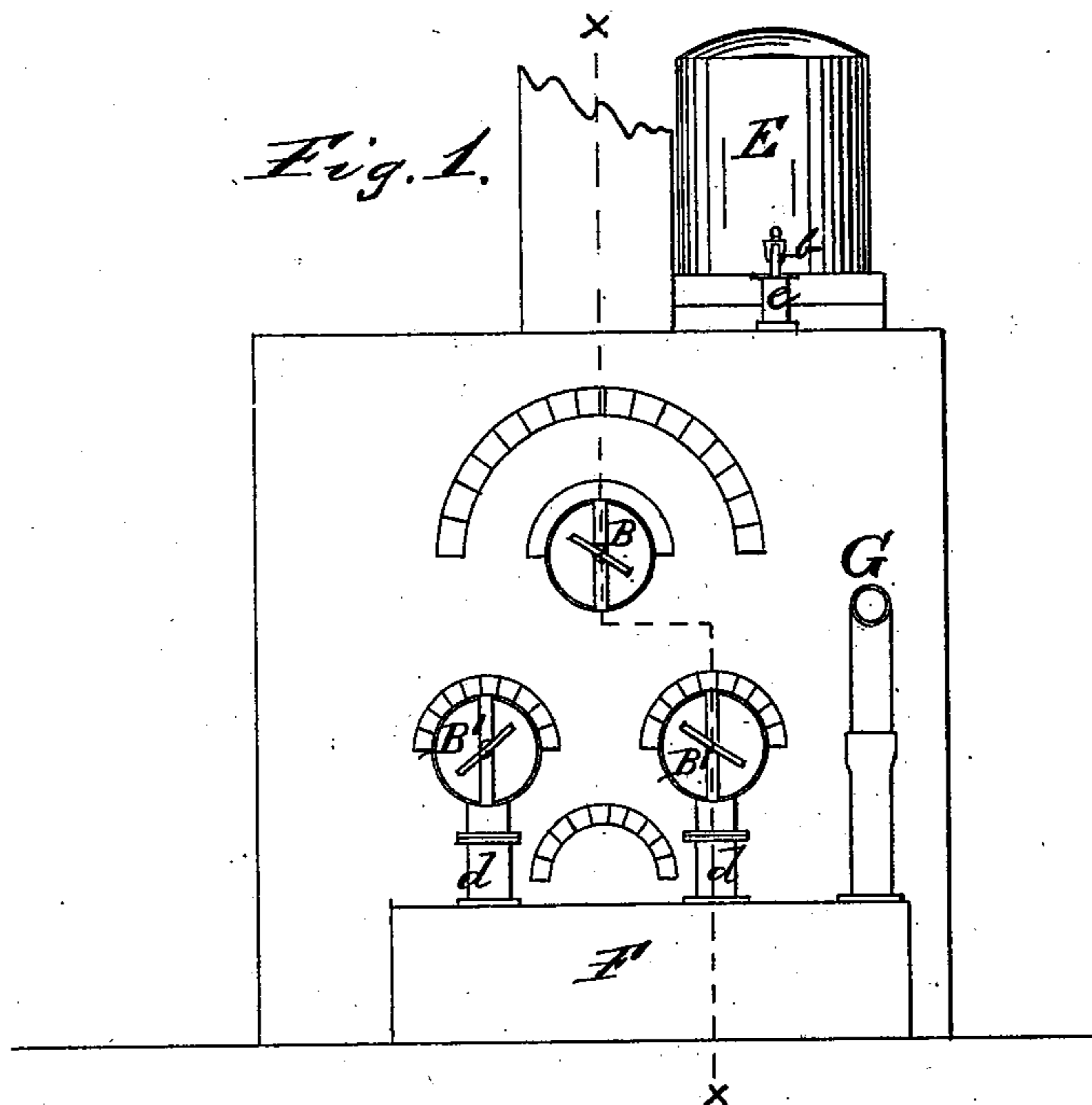
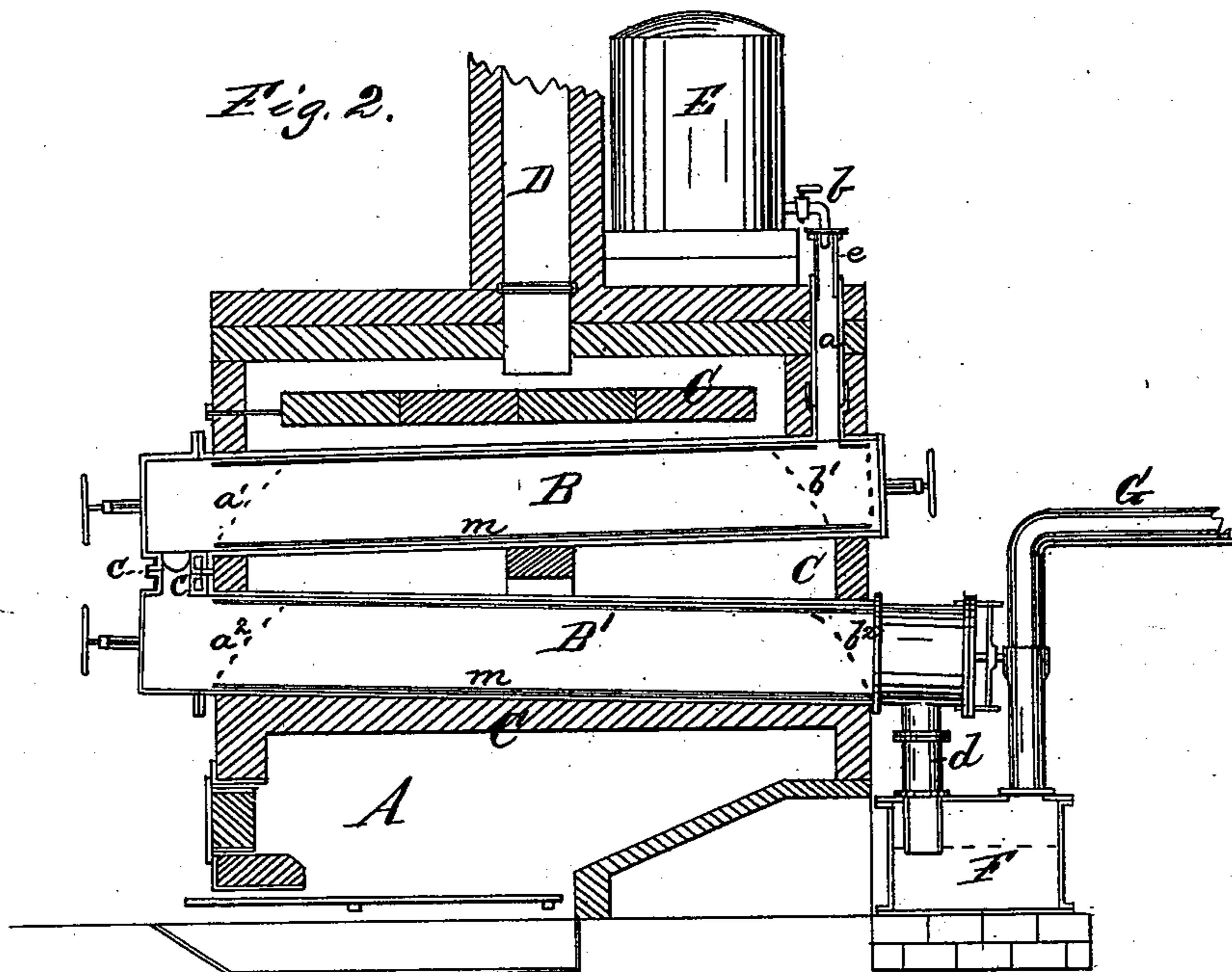


F. SALATHÉ.  
Manufacture of Anthracene.

No. 227,588.

Patented May 11, 1880.



Witnesses  
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# UNITED STATES PATENT OFFICE.

FRITZ SALATHÉ, OF BASLE, SWITZERLAND, ASSIGNOR TO JOHN J. KELLER (TRUSTEE,) OF NEW YORK, N. Y., FOR HIMSELF, SAID SALATHÉ, AND JOHN ROD GEIGY, OF BASLE, SWITZERLAND.

## MANUFACTURE OF ANTHRACENE.

SPECIFICATION forming part of Letters Patent No. 227,588, dated May 11, 1880.

Application filed December 6, 1879.

*To all whom it may concern:*

Be it known that I, FRITZ SALATHÉ, Phil. Dr., of Basle, Switzerland, at present residing in the city of New York, have made an invention of a new and useful Improvement in the Art of Manufacturing Anthracene and its Homologous Hydrocarbons, which are usually obtained from the dry distillation of bituminous coal, and also a new intermediate product containing anthracene and others of said hydrocarbons.

The following is a full, clear, and exact description of my said invention.

Previous to my invention anthracene has generally been manufactured from the coal-tar obtained by the distillation of bituminous coal for the production of illuminating-gas. The quantity of anthracene obtained from coal-tar has been, thus far, small in proportion to the quantity of coal-tar treated.

The object of the present invention is to enable anthracene and homologous hydrocarbons to be produced in larger quantities and at a low price.

To these ends the first part of my invention consists of the improvement in the art of manufacturing anthracene or homologous hydrocarbons by the treatment by heat or distillation of petroleum or its derivatives in a particular manner, as hereinafter set forth—that is to say, at a dull-red heat (say from 400° centigrade to 550° centigrade, or thereabout) and in the presence of charcoal or its equivalent, hereinafter described.

The second part of my invention consists of a product which may be termed “anthracitic tar,” and which is obtained by the before-mentioned process, the said product being rich in anthracene and other hydrocarbons, such as benzene and naphthalene, and being characterized by its freedom from acid matters, such as phenic and cresylic acids. This product is subsequently treated as coal-tar is for the production of anthracene and other hydrocarbons.

In order that the invention may be fully understood, I will proceed to describe the mode in which I have practiced the first part of my invention with success and the means em-

ployed by me, it being understood that such mode and means may be varied as circumstances or the peculiar views of manufacturers may render expedient.

The two raw materials which I have used with success as the basis of my manufacture are crude petroleum and the petroleum-tar obtained as a refuse product in the distillation of petroleum for the purpose of manufacturing illuminating-oils.

The means or apparatus which I have used with success is represented in the accompanying drawings, Figure 1 representing a front view of the same, and Fig. 2 representing a vertical longitudinal section of the same following the line *xx* of Fig. 1.

The said apparatus is similar to that generally employed for the dry distillation of bituminous coal for the production of illuminating-gas. Its principal parts are the fire-chamber A for the fuel, by which the requisite heat is obtained; three cast-iron retorts, B B' B'; the brick-work C, in which said retorts are set and which forms the flues through which the products of combustion of the fuel in the fire-box are conducted to the chimney D, the feed-tank E, the condensing-tank F, and the gas-pipe G. The upper retort, B, is fitted at one end with a feed-pipe, *a*, through which the raw material is fed from the feed-tank E, the supply being regulated by a stop-cock, *b*. The upper retort is connected at the end farthest from the feed-pipe with the two lower retorts, B' B', by means of a forked connection, *c*, and the ends of these lower retorts which are farthest from the forked connection *c* are connected with the tank F by means of dip-pipes *d*. This tank corresponds substantially with the hydraulic main used in coal-gas works, but in the present case it has been placed on the floor instead of overhead. The illuminating-gas which enters this tank from the retorts is conducted from the tank by means of the gas-pipe G to a scrubber of the ordinary construction, and thence to the gas-holder for use.

As the construction of such a scrubber is well understood, it is not deemed necessary to describe it.

The apparatus is heated by means of a fire built in the fire-chamber A. The raw material is placed in the feed-tank E, and if the material be a petroleum-tar too viscid to run through the stop-cock *b*, enough crude petroleum may be added to reduce its consistency, and, if necessary, the raw material may be heated. Before any of the material is allowed to enter the retorts they are charged with charcoal (as from *a'* to *b'* and from *a''* to *b''*) or with some equivalent thereof, for the purposes of the process herein described, such as coke coated or permeated with lamp-black or platinized, or plates of platinum-foil.

The heat employed by me with success is a dull-red heat—say from 400° centigrade to 600° centigrade. When the retorts arrive at this temperature, the fluid raw material is permitted to drip down through the feed-cock into the upper retort. The liquid falling into the head of the retort is first vaporized, and then the vapors are decomposed in the retorts with the aid of the charcoal. The products of decomposition pass to the tank F, which is partially filled with water, and the larger portion of the tarry or oily matters is condensed or received in this tank, while the gas and uncondensed vapors pass through the gas-pipe G to the scrubber, in which, practically, all the residue of the tarry or oily matters is condensed. These tarry or oily matters, produced by the decomposition of the petroleum-tar or crude petroleum in the presence of the charcoal or its equivalent, constitute my new product of anthracitic tar; and it is treated subsequently for the separation of the various hydrocarbons of which it is composed in the same manner as coal-tar is treated for the same purpose, with the exception that, as the anthracitic tar is practically free of acid matters, the use of caustic soda is unnecessary in the treatment.

The essential characteristic of the process above described is the decomposition of the raw material by heat in the presence of charcoal or its equivalent, which does not practically transform or aid in the transformation of the material into solid carbon.

The essential characteristic of the anthracitic tar, as distinguished from coal-tar, is the much greater richness of the former in anthracene, naphthaline, and benzine, and its freedom from acid matters, such as phenic and cresylic acids.

The oils which are separated from the anthracene, benzine, and naphthaline by the subsequent treatment of the anthracitic tar may be mixed with petroleum-tar and subjected to the same process, as they then furnish additional quantities of the valuable hydrocarbons.

It is expedient to make a part, *e*, of the feed-pipe of the retort of glass, so that the speed of feeding may be observed, or the feeding may be effected from the stop-cock into an in-

verted siphon feed-pipe, having a funnel-mouth and containing enough of the liquid to prevent the escape of the gas and vapors from the retorts.

It is also expedient to charge the charcoal or its equivalent into the retorts by placing it in a cylinder, *m*, of heavy sheet-iron, closed at the feeding end of the retort by an iron grating of strong wire. During the process a little hard carbon forms upon this grating, which must be removed from time to time.

It is expedient that the distance traversed by the vapors should be long enough to permit them to be thoroughly decomposed at the comparatively low heat used. Hence it has been found expedient to combine the retorts, as represented in the drawings, so that the vapors traverse at least two of them.

It is also expedient to set the retorts with a slight inclination toward the discharge-point, so that the tarry liquids which collect in the retorts may run toward the discharge end and be delivered into the tank F. When a number of such benches of retorts are placed in a row the tank F may be made long enough to be common to the whole row, as the hydraulic main of a gas-work is. The tank is supplied with water sufficiently to keep it from becoming too hot, the tarry matters and the hot water being permitted to escape to a settling-tank. If the gas produced is not required for illuminating purposes it may be used to heat the retorts.

The quantity of illuminating-gas produced during the process, as well as the quantity of anthracene, may be increased somewhat by introducing steam into the upper retort simultaneously with the raw material. The quantity of steam so introduced should not, in my opinion, exceed that obtained by vaporizing a quantity of water one-fourth the volume of the said raw material.

The invention is highly advantageous because of the utilization of a petroleum-tar and the production at a low cost of a product containing a large quantity of anthracene.

I claim as my invention—

1. In the art of manufacturing anthracene and homologous hydrocarbons, the improvement consisting substantially in the treatment of petroleum or its derivatives in the presence of charcoal at a dull-red heat, and the condensation of the tarry matter produced by such treatment, substantially as before set forth.

2. As a new article of manufacture, anthracitic tar, hereinbefore described, which is distinguishable from coal-tar by its freedom from acid matters.

In witness whereof I have hereto set my hand this 14th day of November, A. D. 1879.

F. SALATHÉ.

Witnesses:

W. L. BENNEM,  
H. H. ISAACS.