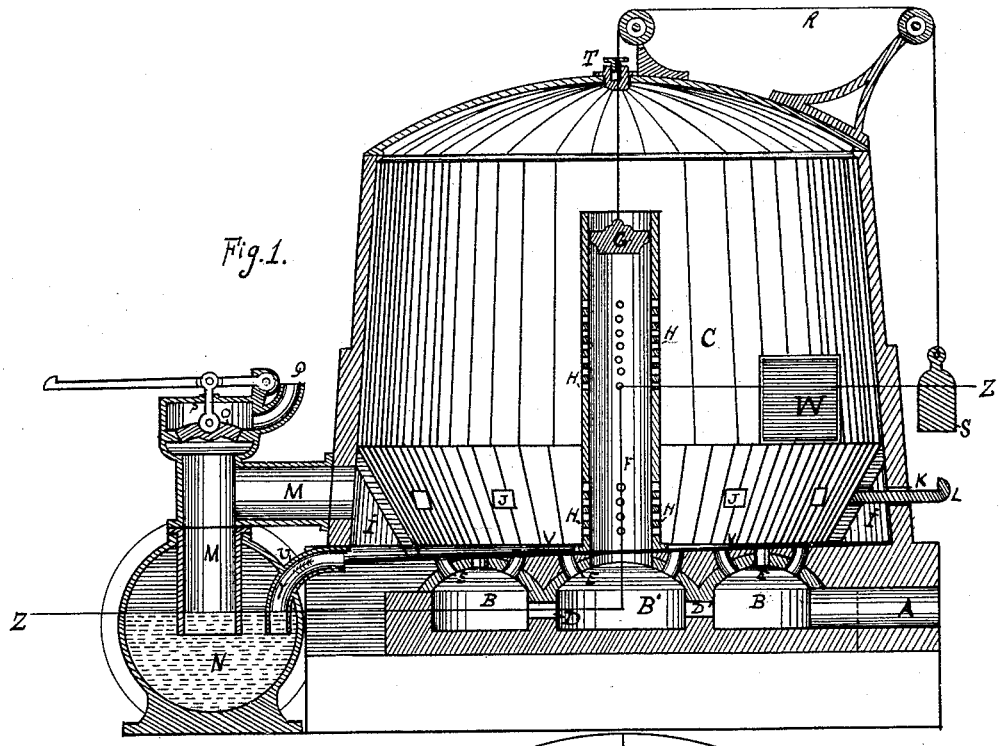
(No Model.)

L. S. GOODRICH.

APPARATUS FOR THE MANUFACTURE OF CHARCOAL.

No. 342,201. Patented May 18, 1886.

Fig. 1.



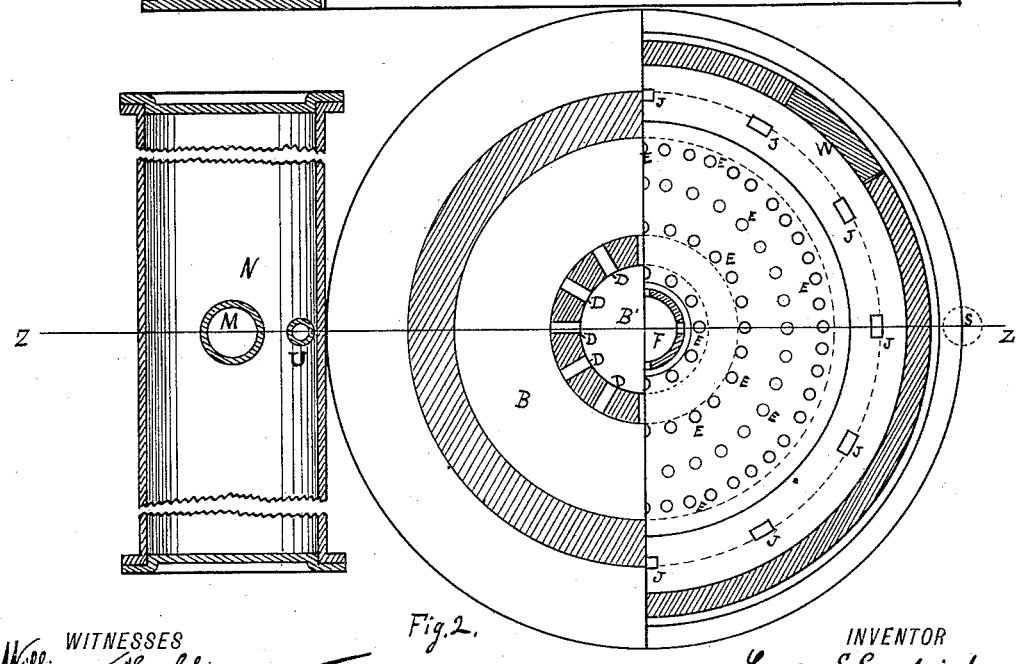


Fig. 2.

WITNESSES

William H. Clarkson

M. M. McGuire

INVENTOR

Leven S. Goodrich,

By Robt. M. Fryer,

his Attorney.

UNITED STATES PATENT OFFICE.

LEVEN S. GOODRICH, OF WARNER, TENNESSEE.

APPARATUS FOR THE MANUFACTURE OF CHARCOAL.

SPECIFICATION forming part of Letters Patent No. 342,201, dated May 18, 1886.

Application filed September 29, 1885. Serial No. 178,590. (No model.)

To all whom it may concern:

Be it known that I, LEVEN S. GOODRICH, of Warner, in the county of Hickman and State of Tennessee, have invented certain new and useful Improvements in the Apparatus for the Manufacture of Charcoal, of which the following is a specification.

The object of this invention is to provide means for controlling and directing the flow of heated gases from the combustion of flammable gas in a furnace to a kiln containing wood for carbonization; also, to provide for the escape of these products in such a manner as to correspond with my process for the manufacture of charcoal described in an application for a patent filed of even date herewith.

In the drawings, Figure 1 represents a vertical section of my improved apparatus; and Fig. 2 represents a section taken on line Z Z, Fig. 1, looking down, both views having letters of reference to indicate parts corresponding with similar letters used in this description, in which—

A represents the inlet-flue to the flues B B′, which are located underneath the floor of the kiln C. The flue B is annular in arrangement and surrounding B′, which is located in the center, as shown, connected by the flues D D′. From the flues B B′ there are provided a series of flues, E, which lead therefrom to the kiln C, by which the heated gas that enters at A is allowed to pass into the kiln. In addition a central pipe, F, is connected with the center flue or chamber, B′, which extends up into the kiln and is provided with a sliding damper or plug, G, which regulates the height of the ascent of these heated gases in the said pipe F, which pipe is also provided with openings or orifices H, through which said gases are allowed to flow into the kiln when the said damper or plug G is above the orifices so opened between this pipe and kiln. For the escape of these gases and those from the products of distillation of the wood in the kiln I provide an annular flue, I, which is led into or entered from the kiln through flues J, which are regulated by dampers K, operated from without the kiln by handles L, located there, as shown, so that the flow of this escape is checked or made free, as desired. From the said flue I, I provide a discharge-pipe, M, which leads into a main pipe or chamber, N, wherein the liquid escaping is allowed to stand about half-way up, as seen in drawings, and into this liquid the end of pipe M dips, as shown, whereby the gas is allowed to bubble through the liquid into the main, but is prevented from returning to the kiln by this liquid seal. At the top of this discharge-pipe M there is located a valve, O, through which the gaseous product from the kiln may be made to pass without entering the main N, and from the chamber P, at the top of valve O, a pipe, Q, is provided, which is designed to carry off this gas to a holder, where it is stored for the purpose of extinguishing the fire in the kiln when the process of charcoal-making is complete, as described in "Case A," above referred to.

The damper or plug G in pipe F is sustained by wire or cable R, which passes over suitable pulleys, as shown, and is counterbalanced by weight S, located at the other end of the said R. I also provide at the top of the kiln a stuffing-box, T, through which the said wire or cable passes, and is kept tight, to prevent leakage of gas from the kiln.

The bottom of the kiln is provided with an incline floor, V, of iron or other suitable material, which compels the condensed liquid from the product of distillation to pass in the direction of the arrow, where said liquids are collected by pipe U and conveyed to the main N, where they are allowed to freely pass, while the gas is prevented from flowing back from the main, as the end of this pipe dips into the liquid like that of pipe M.

It will be here seen that I provide for the bottom of a kiln a hot surface from the heat of the gases passing through the flues underneath, and that from these gases I produce a hot current of heated gas through the wood in this locality. Now, as it is well known that the hottest portion of gas always inclines to reach the top of a kiln and remain there, this provision on my part will be understood as an advantage. In other words, I am here enabled to keep the bottom of the kiln fully as hot as it naturally gets at the top in other kilns, and, in fact, I am enabled in this apparatus to direct the flow of these heated gases to any and all parts of the kiln, and to thereby carry on the work of destructive distillation in such a manner as to avoid the production

of partially charred wood at the bottom. It will also be observed that by removing in a liquid form the condensed products of distillation collecting on bottom of kiln the heat usually consumed in re-evaporating them to be driven off in the form of vapor is saved for charcoal-making, and by the use of this hot dry bottom I am enabled to carbonize all the wood in the kiln, whereas in the ordinary kiln the charring never reaches practically nearer than thirty or forty inches of the bottom, except at great expense of charcoal already made nearer the top.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A kiln for the production of charcoal having an annular flue below its floor, openings through the floor connecting said flue with the interior of the kiln, a central chamber surrounded by said annular flue and communicating with the latter through suitable openings in the dividing wall, and a pipe extending from said central chamber into and toward the top of the kiln, all substantially as set forth.

2. A kiln for the production of charcoal provided with a suitable floor, an annular flue below the floor, a central chamber surrounded by said annular flue, the said flue and chamber connected at the interior of the kiln by openings through the floor, a vertical pipe projecting from said central chamber into the kiln, one or more vertical series of openings through said pipe, and a vertically-adjustable damper therein, substantially as shown and described.

3. A kiln for the production of charcoal provided with gas-flues below its floor, said flues communicating with the interior of the kiln through suitable openings through the said floor, an annular chamber or flue surrounding the lower part of the kiln, and valved openings connecting said chamber and kiln, and a receiving-chamber connected with said annular chamber, substantially as shown and described.

4. In an apparatus for the production of charcoal, the combination of a kiln provided with an inclined floor, gas flues or chambers below said floor and communicating with the interior of the kiln, an annular chamber or flue surrounding the lower part of the kiln and communicating with the latter through valved openings, and a main or vessel, as N, connected with said annular chamber, and a conduit leading from the inclined floor of the kiln into said vessel N, substantially as set forth.

5. In an apparatus for the production of charcoal, a kiln provided with an annular chamber around its lower part, valved openings connecting said chamber with the interior of the kiln, a main or vessel, as N, outside of said kiln, and a pipe connecting the said annular chamber with said vessel or main, its outer end projecting through the top downward into the interior, whereby a liquid seal may be applied to prevent the return of gases passing from the kiln into said main or vessel, substantially as set forth.

6. In an apparatus for the production of charcoal, a kiln provided with an inclined floor, and an annular chamber or flue surrounding its lower part and connected with the interior of the kiln by valved openings, an exterior vessel or main lower than the bottom of the kiln, a pipe or connection leading from the bottom of the said kiln into said vessel or main to conduct the fluid products of distillation into the same, and a pipe leading from said annular chamber or flue into the top of said vessel or main and extending downward into the same, substantially as and for the purpose set forth.

7. In an apparatus for the production of charcoal, a kiln provided with a flue or chamber around its lower part, and valved openings connecting said chambers with the interior of the kiln, an exterior vessel or main, and a pipe connecting said annular flue with said vessel and projecting through the top of and downward into the latter, and an upper valved extension from said pipe, whereby provision is made for conducting the gases of distillation and combustion into said exterior vessel or main or to a holder or other receiver, substantially as and for the purposes set forth.

8. In the manufacture of charcoal, the apparatus herein described, which consists of a kiln provided underneath the bottom with flues or chambers B B′, having passages E E, and supplied with heated gases from a furnace, flue A, pipe F, having orifices H, and damper G, provided with the wire R and weight S, flue I, for carrying off the gases, dampers L, pipe M, and valve P, as shown, main N, and pipe U, all combined substantially as set forth.

In testimony whereof I hereunto set my hand in presence of two witnesses.

LEVEN S. GOODRICH.

Witnesses:
W. H. CRAWFORD,
H. B. COOPER.