H. L. BROOKE.

Plant and Process for the Manufacture of Charcoal and Pyroligneous Acid.

No. 211,376. Patented Jan. 14, 1879.

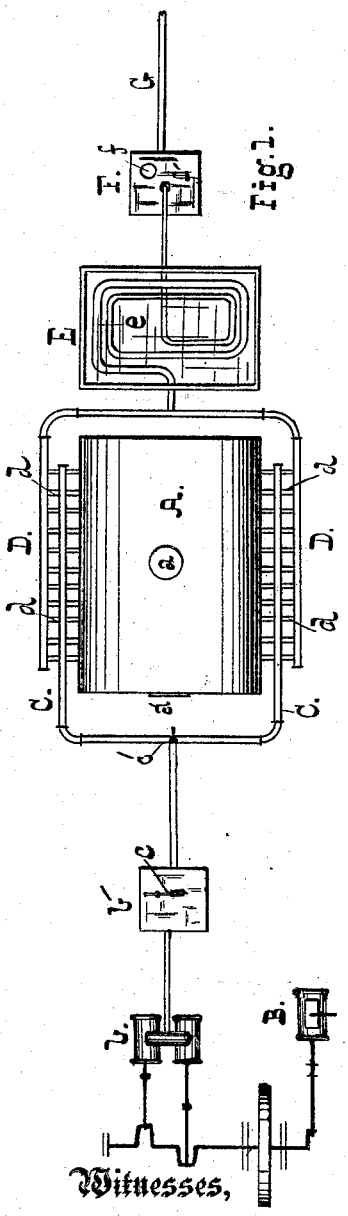

Fig. 1.

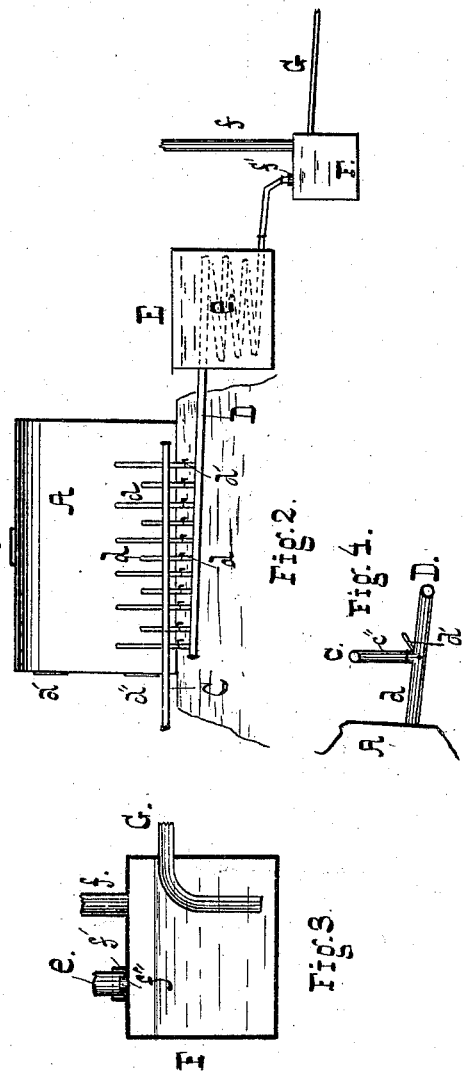

Fig. 2.

Fig. 4.

Fig. 3.

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IMPROVEMENT IN PLANTS AND PROCESSES FOR THE MANUFACTURE OF CHARCOAL AND PYROLIGNEOUS ACID.

Specification forming part of Letters Patent No. **211,376**, dated January 14, 1879; application filed November 26, 1878.

To all whom it may concern:

Be it known that I, HORACE L. BROOKE, of Baltimore city, State of Maryland, have invented certain new and useful Improvements in Plants and Processes for the Manufacture of Charcoal and Pyroligneous Acid; and I hereby declare the same to be fully, clearly, and exactly described as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of the entire plant. Fig. 2 is a side elevation of the kiln and condenser; Fig. 3, a central sectional view of the acid-receiver; and Fig. 4 is a transverse sectional view, showing the attachments of the pipes to the kiln.

This invention relates to apparatus and processes for the manufacture of pyroligneous acid by heating wood; and consists, first, in certain details of construction of the apparatus, and, second, in the process of manufacture, as hereinafter specifically indicated.

Referring to the first part of my invention, as illustrated in the accompanying drawings, A represents a charcoal-kiln of the usual construction, and B *b* represent a steam-engine and air-blast apparatus, such as are ordinarily used in connection with a common blast-furnace. The pipe from the air-cylinders leads into a receiver, *b'*, fitted with a safety-valve, *c*, so as to deliver the air at any desired pressure to the kiln. Pipes C C, communicating with the exit-pipe from the receiver by means of a three-way union and cock, *c'*, pass to either side of the kiln. From the blast-holes of the latter (arranged at different levels) lead inclined pipes *d*, communicating with mains B, that lead to the condenser. Branches *c''* from the main air-pipes communicate with the inclined pipes *d*, being joined also by three-way unions fitted with cocks *d'*. The mains D are joined behind the kiln, and form a worm, *e*, of steadily-diminishing size in the water-tank or condenser E. From the latter an exit-pipe delivers the condensed matter and gases into a receiver, F, arranged to separate the liquid from the gaseous matters, the former passing into suitable clarifiers or lime-trays by means of a pipe, G. The construction of the receiver is shown in Fig. 3.

It will be noticed that the exit-pipe dips below the surface of the liquid, preventing escape of gas in that direction. All of the uncondensed products pass off through the pipe *f*, to be utilized as may seem desirable. A liquid seal is formed where the pipe *e* joins the receiver by means of the annular concentric flanges *f' f''*, between which the end of the pipe *e* fits. The internal flange is lower than the external one, so as to shed any condensed matter into the vessel F.

Such is, in general terms, a description of the construction of the device. Its mode of operation, constituting the second part of my invention, is as follows: The kiln being charged with wood through the doors *a' a''*, fire is started through the upper door, *a*, in the usual manner. As soon as the fire is lighted, a blast of air is driven through one of the pipes C into the kiln, in order to get the combustion well under way. This being done, but just sufficient air is let into the kiln to support combustion in a part of the wood enough to char the rest, the products of combustion and distillation passing out through the pipes *d* and into the main D, or the side opposite to that on which the blast is applied. By reversing the cocks the direction of the blast is altered at will, as may seem desirable. From the main D the gases pass to the worm *e*, which has a steady pitch to facilitate discharge, and, being therein condensed as far as practicable, pass into the receiver F. Here the gas passes off through the pipe *f*, and the pyroligneous acid, mixed with certain tarry matters and impurities, is carried, by means of the pipe G, to the clarifiers or lime-troughs. With its subsequent treatment my present invention has nothing to do.

The process described results in the production of more charcoal from a given quantity of wood than is possible with a retort, the process is complete in a much shorter time, and is completely under the control of the operator.

I am aware that it is not new, broadly, to condense and save the pyroligneous products from a charcoal-kiln, as apparatus designed to accomplish that end has long been in use, the distilled matters being led from the kiln to suitable condensers, in which the acid is condensed by cold or pressure, or both; but I

am not aware, and do not believe, that heretofore an air-blast of graduated intensity has been forced into a kiln provided with suitable condensing apparatus, and such is the salient feature of my invention.

It is obvious that results attend the use of the said invention which have heretofore been unattainable with the devices already in use.

I am enabled to retain the process completely under control, as the amount of air delivered to the kiln may be altered as the stage of the process or occasion requires.

What I claim as new is—

1. The process herein described of manufacturing charcoal and pyroligneous acid, the said process consisting in forcing into a charcoal-kiln a quantity of air sufficient to support combustion of a part of its contents, and thereby char the rest, and condensing and recovering the pyroligneous acid and vapors, substantially as described.

2. The combination, as described, of the following elements: a charcoal-kiln, mechanism for forcing a blast of air thereinto, and a condenser, substantially as described.

3. In combination with the kiln A, the pipes C *c″ d* and mains D, substantially as described.

4. In combination with the kiln A, the air-blast mechanism, air-pipes, pipes for the products of combustion and distillation, and a condenser, substantially as set forth.

5. The receiver F, having liquid seal, as described, pipe *f*, and curved pipe G, substantially as set forth.

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