

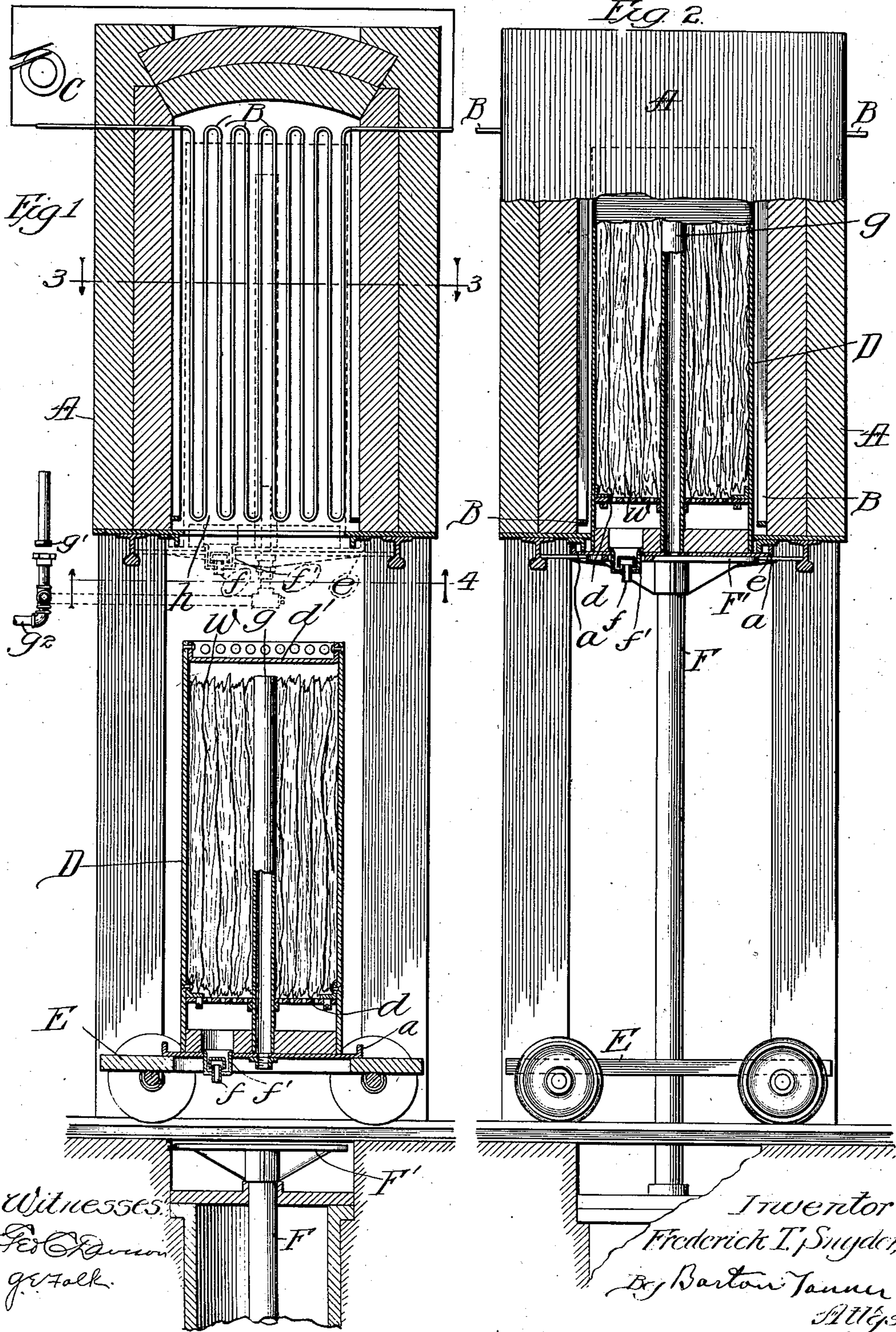
No. 896,167.

PATENTED AUG. 18, 1908.

F. T. SNYDER.
FURNACE.

APPLICATION FILED MAY 31, 1906.

2 SHEETS—SHEET 1.



No. 896,167.

PATENTED AUG. 18, 1908.

F. T. SNYDER.
FURNACE.

APPLICATION FILED MAY 31, 1906.

2 SHEETS—SHEET 2.

Fig 3.

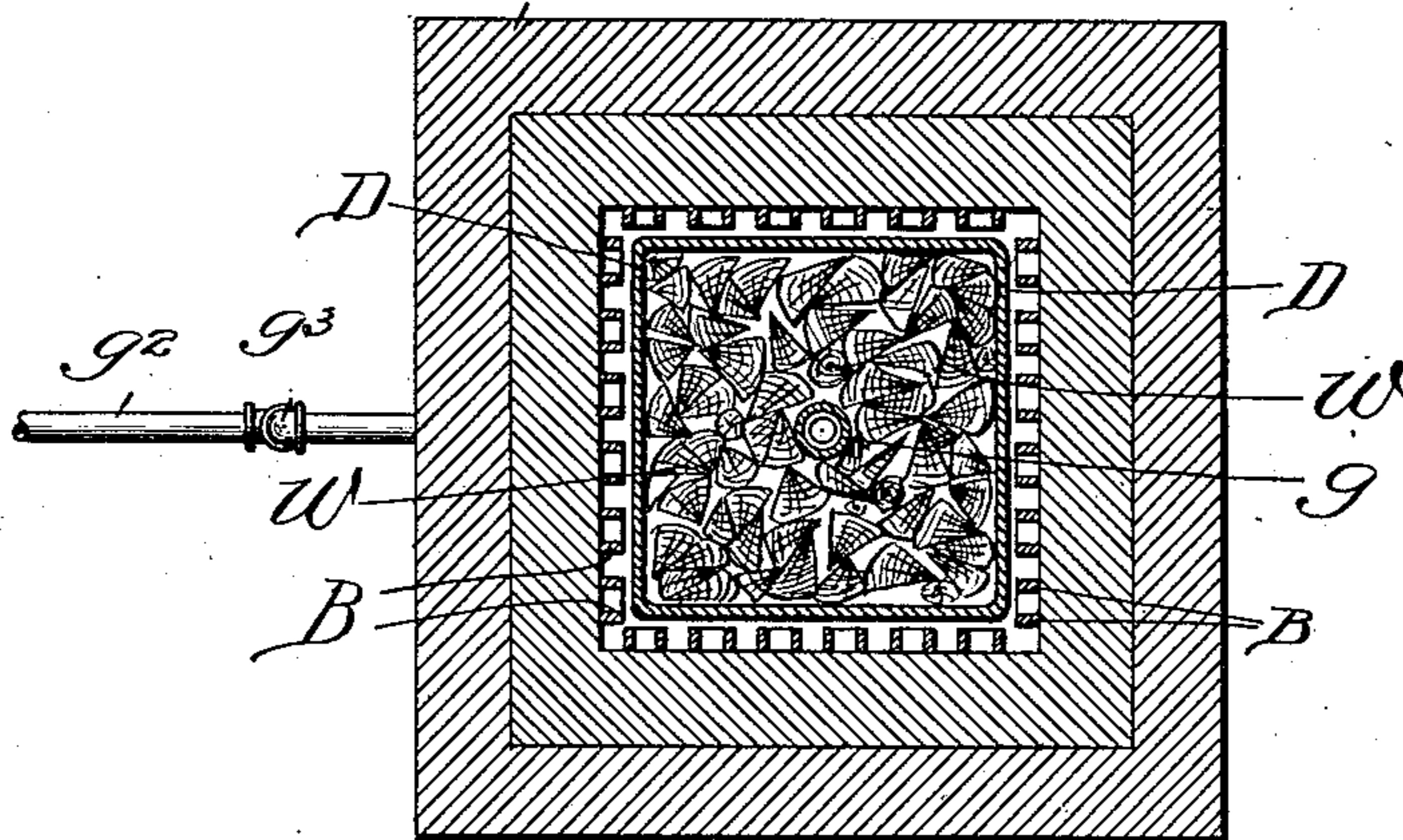
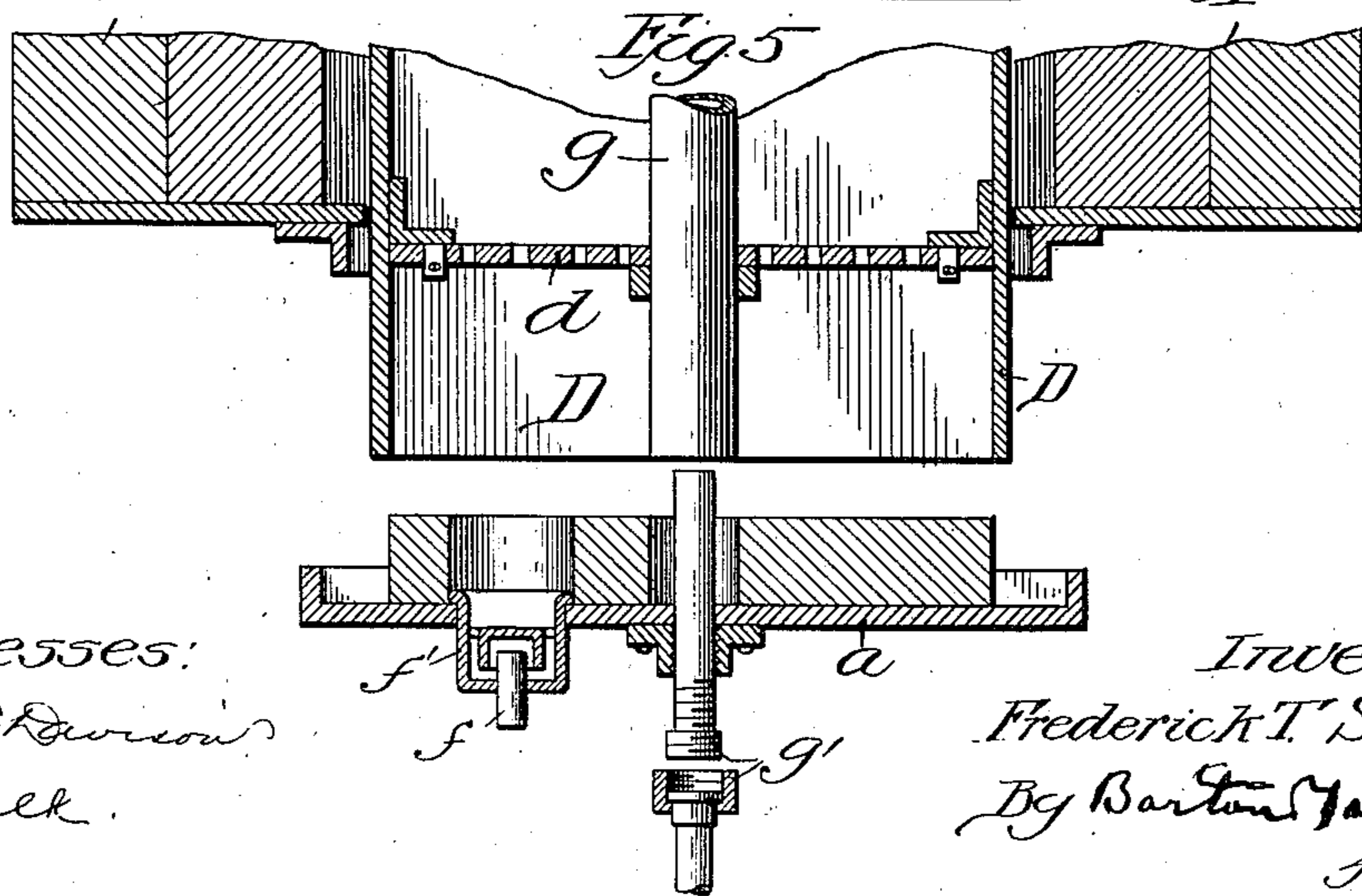
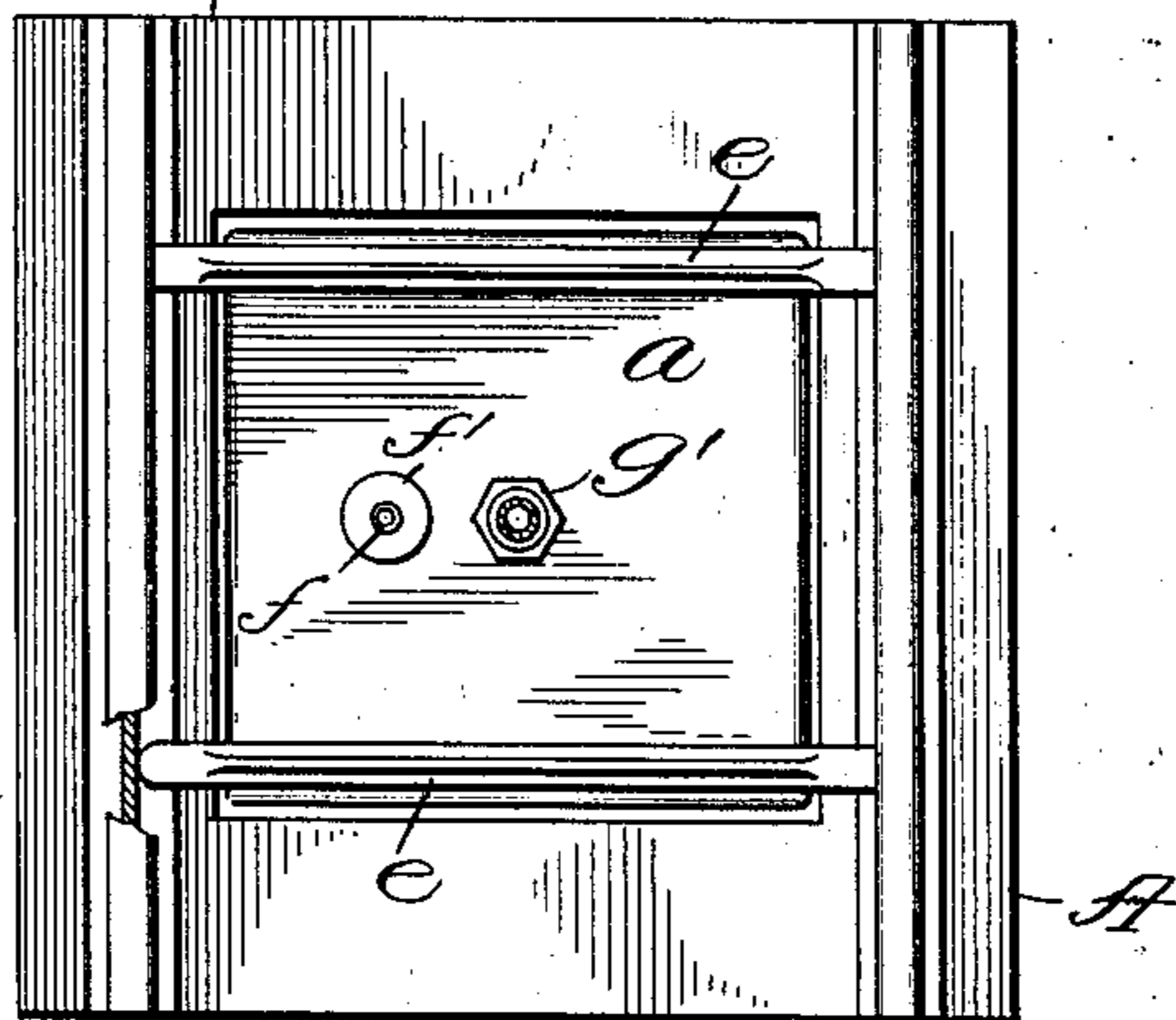


Fig 4.



Witnesses:
Geo. C. Dawson
J. E. Folk.

Inventor:
Frederick T. Snyder,
By Barton Yanner,
Attys.

UNITED STATES PATENT OFFICE.

FREDERICK T. SNYDER, OF OAK PARK, ILLINOIS.

FURNACE.

No. 896,167.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed May 31, 1906. Serial No. 319,453.

To all whom it may concern:

Be it known that I, FREDERICK T. SNYDER, citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Furnaces, of which the following is a full, clear, concise, and exact description.

My invention relates to a furnace or retort, and its object is to provide apparatus of simple construction which will utilize to the fullest degree the heat developed in the furnace, which will minimize the escape of heat therefrom by convection, and which will permit the maintenance of a uniform temperature in the furnace chamber or retort.

One feature of my invention consists of a vessel or chamber having air-tight sides and top and a charging opening at the bottom, and suitable means for heating said vessel, said vessel being adapted to inclose material, such for example as wood, for treatment, and having a pipe leading from the interior to the exterior of the vessel for withdrawing the volatile products of distillation.

While I do not wish to be considered as limiting myself, except as hereinafter set forth in the claims, to any particular means for applying heat to said vessel, nevertheless, as a further feature of my invention, I may for such purpose employ a furnace in which the sides and top thereof are inclosed or air-tight to prevent the heated air or gases developed in the furnace from escaping upwardly, and in which the charging opening is located at the bottom. As is well-known, air or gases when heated ascend, and if the only opening to the vessel or to the furnace chamber or to both is located at the bottom, the egress of heated air from said vessel and said chamber and the consequent ingress of cold air is so small as to be negligible. For this reason, no door is provided for the charging opening of the vessel, and in case the furnace likewise has its charging opening at the bottom, the door to said charging opening may likewise be entirely omitted, as is in some cases desirable, without appreciable escape of the heat of the furnace downwardly by convection.

The apparatus comprising my invention is not limited to any particular use, but may be most advantageously employed in carrying out the process for the destructive distillation of wood described in my Patent No. 821,264 of May 22nd, 1906. I will, therefore,

by reference to the accompanying drawings describe my invention as embodied in a furnace adapted to such use.

Figure 1 is a vertical sectional view of an electric furnace, with a removable inner vessel, which immediately contains the wood for treatment, in position to be hoisted into the furnace, the position of the door of the furnace and of the vessel when the latter is inserted in the furnace, being indicated in dotted lines; Fig. 2 is a similar view partly in elevation, showing the hoisting means in position to remove a vessel from the furnace; the outlet pipe having been removed to permit this operation. Fig. 3 is a horizontal section on the line 3—3 of Fig. 1; Fig. 4 is a bottom view of the furnace with the door in place; and Fig. 5 is a separated detail view showing parts of the lower portion of the furnace.

Like parts are designated by similar letters of reference throughout the several views.

The furnace or retort A has its interior side walls lined with a flat heating coil comprising continuous return bend conductors B of cast iron or other suitable material extending from the top to the bottom of the walls, for the passage of an electric current by means of which I preferably heat the furnace, as this permits exact regulation of the temperature. The material heated in the furnace thus forms no part of the electric furnace. By this means I am enabled to continuously apply heat to the interior of the furnace irrespective of whether or not the furnace is charged with material under process of treatment, thereby maintaining the heat in the furnace during the time one charge is being removed and another inserted. An alternating current of constant potential furnished by a generator C may be used to maintain the furnace at a uniform temperature.

In using my furnace for the treatment of wood to extract the turpentine therefrom, I have found that a current of a thousand amperes having a potential of two hundred volts maintains a furnace or retort holding one-half of a cord of wood at approximately the temperature at which turpentine in form of vapor is released from the wood.

The wood to be treated is preferably placed inside of a vessel D, somewhat smaller in size than the interior of the furnace, and rests upon a grate *d* removably secured in any suitable manner near the bottom of said vessel. I employ this separate container in

order that, when the wood has been sufficiently treated, it may be immediately removed without the danger of the residual charcoal or any portion thereof burning to ash by exposure to air in its heated condition. In order to prevent an ingress of air sufficient to damage the charcoal when the heated vessel is removed from the furnace, the top d' of the vessel D is securely sealed, as shown. At the end of the period of distillation, the vessel D is removed from the furnace through the charging-opening h and is maintained in an upright position. Although the bottom of said vessel may be open, the external air does not rise within the same or have access to the heated charcoal because of the heated vapors which still fill the vessel and cannot escape, owing to the closed sides and top, to let in the air. In the same manner, the heat of the furnace is conserved, the top and sides thereof being closed to keep in the heated gases. Another vessel D containing wood is then inserted in the furnace, while the vessel containing the charcoal is allowed to cool, with the charcoal thus protected from the air. The furnace itself need not be cooled down.

In Figs. 1 and 2 I have shown means for feeding a vessel D into the furnace or removing the same therefrom, through charging-opening h , located at the bottom of the furnace in order, as before stated, to prevent the escape of the heated gases from the furnace during the time the door or cover a is not in place. Said door a is removable, being normally held in place by one or more bars e .

As shown in Fig. 1, a vessel upon a car E is placed in position over a pneumatic or other suitable hoisting device F, the head F' of which passes through an opening in the car and lifts the vessel D into position.

The wood W is preferably arranged in the vessel D so that the grain of the wood extends in a vertical direction, so that the pitch extracted from the heated wood is furnished an easy path in which to flow and rapidly removes itself from the heated portion of the furnace to the comparatively cool portion lying beneath the grate d . From thence it escapes through an opening f in a trap f' sealed by the pitch from the access of air. It will be noted that the pitch being rapidly conducted away from the heat is not decomposed thereby, and consequently the production and mingling of vapors of the tarry products with the turpentine vapors are prevented.

The outlet pipe g for conducting the turpentine vapors to the usual condensers is preferably located vertically near the middle of the vessel D, with its opening near the top thereof, and extends downwardly through the bottom of the furnace. As shown most clearly in Figs. 1 and 5, the portion of the outlet pipe g , which extends into the furnace

is preferably formed in two loosely telescoping sections. The upper section extends through the grate d and is removable therewith. The lower section of the outlet pipe extends through the door a telescoping into the upper section of the pipe. Said lower section of the pipe g may be uncoupled at g' from the pipe section g^2 , in order that the pipe arm g^2 may be swung out of the way in charging the furnace, the pipe g^2 being provided with a swing joint g^3 . By thus locating the pipe g away from the heated walls B and also removing the pitch, as fast as it is formed, away from the heated portion of the chamber, a wider range of temperature is permissible without danger of decomposing either the turpentine vapors or the pitch.

The furnace of my invention permits of the continuous maintenance of a uniform temperature in the retort or furnace. My invention as embodied in a furnace for the destructive distillation of wood enables the production of clean, clear turpentine, the saving of pitch without decomposition thereof, and the saving also of the charcoal in good condition, free from ash. The process of treatment of wood moreover may be carried on continuously, since it is not necessary to allow the furnace to cool off before removing one charge and inserting another.

I claim:—

1. In a distillation apparatus, the combination with a furnace, of a vessel for inclosing material for treatment in said furnace, said vessel having air-tight sides and top and a charging opening at the bottom, and being removable from said furnace for the purpose of removing the treated products and recharging said vessel, and a pipe communicating with the interior of said vessel for withdrawing the volatile products of distillation.

2. In a distillation apparatus, the combination with a furnace having air tight sides and top and a charging-opening at the bottom, of a vessel for inclosing the wood for treatment, said vessel having air-tight sides and top, and means for withdrawing the products of distillation through the bottom of the vessel.

3. The combination with a furnace having air-tight sides and top and a charging-opening at the bottom thereof, of a vessel for inclosing material to be heated in said furnace, said vessel also having air-tight sides and top and a charging opening at the bottom, and means for withdrawing said vessel in an upright position from said furnace.

4. The combination with a furnace having air-tight sides and top and a charging opening at the bottom, of a vessel adapted for insertion in said furnace, said vessel being provided with air-tight sides and top, an open bottom and a grate for retaining material for treatment in said vessel, a pipe extending through the bottom of said vessel and com-

communicating with the upper interior of said vessel to withdraw the volatile products given off by the material under treatment, and means for removing said vessel in an upright position from the furnace.

5. In an electric furnace, a chamber having closed sides and top and a charging-opening at the bottom, conductors arranged in the furnace for developing heat electrically in the same, a vessel for insertion in said furnace having air-tight sides and top, an open bottom, and a grate for retaining material within the same, a pipe located at approximately the vertical center of said vessel, said pipe communicating with the upper portion of said vessel and the exterior of the furnace to withdraw the volatile products given off by the heated material, and means for removing one vessel in an upright position through said charging opening of the furnace and substituting another therefor.

6. The combination with a furnace chamber having a charging opening, said chamber being otherwise air-tight, of a vessel for inclosing material to be heated in said furnace, said vessel also having a charging opening and being otherwise air-tight, and a door adapted when said vessel is in position in said chamber to close both of said openings, thereby preventing communication between said vessel and chamber and also preventing the egress of the heated gases from said chamber.

7. The combination with a furnace, of a vessel for inclosing material for treatment in said furnace, said furnace and vessel each having air-tight sides and top and an opening at the bottom, and a door adapted when said vessel is in upright position in the furnace to close both of said openings, thereby preventing communication between said vessel and chamber and also preventing the egress of the heated gases from said chamber.

8. In a furnace, for the treatment of wood, the combination with a furnace chamber of a vessel for inclosing wood for treatment in said chamber, said chamber and vessel each having air-tight sides and top and a charging-opening at the bottom, a door adapted when said vessel is in an upright position in said chamber to close both of said charging-openings, a pipe passing through an opening in said door into the interior of the vessel,

and a trap for sealing an opening in said door through which the pitch is conducted away.

9. In a distillation apparatus, the combination with a furnace, of a vessel for inclosing the material for treatment in said furnace, said vessel having air-tight sides and top, and a charging opening at the bottom, and a pipe communicating with the interior of said vessel for withdrawing the volatile products of distillation.

10. The combination with a furnace, of a vessel adapted for insertion in said furnace, said vessel being provided with air-tight sides and top, an open bottom and a grate for retaining material for treating in said vessel, an outlet pipe leading from the upper portion of said vessel to the exterior of the furnace, for withdrawing the volatile products given off by the heated material, and means for removing said vessel in an upright position from the furnace.

11. In an electric furnace, a chamber, conductors arranged in the furnace for developing heat electrically in said chamber, a vessel for insertion in said chamber, said vessel having air-tight sides and top, an open bottom and a grate for retaining material within said vessel, a pipe communicating with the upper portion of said vessel and the exterior of the furnace to withdraw the volatile products given off by the heated material, and means for removing one vessel in an upright position from said chamber and substituting another.

12. In a furnace, the combination with a furnace chamber having a charging opening, of a vessel for inclosing material for distillation in said chamber, said vessel having air-tight sides and top, and a charging opening at the bottom, a cover adapted when said vessel is in an upright position in said chamber to close the charging opening of said chamber, and an outlet pipe for the volatile products of distillation, said outlet pipe passing through an opening in said cover into the interior of the vessel.

In witness whereof, I, hereunto subscribe my name this 28th day of May, A. D., 1906.

FREDERICK T. SNYDER.

Witnesses:

DE WITT C. TANNER,
ALFRED H. MOORE.