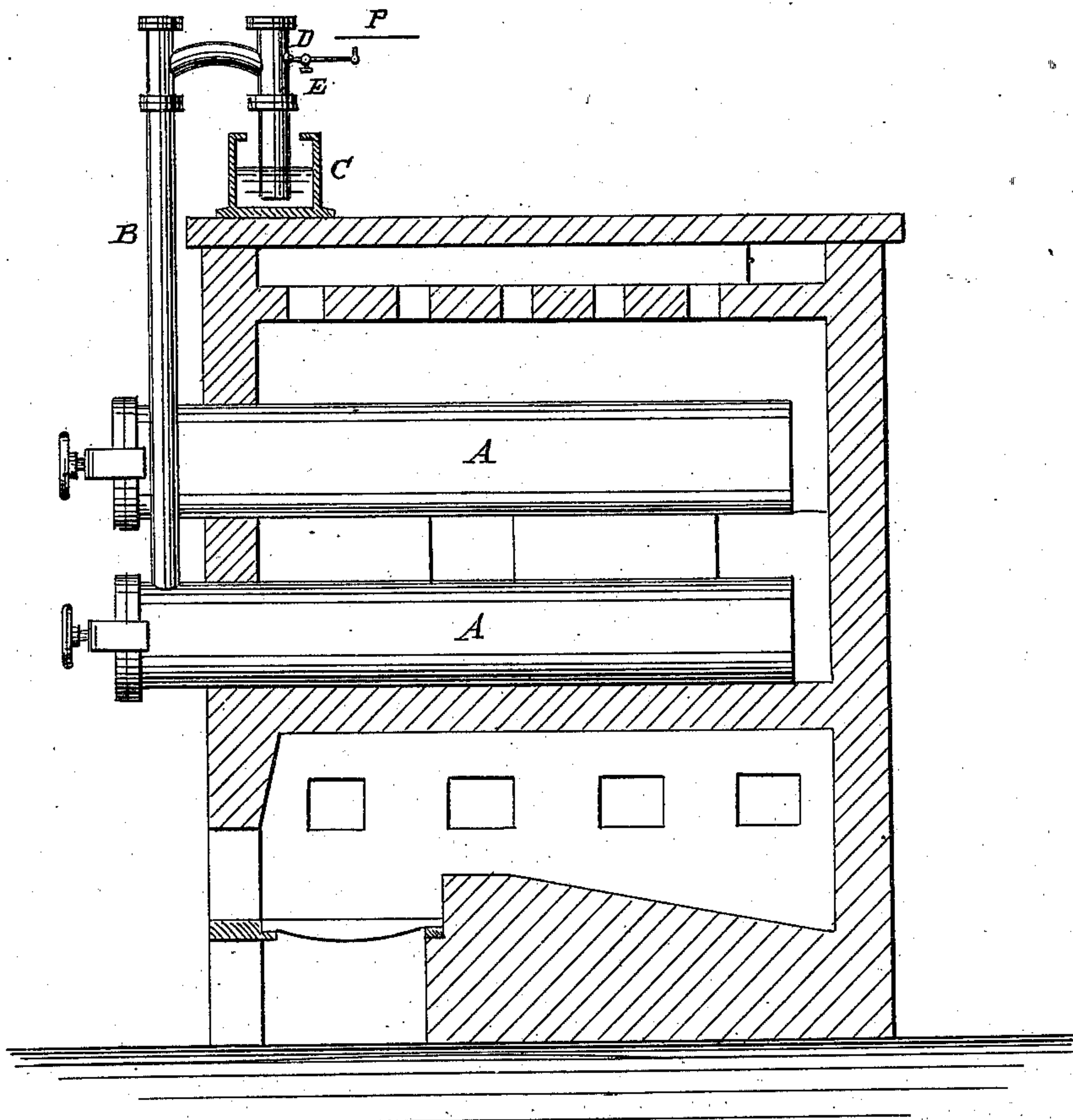
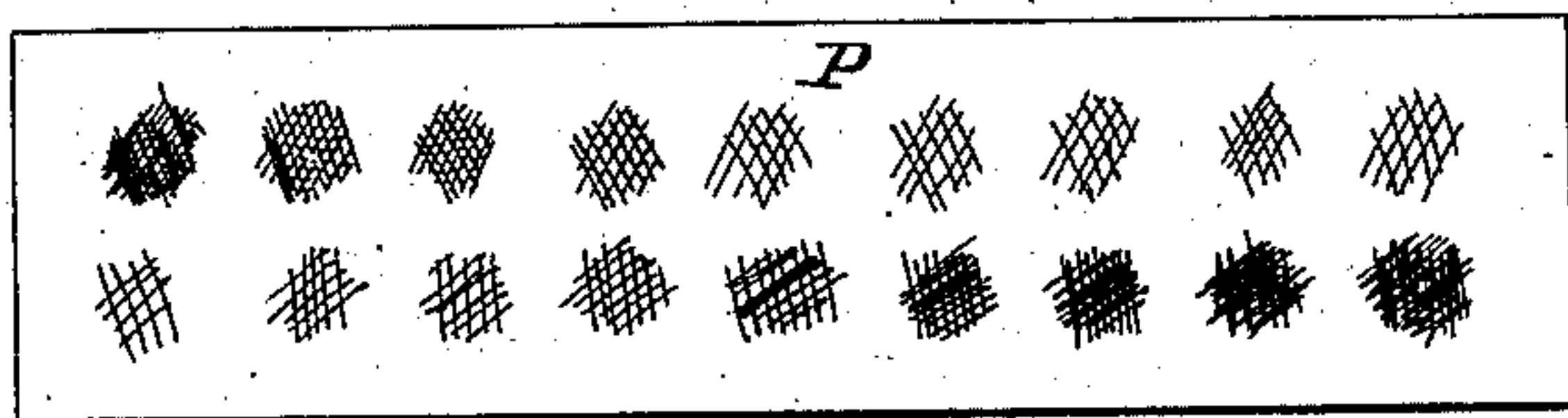


Fig: 2.



WITNESSES:

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METHOD OF DETERMINING THE TEMPERATURE AND PROGRESS OF DISTILLATION IN GAS-RETORTS.

SPECIFICATION forming part of Letters Patent No. 224,866, dated February 24, 1880.

Application filed January 9, 1879.

To all whom it may concern:

Be it known that I, HENRY C. BOWEN, of the city, county, and State of New York, have invented a new and Improved Method of Determining the Temperature and Progress of Distillation in Gas-Retorts, of which the following is a specification.

Figure 1 shows the ordinary method of setting gas-retorts. Fig. 2 is an indicator-card, denoting by the depth of the shadings the thermal changes in the working gas-retort.

Similar letters of reference indicate corresponding parts.

The invention is a method of determining the temperature of gas-retorts and progress of distillation within the same, so as to enable the operator to control the decomposition and secure greater uniformity in the quality of the gas.

It consists in recording upon a piece of paper or other equivalent material the richness of the gas in carbon by condensing upon the said paper, from time to time, spots or surfaces caused by the impact of a jet of the crude gas, which evidence by their depth of color or proportion of carbon the activity of decomposition, and correlatively the heat of the retort, so that the latter may be controlled in temperature to secure uniformity in the product.

In Fig. 1 is seen a gas-retort, A, set in brick-work in the usual manner. B is the pipe conducting the crude gas from retort to the hydraulic main C, wherein a partial condensation and deposit of the tarry matter contained in the gas occurs. This plan is, in principle and general features, common to all gas-works; hence I give it here simply in order to assist in illustrating my method.

It is well known to all gas-manufacturers that too high a temperature in a retort will cause the escaping gas to be too highly charged with the heavy hydrocarbons, and that hence arises a very material pecuniary loss. It is as well known that too low a temperature causes the gas to escape from the retort not sufficiently charged with the gaseous hydrocarbons, and hence results a gas deficient in proper illuminating power.

Ordinary gas-retorts are set in "benches," as they are called, three or more retorts to a bench, and heated by one and the same fire,

in order to save fuel and labor and to secure better uniformity of product. Yet it is the rule that no two retorts in the same bench work alike. Sometimes the one farthest from the fire will work the hottest, while at times the reverse condition may obtain.

It is not difficult to modify and regulate the temperature when once the conditions of the working are shown; but so much time is lost in determining them from the pyrometers and other appliances commonly in use that the harm is done—the imperfect work has long continued—before the discovery of it is made.

Many efforts have been made, many devices employed, for more readily reading the indications of the working condition of the retorts; but none of them, so far as I can learn, is free from the objections above stated.

Starting, then, with the unquestioned fact that too low a temperature gives a gas deficient in hydrocarbons, and that too high a temperature produces a gas overcharged with them, and that the richness of the gas in hydrocarbons consequently varies, within certain limits, with the rise and fall of the temperature in the retorts, my method is to test the gas for hydrocarbons as it leaves the retort and before it reaches the hydraulic main.

In order to accomplish this I tap the pipe conveying the gas from the retort and attach a pipe, as shown at D, which has a small orifice at the other end, or terminates in an ordinary gas-burner. The flow of gas from this pipe is regulated by a cock, E.

When the retort is at work producing gas, and I wish to ascertain its condition, I open the cock E to permit the escape of a small jet of the gas; then directly over this jet I hold a slip of paper, P, (white paper serves the purpose very well,) which, receiving upon its surface the impinging jet, becomes thereby at once discolored by the tarry substance which it carries.

It is found that the depth of the color of the deposit upon the paper corresponds accurately with the temperature in the retort; that with too high a temperature in the retort the gas-jet imprints (deposits) upon the paper a very dark-brown shade of color, while too low a temperature causes an imprint of a very light-brown or yellow color; and that, within cer-

tain limits, each change of temperature in the retort records itself instantly in changing shades of color upon the paper indicator whenever it is applied.

5 In Fig. 2 of the drawings is an indication of the changes of temperature in the retort, registered every quarter of an hour for a certain time.

10 To make the indications continuous and automatic, so that the constant work of the retorts shall be imprinted upon the paper, I roll a strip of paper upon a reel, and, by any well-known device, cause it to unroll gradually in contact with the gas jet, so that an uninterrupted register of the illuminating quality of
15 the gas may be had.

It is obvious that if the pipe or pipes D be jacketed or arranged so as to prevent the condensation or deposit of tarry matter in them
20 they could be made to converge to any part of the gas-works, where one could at a glance read the indicated conditions of each and all of the retorts.

25 In defining my invention with greater clearness, I would state that I am aware that it is not new to test the quality of the gas by observing the appearance of the cloud of escaping gas from a test-cock; but this is both uncertain and observable only when there are
30 great variations in the character of the gas. It is, moreover, only a passing or temporary test, and subject only to the inspection and responsibility of the immediate operator. By my process the piece of paper or chart P be-
35 comes a permanent record, so that it is always subject to the inspection of the chief engineer in the morning, so that he can tell what the condition of the retorts was through the night, or during his absence.

I am aware, also, that litmus and turmeric 40 paper have been heretofore used for detecting the presence of ammonia and sulphureted hydrogen in gas; but they were acted upon chemically to produce a discoloration, and were designed to test the quality of the gas as to 45 impurities, and not to determine the temperature of the retorts. In any case unprepared paper or other material is used, and it is distinguished by the fact, first, that the paper receives no preliminary preparation; secondly, 50 the tinting of the paper is effected by the mechanical deposit of inert carbon, and not by chemical discoloration; and, thirdly, it serves, not to indicate any impurities of the gas, but only a variation of the proportions of the nor- 55 mal elements of the gas, which, being correlated to the heat of the retort, affords data for its correction.

What I claim as new and of my invention is— 60

The method of determining and recording the heat of gas-retorts, and the progress of the distillation or decomposition going on therein, which consists in applying, from time to time, a sheet of plain paper or analogous material 65 to an impinging jet of the unburned and crude gas being generated in said retort, whereby a color of greater or less depth is made by the mechanical deposition of carbon, dependent for said depth upon a greater or less disen- 70 gagement of carbon or the correlative heat of the retort, as described.

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Witnesses:

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