

(No Model.)

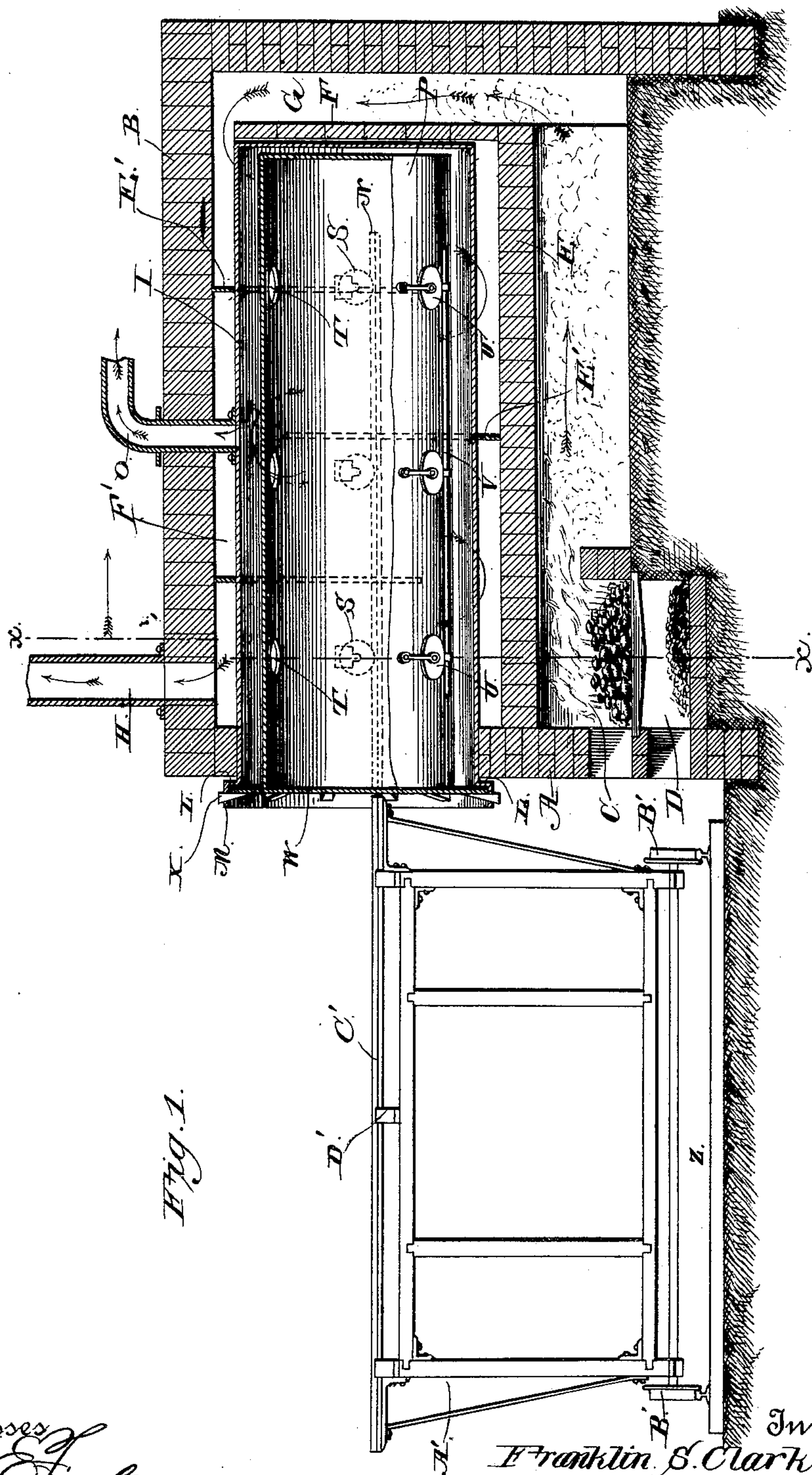
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F. S. CLARK.

### RETORT FOR DISTILLING WOOD AND MAKING CHARCOAL.

No. 407,166.

Patented July 16, 1889.



Witnesses

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L. L. Lippert

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(No Model.)

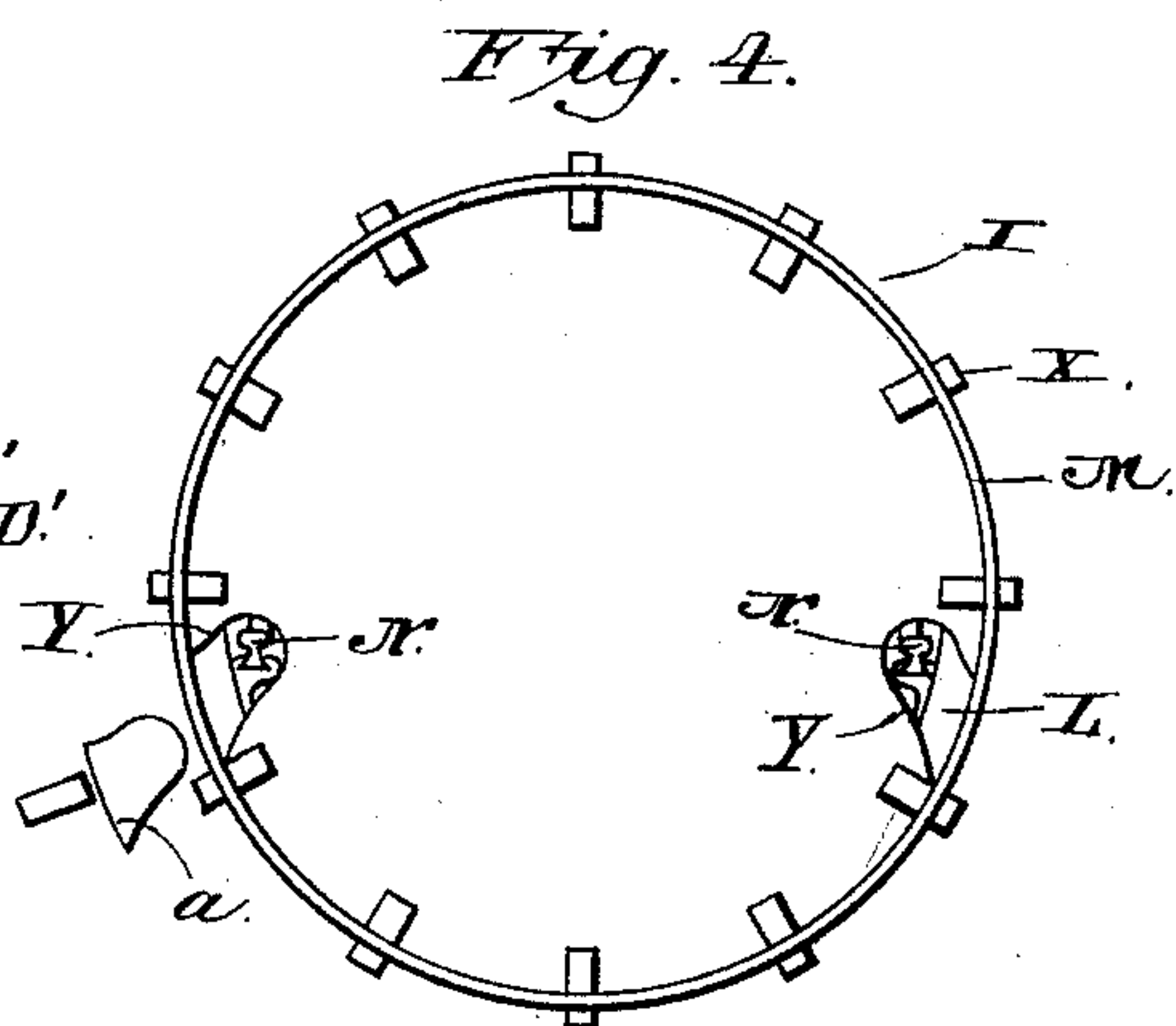
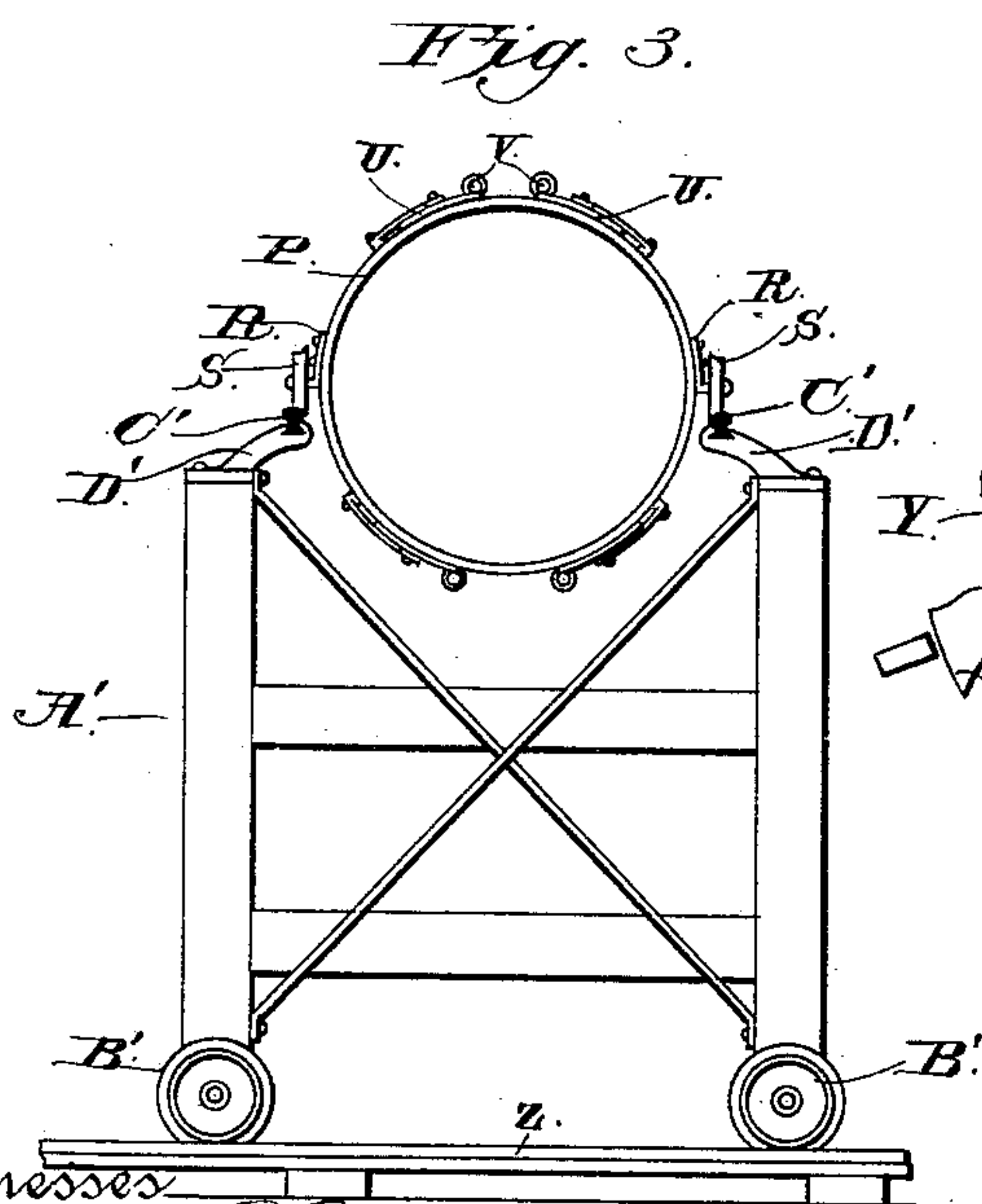
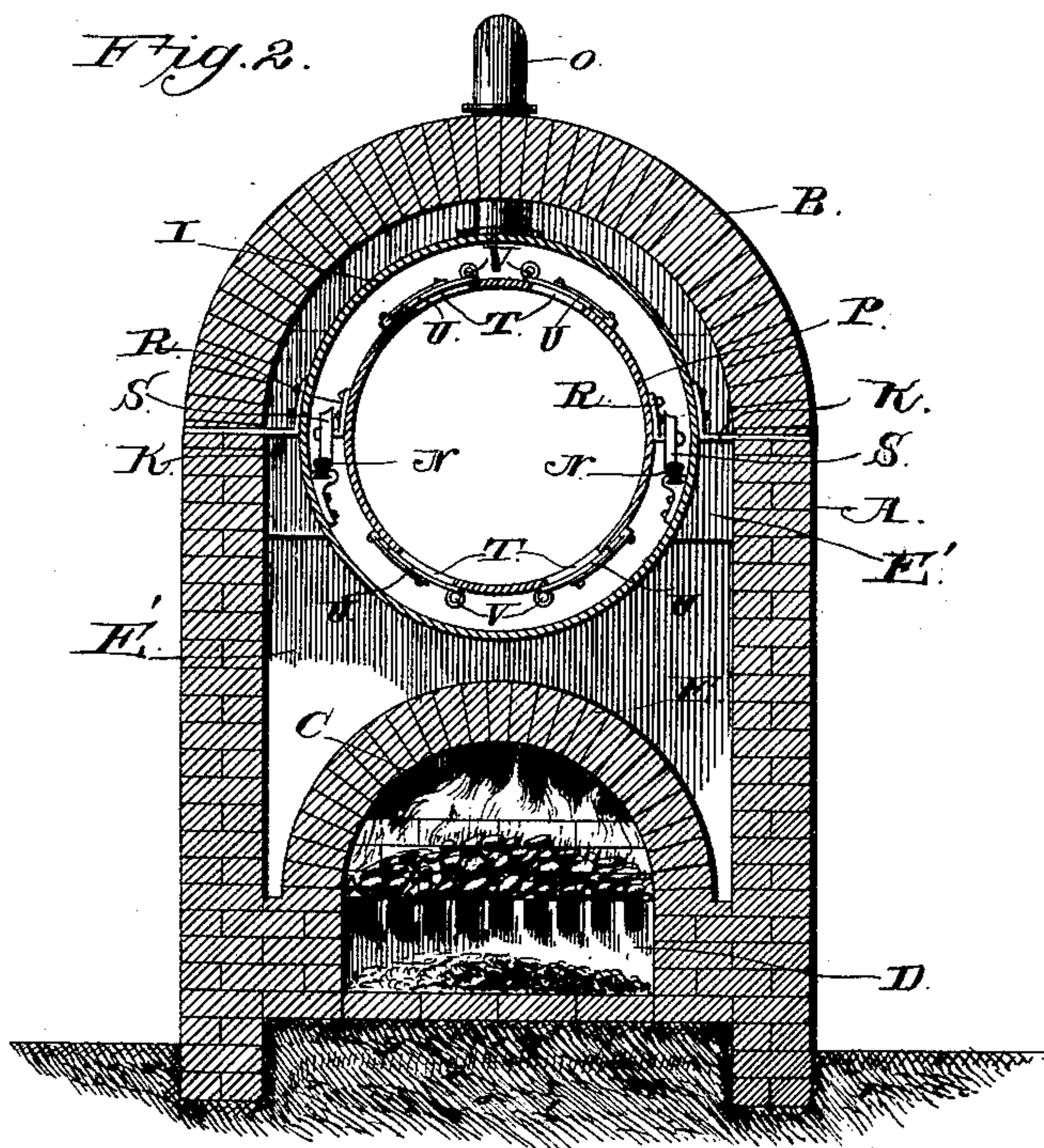
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# UNITED STATES PATENT OFFICE.

FRANKLIN S. CLARK, OF WILMINGTON, NORTH CAROLINA.

## RETORT FOR DISTILLING WOOD AND MAKING CHARCOAL.

SPECIFICATION forming part of Letters Patent No. 407,166, dated July 16, 1889.

Application filed January 5, 1888. Serial No. 259,834. (No model.)

*To all whom it may concern:*

Be it known that I, FRANKLIN S. CLARK, a citizen of the United States, residing at Wilmington, in the county of New Hanover and State of North Carolina, have invented a new and useful Improvement in Retorts for Distilling Wood and Making Charcoal, of which the following is a specification.

My invention relates to an improvement in retorts for distilling wood and making charcoal; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of the retort embodying my improvements. Fig. 2 is a vertical transverse sectional view of the same, taken on the line *xx* of Fig. 1. Fig. 3 is an end elevation of the carriage, showing the inner cylinder supported thereon. Fig. 4 is an end elevation of the outer cylinder, showing it closed.

A represents the furnace, which is built of masonry, has an arched roof B, provided at its front side with a fire-chamber C, beneath which is the ash-pit D, and extending longitudinally from the front wall of the furnace to within a suitable distance from the rear wall thereof and at a suitable height above the bottom is an arch E, the rear end of which is open. From the upper side of the rear end of the arch extends a vertical wall F, which reaches to within a slight distance of the roof, and thereby forms a vertical flue G in the rear end of the furnace. At the front end of the furnace its arched roof is provided with a vertical escape-flue H for the products of combustion.

I represents an outer cylinder, which is made of metal and has its inner end closed. The said cylinder is inserted in the furnace through an opening in the front wall thereof and is arranged above the arch, the rear end of the said cylinder being almost in contact with the vertical wall F. A space is formed between the cylinder and the interior of that portion of the furnace in which it is arranged and surrounding the cylinder, as shown in Figs. 1 and 2. The said cylinder is supported in position in the furnace by means of brackets K. The outer end of the cylinder I is

open and is provided with an annular ring or mouth L, having a flange M. On the inner side of the cylinder I, on opposite sides thereof and in a plane somewhat below the axis of the cylinder, are track-rails N. O represents a pipe or flue which communicates with the upper side of the cylinder I and extends through the roof of the furnace.

P represents a smaller cylinder, which is likewise made of metal, (preferably of boiler-iron,) and is provided at diametrically-opposite sides with brackets R, which project outwardly and form bearings for supporting-rollers S, which engage the tracks N, and thereby support the cylinder P on the inner side of the outer cylinder I and concentrically therewith, so that an annular space is formed between the said cylinders. The inner end of the cylinder P is closed and the outer end thereof is open. The said cylinder P is provided with a number of openings T of suitable size, which openings are adapted to be uncovered or closed by circular disks U, which disks are arranged on the outer side of the cylinder P and are pivoted thereto. The said disks or covers are arranged in longitudinal series and are connected by means of rods V. The outer end of the inner cylinder is closed by a circular plate W of wrought-iron, the said plate being of greater diameter than the said inner cylinder, and being adapted to fit snugly in the flange M at the outer end of cylinder I. The said flange is provided with a series of openings, in which wedges or keys X are inserted and caused to bear against the outer side of the plate W, and between the said plate and the mouth L is inserted a piece of asbestos, in order to effect a tight joint. The wedges or keys may be tightened to any desired extent. In opposite sides of the plate W are recesses or notches Y, for the purpose to be hereinafter explained.

In practice I use a number of retorts, such as herein described, arranged side by side, and in front of the same is a track Z, on which is a carriage A', of suitable size and height, having flanged wheels B', that bear upon the track. On the upper sides of the carriage are tracks C', which are adapted to align with the tracks N, and to form an extension thereof. The said tracks C' are supported by inwardly-inclined vertical brackets D'.



E' represents a series of vertical baffle-plates, which are arranged in the furnace between the arch and the sides and arched roof thereof. The said baffle-plates are open on  
5 opposite edges and fit snugly against the outer cylinder I, and thereby form tortuous communicating flues or passages F', which surround the outer cylinder and communicate with the flue G and with the escape-flue H.

10 The operation of my invention is as follows: The inner cylinder, when it has been charged with wood, is arranged in the outer cylinder and firmly secured therein, as shown, the disks U being first caused to uncover the  
15 openings T. The fire in the fire-box of the furnace causes caloric currents to pass rearward under the arch, up through the flue G, and from thence around the outer cylinder and backward and forward through the flues  
20 F' between the baffle-plates, so as to effectually heat the outer cylinder. The smoke and products of combustion escape through the flue H. Inasmuch as the inner cylinder is arranged within the outer cylinder, and inas-  
25 much as an air-tight joint is formed between the said inner and outer cylinders at their outer ends, the contents of the inner cylinder are entirely protected from contact with atmospheric air. Heat is radiated from the  
30 outer cylinder through the inner cylinder to the wood therein, and the latter is distilled thereby, the products and gases of distillation escaping through the openings T into the outer cylinder, and from the latter  
35 through the pipe O. When this process has been continued for a suitable length of time, the carriage is drawn on the track Z to the front side of the furnace, the wedges or keys X are removed, and the inner cylin-  
40 der is drawn outward from the outer cylinder onto the carriage, as shown in Fig. 3. When the inner cylinder is first withdrawn from the outer cylinder, the charcoal is of inferior quality, by reason of containing a re-  
45 siduum of tarry matter. To correct this, the openings T are left uncovered for a short time, when the inner cylinder is withdrawn from the retort, and atmospheric air is admitted to the interior of the cylinder P, which  
50 instantly generates combustion of the charcoal. The latter is permitted to burn until the foreign substances are consumed, which may be ascertained by noting the color of the vapors that escape through the openings in  
55 the upper side of the cylinder, and when the charcoal has burned a sufficient length of time the process of combustion is arrested by closing the openings T, which may readily be done by grasping the rods V and swinging  
60 the disks U over the openings. As soon as the inner cylinder is removed from the retort another cylinder, freshly charged, is inserted therein in its stead, and thus the fire is main-  
65 tained continuously in the furnace, and is caused to act upon the contents of one cylinder as soon as its predecessor has been removed, thereby very greatly facilitating the

operation of making charcoal and materially reducing the cost thereof, as the fuel which is used to generate the heat is entirely utilized. 70

Heretofore, so far as I am aware, it has been the custom in this art to provide the furnace with a retort, which is arranged therein and extends through both ends thereof to the outer air. This retort has heretofore been charged, 75 and when its contents have sufficiently been distilled it has been customary to put out the fire in the furnace and allow the latter and the retort to cool before withdrawing the charcoal. This form of furnace and retort is 80 disadvantageous, first, for the reason that both ends of the retort being exposed to the air the large proportion of the heat is lost by radiation; secondly, the use of fuel required to operate such a furnace and retort is very 85 wasteful; third, time is lost when waiting for the furnace and retort to cool after the fire is extinguished; fourth, the retort is injured by reason of the flames in the furnace being in direct contact therewith; fifth, the brick-work 90 of the furnace is injured by reason of the changes of temperature occasioned by alternately heating and allowing the furnace to cool; and, finally, the charcoal manufactured in such a retort and furnace is of poor quality, 95 by reason of the presence of much tarry matter, which causes the charcoal, when used, to burn with a smoky flame.

A retort and furnace constructed by my improved method, hereinbefore described and 100 illustrated, is not open to these objections.

The openings Y in the sides of the plate W are closed when the inner cylinder P is arranged in the retort by means of plates a, pieces of asbestos, and the wedges or keys 105 hereinbefore described, so as to prevent air from entering the outer cylinder or retort, as will be readily understood.

The openings Y on each side of the door are left open to allow the track to pass through 110 when the cylinder is rolled on the carriage. The projecting flange forming the outside of the door would strike the rail unless there were an opening to let the track pass through. This opening is closed after the retort-cylin- 115 der is run into the retort-chamber to prevent the interior of the cylinder being in communication with the outer air and causing the vapors to escape.

Having thus described my invention, I 120 claim—

1. The furnace having the fire-chamber C at the front end, the arch E, extending from the fire-chamber to the rear of the furnace, the rear end of the arch being open, the flue G at 125 the rear end of the furnace communicating with the open rear end of the arch E, said flue G being formed by the back wall of the furnace and the vertical wall F, said wall F being arranged at a suitable distance from 130 the back wall of the furnace and terminating at its upper end a short distance below the roof of the furnace, the roof B, provided with the escape-flue H at the front end, the fur-



nace-chamber, the retort placed within the furnace-chamber between the arch E and the roof, but out of contact with both, the rear end of the retort being close to the wall F, and the baffle-plates E', arranged in the space separating the retort and the furnace, and each alternate plate open at its opposite ends, so as to provide tortuous passages F' for the hot air escaping from the flue G to the flue H.

2. In a wood-distilling apparatus, the outer cylinder I, having its outer end open and provided with the ring or mouth L, having flange M, combined with the inner cylinder having the plate W, of greater diameter than the inner cylinder, and adapted to fit snugly within the flange M and bear against the mouth L, and the wedges or keys X, passing through perforations of the flange M and bearing against the outer plate W, so as to hold the inner cylinder in place, provide an air-tight connection, and dispense with the necessity of a separate door, as set forth.

3. In a wood-distilling apparatus, the furnace, combined with the stationary outer cylinder I, arranged within the furnace, and the removable inner cylinder P, to contain the wood and having the openings T in its sides, said inner cylinder being smaller than the outer cylinder and arranged within the latter, so as to provide an air-space around the inner cylinder, with which air-space the openings T communicate, and the doors U on the inner cylinder for closing the openings, said doors being carried by the inner removable cylinder when it is drawn out, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

FRANKLIN S. CLARK.

Witnesses:

W. L. SMITH,  
W. P. PRICE.