

H. M. CHASE.
 RETORT OR STILL.
 APPLICATION FILED MAR. 3, 1914.

1,184,925.

Patented May 30, 1916.
 2 SHEETS—SHEET 1.

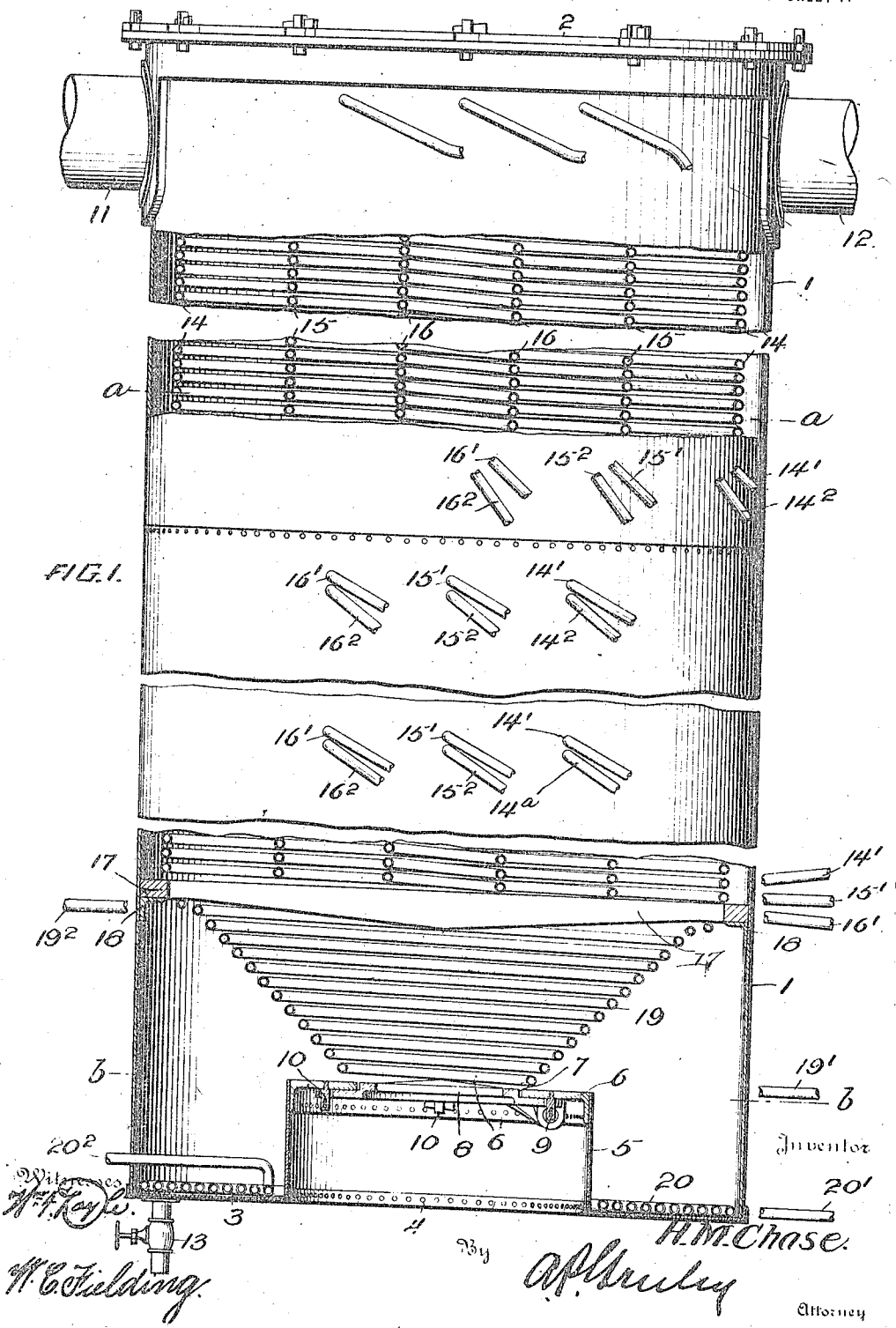


FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 2.

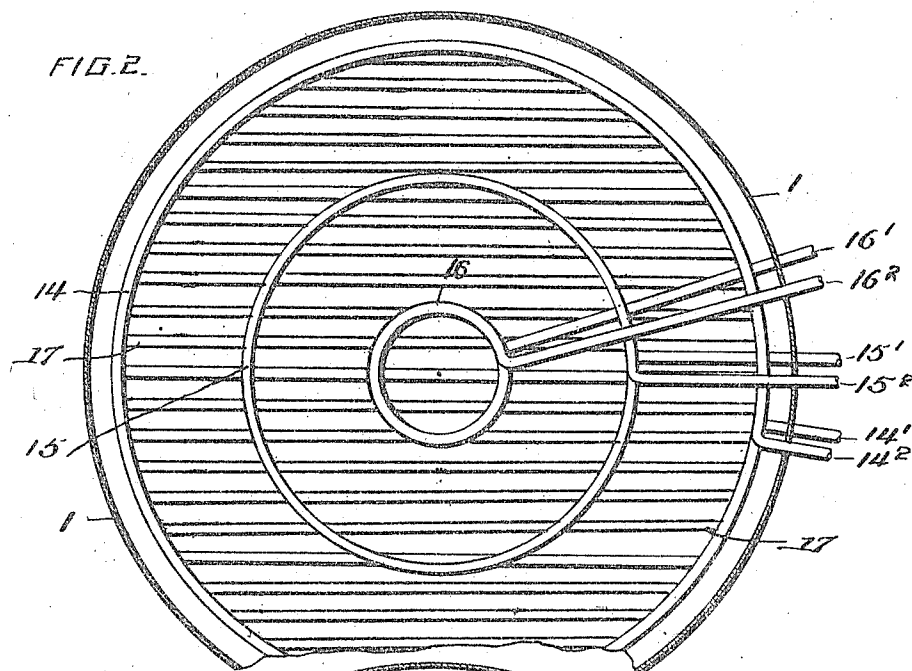
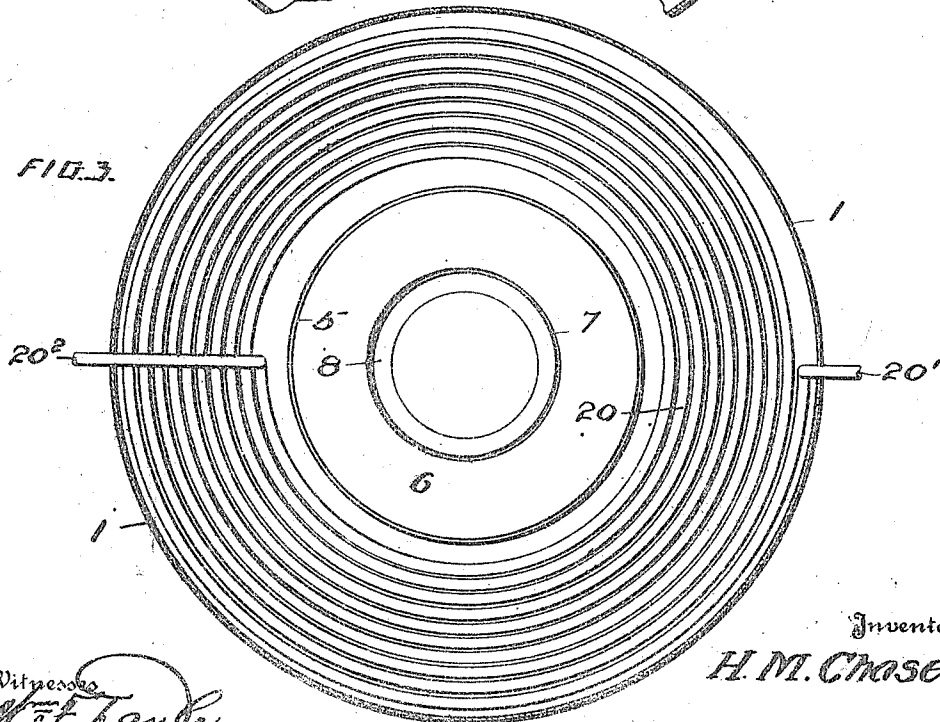


FIG. 3.



Witnesses
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RETORT OR STILL.

1,184,925.

Specification of Letters Patent.

Patented May 30, 1916.

Application filed March 3, 1914. Serial No. 822,193.

To all whom it may concern:

Be it known that I, HAROLD M. CHASE, a citizen of the United States, residing at Wilmington, in the county of New Hanover, State of North Carolina, have invented certain new and useful Improvements in Retorts or Stills, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to stills or retorts particularly adapted to be used in the destructive distillation of non-liquid material in fragments or pieces such for instance as wood of resinous or other trees and my invention has for its object to provide a means for heating such stills or retorts which will be adapted to be used with retorts of large capacity and will make it possible to not only regulate the heat applied but will cause the heat to penetrate evenly throughout the material in the retort.

In the patent to Thomas W. Fritchard issued Feb. 25, 1908, No. 880,466, a method and means for heating retorts for the destructive distillation of wood is disclosed having for its main feature the circulation about the retort of a current of heated liquid having a high volatilizing point, the temperature of the liquid being so regulated as to get in the retort just the temperature necessary to drive off the particular product desired. In the use of this system of heating it is found that owing to the fact that heat penetrates slowly through a mass of wood the diameter of the retort is necessarily limited where the heating liquid is circulated in a jacket surrounding the retort or in pipes near the walls of the retort as if the retort is of large diameter the outer portions of the charge will be brought to the temperature desired a considerable time before the inner or central portions will be sufficiently heated to drive off the product desired. My present invention is designed to overcome this difficulty and to enable retorts to be used with the system of heating by circulation of a heated liquid, which are not only of larger diameter than those found possible to use heretofore but are also arranged with their axis vertical so as to permit the material to be treated to be introduced at the top of the retort and the residue to be removed from the lower end thus

dispensing with the cars necessary to be used where the retorts are arranged with their axes horizontal.

With the objects above explained and other objects hereinafter explained in view my invention consists in the construction and combination of elements hereinafter set forth and claimed.

Referring to the drawings Figure 1 is a side elevation partly broken away, of a still or retort embodying my invention. Fig. 2 is a horizontal section through the same on line *a-a* of Fig. 1 and Fig. 3 is a similar view on line *b-b* of Fig. 1.

Referring to the drawing 1 indicates a still or retort preferably formed of sheet metal in cylindrical form and preferably arranged with its axis vertical.

2 indicates a cover for the retort which is constructed so as to be either in whole or in part removable to permit the material which is to be treated to be introduced.

3 indicates the lower end of the retort having a central opening 4 through which the residue resulting from the destructive distillations may be taken out. A flange 5 extends upward about this opening 4 having at its upper end a plate 6 with central opening 7 adapted to be closed by a door 8 hinged at 9 and arranged to swing downward to permit the residue to be discharged through it. A securing device 10 of any convenient construction serves to hold the door closed.

Near the upper end of the retort or still are arranged oftakes 11 and 12, preferably two in number though more or less than two may be used, through which the products of distillation may be led off to suitable condensers (not shown). In the bottom 3 a valved outlet 13 is provided for drawing off any liquid residues which may accumulate about the flange 5.

Within the retort are arranged heating coils 14, 15 and 16 of which the coils 14 are near the walls of the retort, the coils 16 are near the axial center of the retort and the coils 15 are between coils 14 and 16 and are preferably concentric with them. The distance between coils 14 and 15 and between coils 15 and 16 is such as to permit of introducing the material to be treated in pieces or fragments of such size as the material can conveniently be cut or broken into and the in-

terior diameter of the coils 16 is preferably such that the pieces or fragments of the material may be introduced within this coil.

The coils 14, 15 and 16 are supported by cross bars 17 arranged near the lower end of the retort supported at their ends in any convenient manner as by brackets 18. Below these cross bars is arranged a heating coil 19 the coils of which are preferably arranged as to form a cone the diameter of the upper end of which is nearly the same as that of the interior of the retort and the diameter of the lower end of which rests on the plate 6 about the opening 7 so as to form a funnel to direct the solid portions of the residue to the opening, the spaces between the coils being sufficient to permit any liquid residue to escape into the space surrounding the flange 5 or opening 4. At the extreme lower end of the retort or still is arranged a heating coil 20 surrounding the flange 5 or opening 4.

The heating liquid is supplied to the coils 14, 15, 16, 19 and 20 by inlets 14', 15', 16', 19' and 20' extending through the walls of the retort and the liquid passes out through outlets 14", 15", 16", 19" and 20" the inlets and outlets being connected with a suitable supply pipe and return pipe (not shown) leading from and to the heater (not shown).

In a retort or still of any considerable height the several coils 14, 15 and 16 will preferably be formed in sections each having its inlet and outlet so as to avoid the cooling which would result from forcing the heating liquid to pass through too great a length of pipe.

In actual construction particularly where the retort or still is to be used for the destructive distillation of resinous wood the spaces between the coils 14 and 15 and between the coils 15 and 16 and the interior diameter of the coil 16 should not be greater than two or three feet in order to get the best heating effect on the material to be treated.

In operation after the top or cover 2 has been opened and the spaces between the coils filled with the material to be treated the cover is closed and the heating liquid forced through the coils. If desired the funnel formed by the coil 19 may be left filled with solid residue from the previous run, or the material to be treated may be allowed to fill it. As soon as the material is heated to the degree necessary to drive off the first fractional distillate this distillate will pass off through the offtakes and will continue to pass off so long as the heat is maintained until fully driven off. The heat is then increased and successive distillates driven off until only nonvolatile residues remain. These residues, in case the retort or still is used for destructive distillation of resinous

wood, will consist of charcoal and a tarry or pitchlike substance which at high temperature is sufficiently liquid to flow into the space surrounding the flange 4, from which it may be drawn off through the valved outlet 13. In the process of distillation this tarry or pitchlike residue will carry down with it more or less volatile matter and will submerge the heating coil 20 and will be kept highly heated by this coil and by the coil 19 so as to drive off any volatile matter. The wood or charcoal which fills the funnel formed by the coil 19 will be freed from any volatile or tarry matter carried by it by the heat of this coil. After the distillation has been completed and the retort or still cooled by circulation of comparatively cool liquid through the coils the door 8 may be opened and the charcoal permitted to fall into a suitable receptacle.

By reason of the arrangement of the coils 14, 15 and 16 the material to be treated may be treated rapidly and by the action of the coils 19 and 20 the residues may be freed from volatile matter thus not only reducing the time necessary for the effective distillation but also securing a larger recovery of volatile matter than could otherwise be obtained. The arrangement of coils also permits of the use of larger retorts and the consequent treatment of a larger mass of material than would otherwise be possible.

It will of course be understood that the intermediate coils 15 may be omitted in retorts of smaller diameter and more than one intermediate coil may be used in retorts of larger diameter than the one illustrated.

It will of course be understood that the retort or still of this invention may be used for the treatment of any material capable of being distilled to drive off volatile substances.

It will also be understood that I do not desire to be limited to the particular construction and arrangement shown as this may obviously be varied without departing from the spirit of my invention.

Having thus described my invention what I claim is:—

1. A retort or still for the treatment of solid material in pieces or fragments, comprising an outer shell arranged vertically having an opening at its upper end to receive the material to be treated, having a central opening at its lower end for the discharge of solid residues and having a plurality of sets of heating coils arranged therein one above the other, each set comprising a plurality of coils arranged one within another spaced apart sufficiently to permit the material to be treated to enter between them, and each set having a separate inlet and outlet for the heating medium.

2. A retort or still for the treatment of

solid material in pieces or fragments, comprising an outer shell arranged vertically having an opening at its upper end to receive the material to be treated, having a central opening at its lower end for the discharge of solid residues and having a plurality of sets of heating coils arranged therein one above the other, each set comprising a plurality of coils arranged one within another spaced apart sufficiently to permit the material to be treated to enter between them, and each set having a separate inlet and outlet for the heating medium, and means for supporting the material to be treated adapted to permit the passage of material disintegrated by treatment.

3. A retort or still for the treatment of solid material in pieces or fragments, comprising an outer shell arranged vertically having an opening at its upper end to receive the material to be treated, having a central opening at its lower end for the discharge of solid residues and having a plurality of sets of heating coils arranged therein one above the other, each set comprising a plurality of coils arranged one within another spaced apart sufficiently to permit the material to be treated to enter between them, and each set having a separate inlet and outlet for the heating medium, means for supporting the material to be treated adapted to permit the passage of material disintegrated by treatment, and a conically arranged heating coil below the material supporting

means adapted to direct the disintegrated material to an outlet and to permit liquids to pass between the coils.

4. A retort or still for the treatment of solid material in pieces or fragments, comprising an outer shell arranged vertically having an opening at its upper end to receive the material to be treated, having a central opening at its lower end for the discharge of solid residues and having a plurality of sets of heating coils arranged therein one above the other, each set comprising a plurality of coils arranged one within another spaced apart sufficiently to permit the material to be treated to enter between them, and each set having a separate inlet and outlet for the heating medium, means for supporting the material to be treated adapted to permit the passage of material disintegrated by treatment, a conically arranged heating coil below the material supporting means adapted to direct the disintegrated material to an outlet and to permit liquids to pass between the coils, a chamber surrounding the conically arranged coil adapted to receive the liquid, and means for heating the chamber.

This specification signed and witnessed this 25th day of November, A. D. 1913.

HAROLD M. CHASE.

In the presence of—
P. P. CAUSEY,
BESSE C. STRAUB.