A. F. ROCKWELL.

PROCESS OF CARBONIZING.

APPLICATION FILED JAN. 10, 1910.

975,076.

Patented Nov. 8, 1910.

Fig. 1

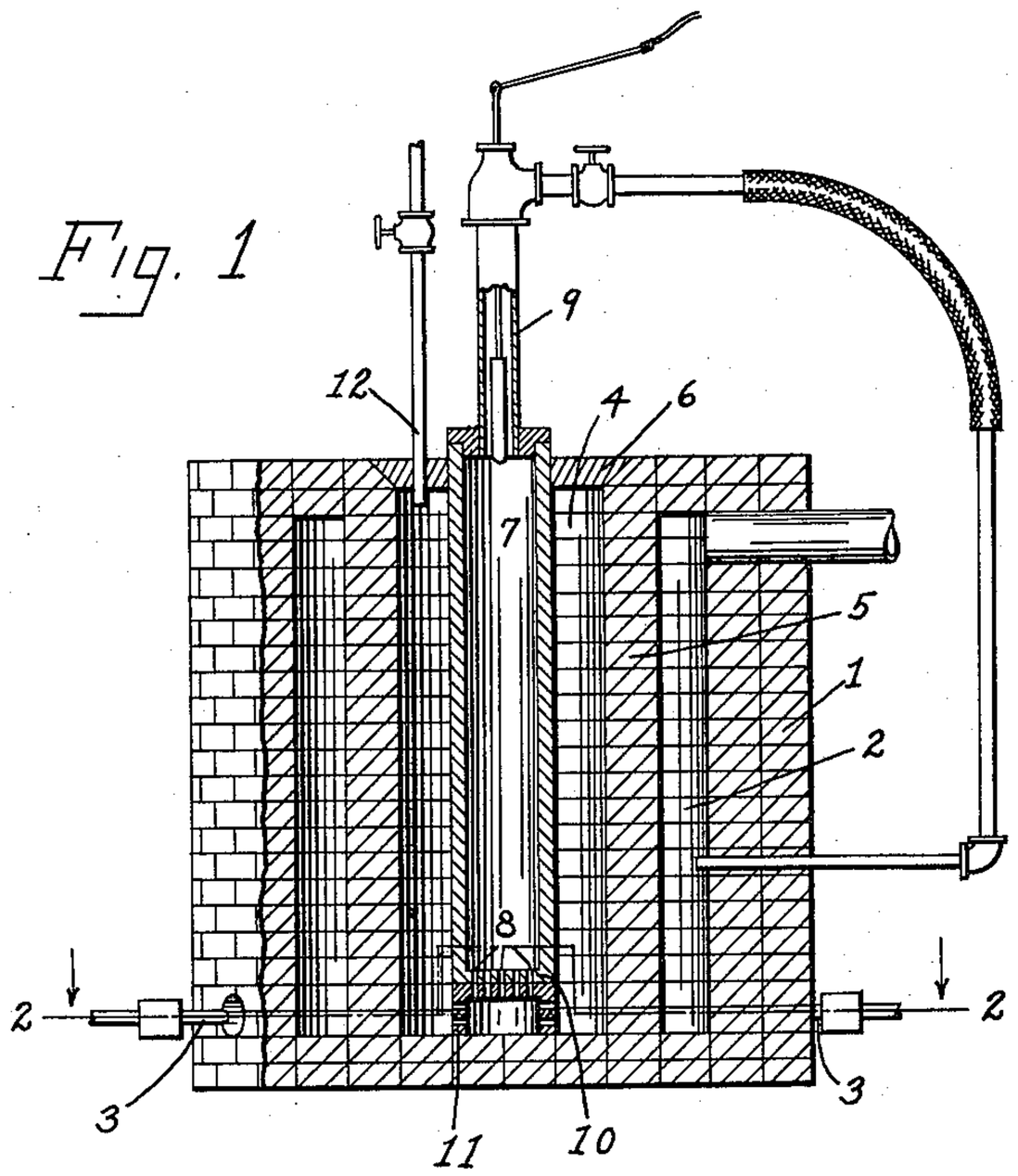
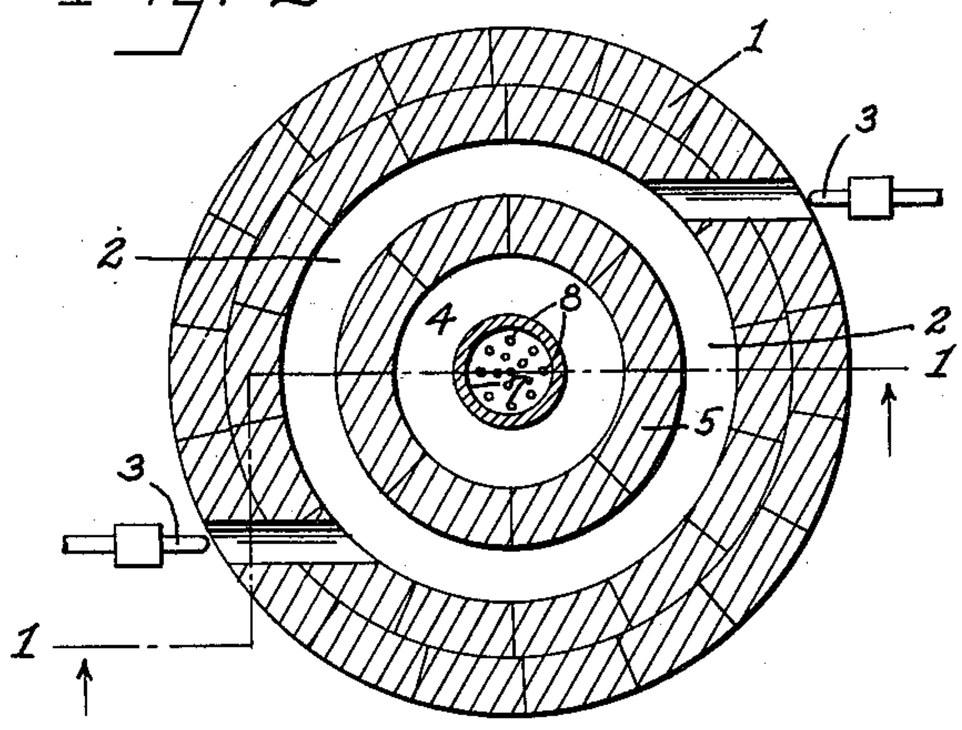


Fig. 2



WITNESSES:

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UNITED STATES PATENT OFFICE.

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PROCESS OF CARBONIZING.

975,076. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed January 10, 1910. Serial No. 537,191.

To all whom it may concern:

Be it known that I, ALBERT F. ROCKWELL, a citizen of the United States, residing at Bristol, county of Hartford, State of Connecticut, have invented a certain new and useful Process of Carbonizing, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to processes of carbonizing.

One object is to so introduce a carbon-bearing fluid into a flask that the introduction of such fluid does not chill the material to be treated confined in such flask.

Another object is to avoid oxidation of the material being treated.

A further object is to provide for evenly distributing the carbon throughout the body of the article being carbonized.

To these ends, and also to improve generally upon processes of the character indicated, my invention consists in the various matters hereinafter described and claimed.

In carrying out my invention a carbon-bearing gas is first brought to a heat as great as that of the material being treated and is at such temperature then introduced into contact with the said material. In this way the incoming gas does not interfere with the carbonizing operation by chilling the material. Indeed, at the beginning of the operation, the gas is generally at a temperature greater than that of the said material, in which event said incoming gas not only does not chill the material but assists in heating the same.

I prefer to employ a heating chamber separate from the flask which contains the material to be treated but communicating with said flask, such heating chamber being of a temperature at least equal to (and, as above explained, some times greater than) that of the flask, and to introduce a carbon-bearing liquid, such as a hydrocarbon oil, into said heating chamber in small quantities, whereby said oil is converted into gas and heated, the heated gas then passing into said flask. The gas thus creates its own pressure in the heating chamber whereby said gas is forced into said flask and into intimate contact with the material therein.

Preferably the air is driven away from the material before the latter reaches the degree of heat which would produce oxidation and air is kept away from said material until the carbonizing process is completed, thus avoiding oxidation and its attendant disadvantages. This expulsion of the air is accomplished by permitting a small amount of the carbon-bearing gas to enter the flask containing the material before the latter has become sufficiently heated to oxidize, such supply of gas being sufficient to drive off the air, but insufficient, when initially supplied, to produce appreciable carbonization. After the air is thus driven off, the supply of gas is cut off and the gas in the flask lies dormant, thus excluding the air, until the material has been brought to the desired temperature for carbonization, when the gas is admitted in carbonizing quantity and the process of carbonizing commences.

Sometimes it is desirable to distribute the carbon throughout the body of the article being treated, rather than to produce a finished article with a relatively high carbon outer portion and a low carbon or soft interior. This is advantageous, for example, in carbonizing spring plates where it is desired to carbonize the whole body of the article to a relatively small degree and yet is disadvantageous to give the article an outer portion highly carbonized. When it is desired to produce an article thus evenly carbonized throughout its body, I cut off the supply of carbon-bearing fluid after the article has (at its outer portion) absorbed the total quantity of carbon desired to be distributed through the body of the article, but I maintain the article at its carbonizing heat. In this way no additional carbon is supplied but the interior of the body of the article absorbs carbon from the relatively highly carbonized outer portion, thus increasing the carbonization of the interior and correspondingly reducing the degree of carbonization of the outer portion until the whole of the carbon is evenly distributed. In this way it is possible to produce, for example, an article of a low degree of carbonization but evenly carbonized throughout its body; and by employing the carbon-bearing fluid

as the carbonizing agent the whole operation is performed without the necessity of reducing the temperature of the article being treated or of handling the same during treatment.

The accompanying drawing illustrates an apparatus for use in practicing my process, Figure 1 being an elevation on about the line 1—1 of Fig. 2; and Fig. 2 being a view on about the line 2—2 of Fig. 1.

As here illustrated such apparatus embodies a furnace wall 1 providing a fire chamber 2 which may be heated by the gas or oil burners 3, a heating chamber 4 within said fire chamber and separated therefrom by the surrounding wall 5, and a flask 7 in said heating chamber and having its lower head 10 supported, as by the standard 11, above the floor of the heating chamber and provided with inlet openings 8 for the heated gas, there being a gas outlet 9 from the flask, and the heating chamber having a valve-controlled inlet 12 for the hydrocarbon oil.

In practicing the process, the material is placed in said flask, the removable cover 6 is put in place to close the heating chamber and the furnace is heated. Preferably, a small amount of the hydrocarbon oil is now introduced into the heating chamber 4, the resulting gas flowing into the flask 7 and driving off the air therein to prevent oxidation as above explained. When the proper temperature has been attained, say a red heat, oil is again admitted through the inlet 12, and such oil is at once converted into gas and heated to the temperature of the heating chamber, which is always as great as the temperature of the material in the flask. The heated gas, of course, creates its own pressure in the heating chamber and is thus forced through the inlets 8 into the flask and into intimate contact with the material therein, such heated gas not chilling the material as it enters the flask. Indeed, at the beginning of the operation the temperature of the gas is greater than that of the material in the flask, so that at the outset the incoming gas not only does not chill the material but such gas assists in heating the same.

When it is desired to distribute the carbon throughout the body of the article as above described, the supply of oil from the inlet 12 is merely cut off, the flask being continued at carbonizing temperature until the desired distribution of carbon is effected.

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

1. The process of carbonizing which consists in heating a carbon-carrying fluid to a temperature greater than that of the material being treated, supplying said fluid at such temperature to said material until the latter reaches carbonizing temperature, and then continuing to supply said fluid to said material at substantially the carbonizing temperature of the latter; substantially as described.

2. The process of carbonizing which consists in heating a carbon-carrying fluid to a temperature greater than that of the material being treated, bringing said fluid into contact with said material after the fluid is thus heated, and heating said material to carbonizing temperature; substantially as described.

3. The process of carbonizing which consists in introducing a carbon-bearing liquid in relatively small quantities into a closed and heated chamber whereby said liquid is converted into gas and said gas exerts pressure, permitting said heated gas to flow under such pressure into a flask communicating with said chamber and containing the material being treated, and heating said material to carbonizing temperature; substantially as described.

4. The process of carbonizing which consists in introducing a carbon-bearing liquid in relatively small quantities into a closed chamber which is heated to such a degree that the said liquid is converted into gas which exerts pressure and is at a temperature at least as great as that of the material being treated, permitting said gas at said temperature to flow under such pressure into a flask communicating with said chamber and containing the material being treated, and heating said material to carbonizing temperature; substantially as described.

In testimony whereof, I hereunto affix my signature, in the presence of two witnesses.

ALBERT F. ROCKWELL.

Witnesses:
JOSEPH D. BROWN,
GEORGE L. SANFORD.