(No Model.) 4 Sheets—Sheet 1.

E. KOCH.

APPARATUS FOR DISTILLING WOOD.

No. 421,029. Patented Feb. 11, 1890.

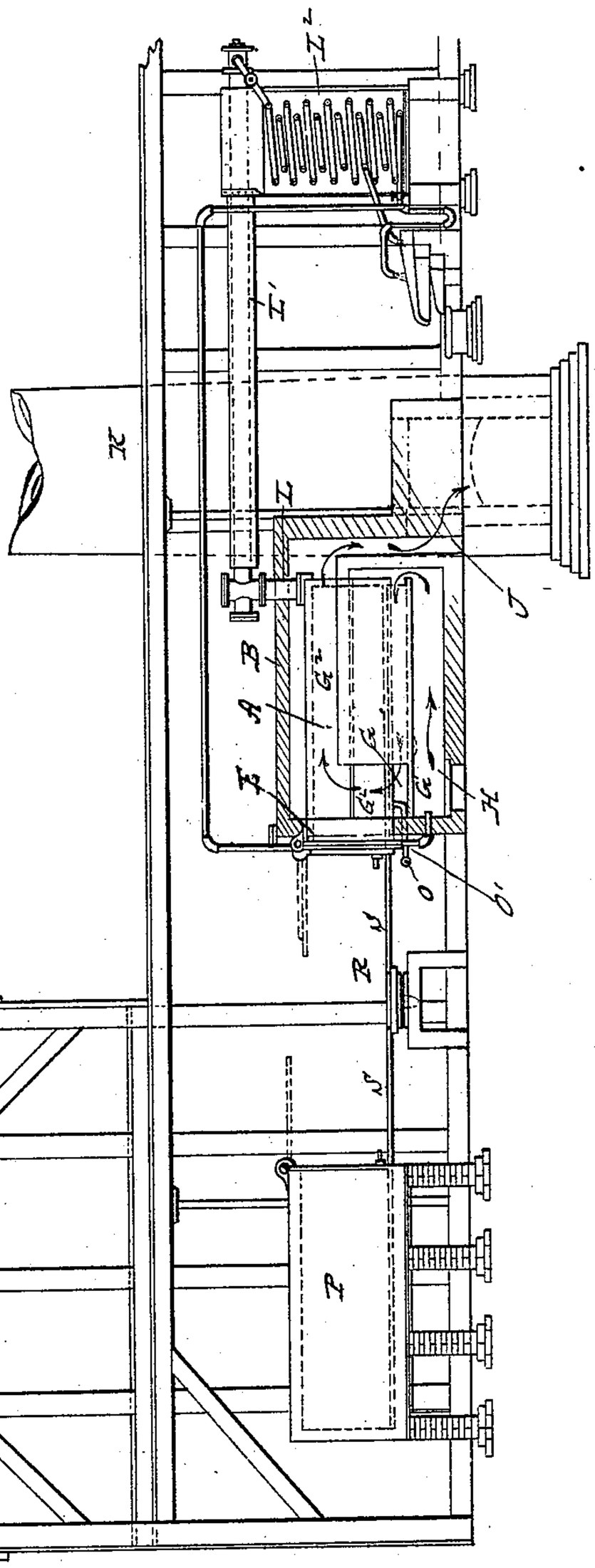


Fig. 1.

Witnesses
Geo. F. Downing.
S. G. Nottingham

Inventor
Eberhard Koch
By his Attorneys
Leggett and Leggett

(No Model.) 4 Sheets—Sheet 2.

E. KOCH.

APPARATUS FOR DISTILLING WOOD.

No. 421,029. Patented Feb. 11, 1890

Fig-2-

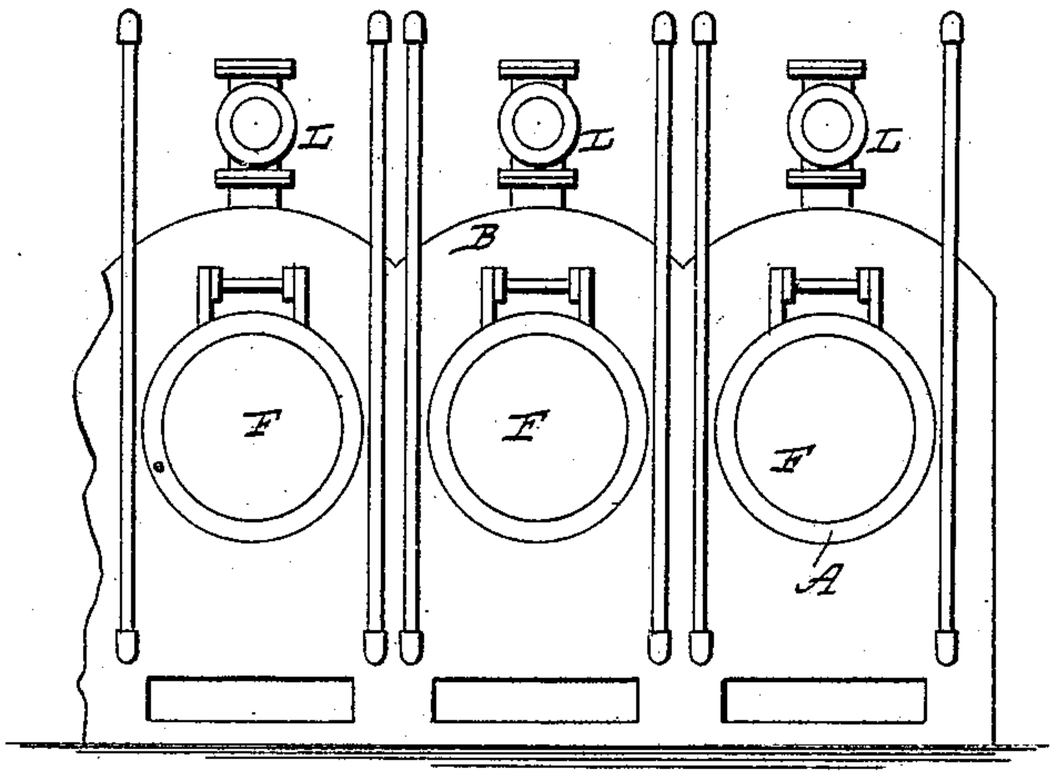
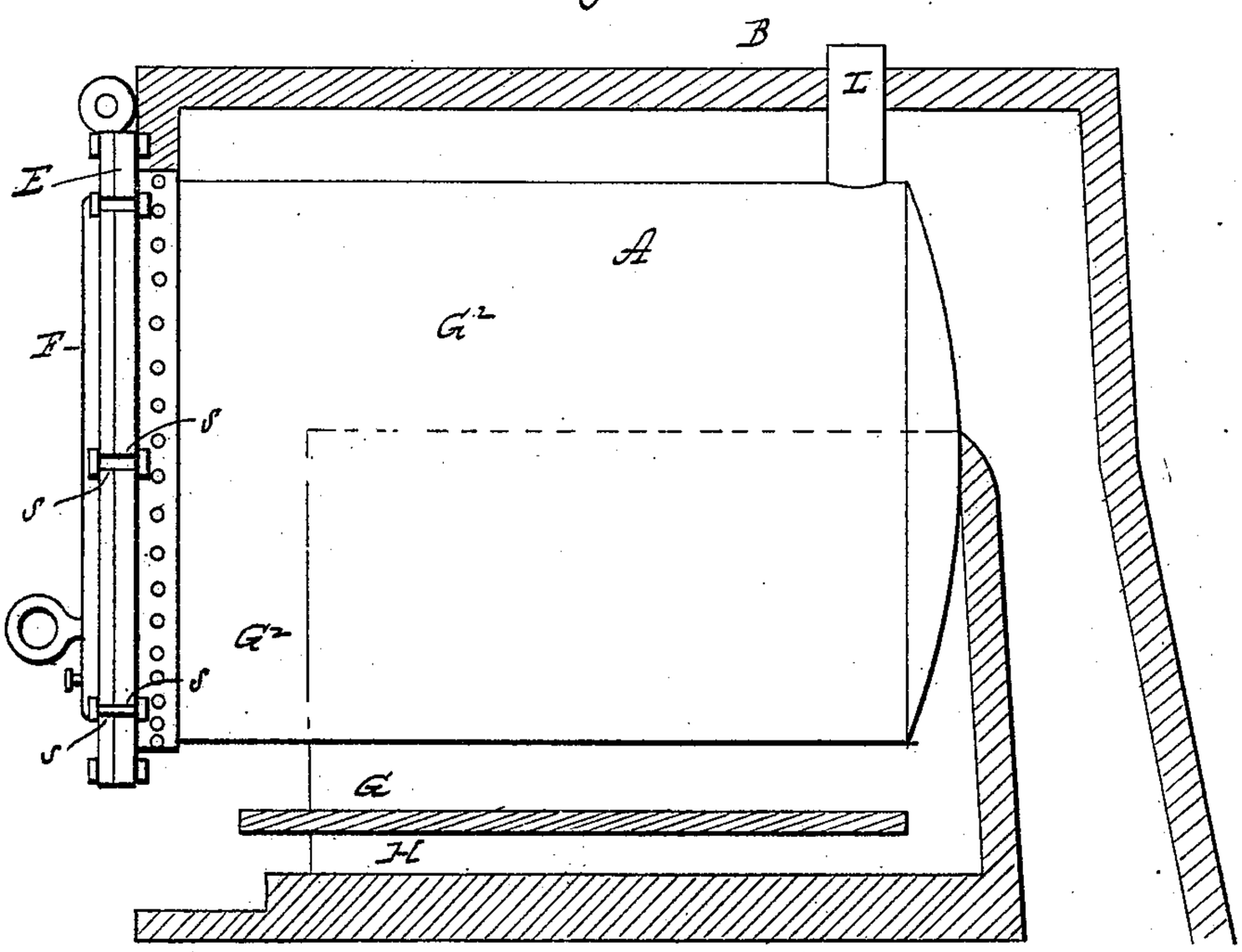


Fig-4-



Witnesses
Geo. F. Downing.
S. G. Nottingham

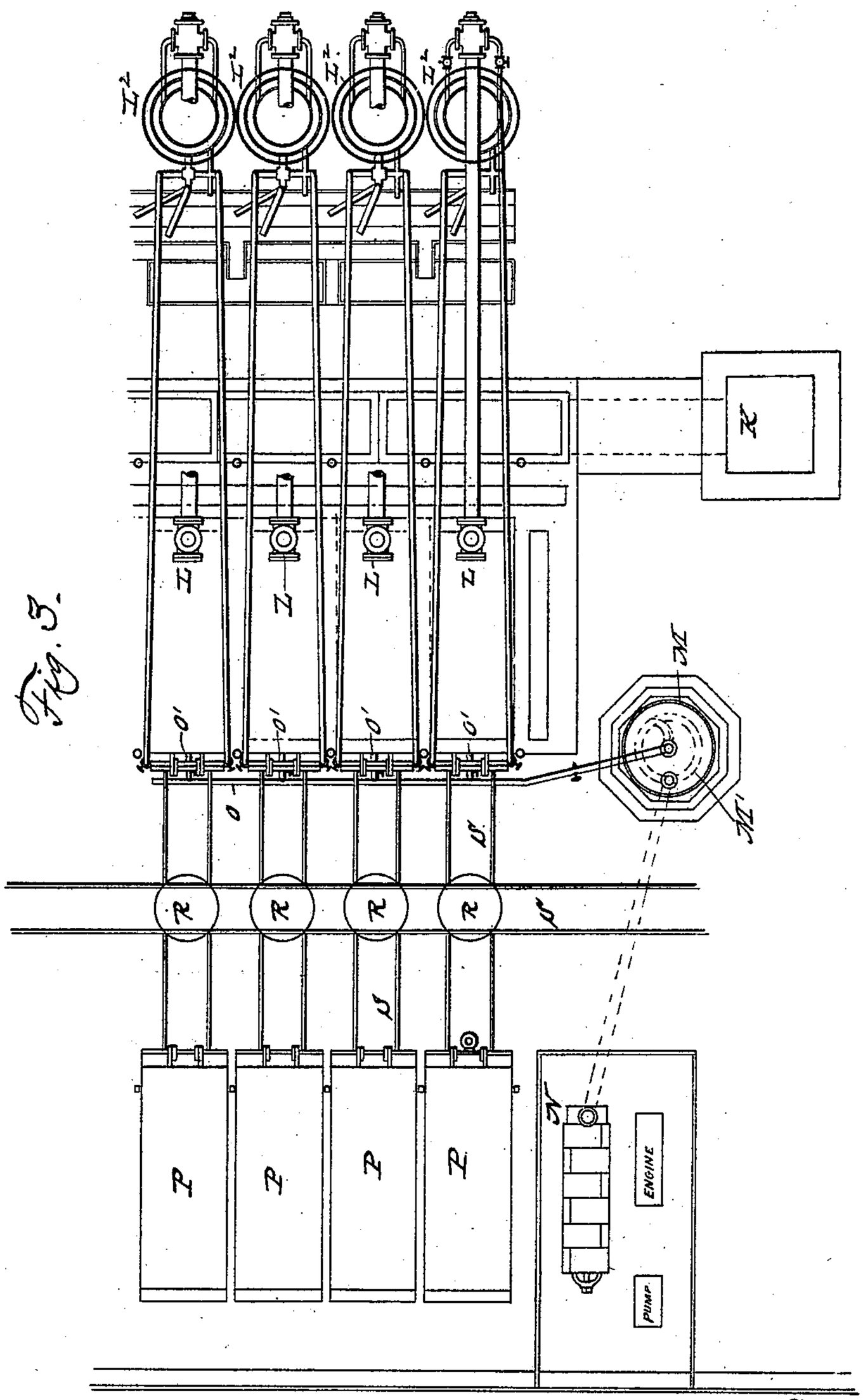
Inventor
Eberhard Koch
By his Attorneys
Leggett and Leggett

(No Model.) 4 Sheets—Sheet 3.

E. KOCH.

APPARATUS FOR DISTILLING WOOD.

No. 421,029. Patented Feb. 11, 1890.



Witnesses
Geo. F. Downing.
S. G. Nottingham

Inventor
Eberhard Koch
By his Attorneys
Leggett and Leggett

(No Model.) 4 Sheets—Sheet 4.

E. KOCH.

APPARATUS FOR DISTILLING WOOD.

No. 421,029. Patented Feb. 11, 1890.

Fig. 5

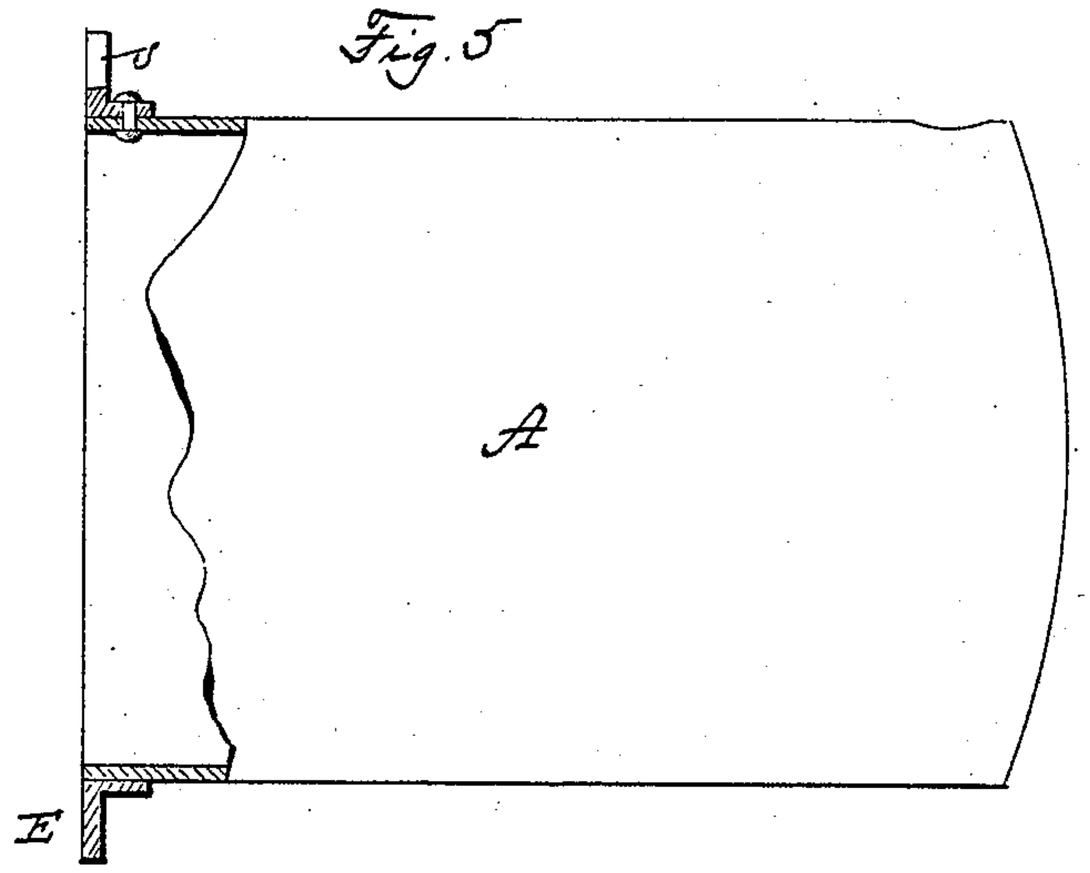


Fig. 6

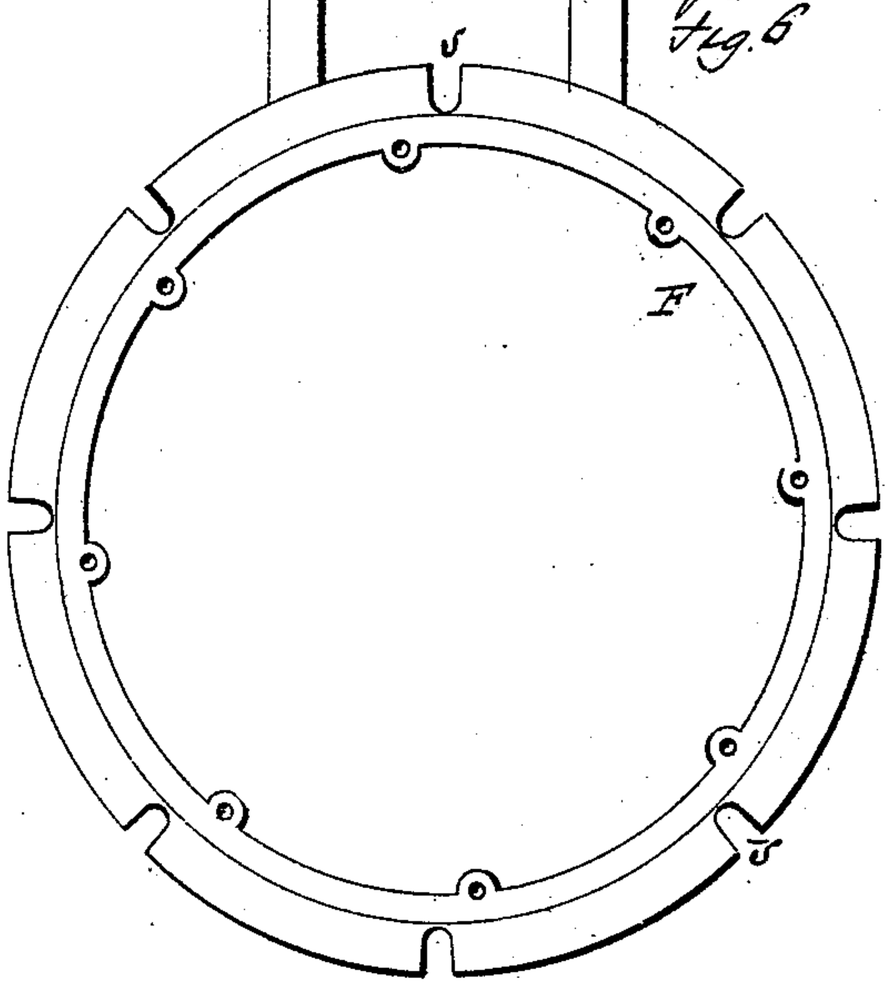
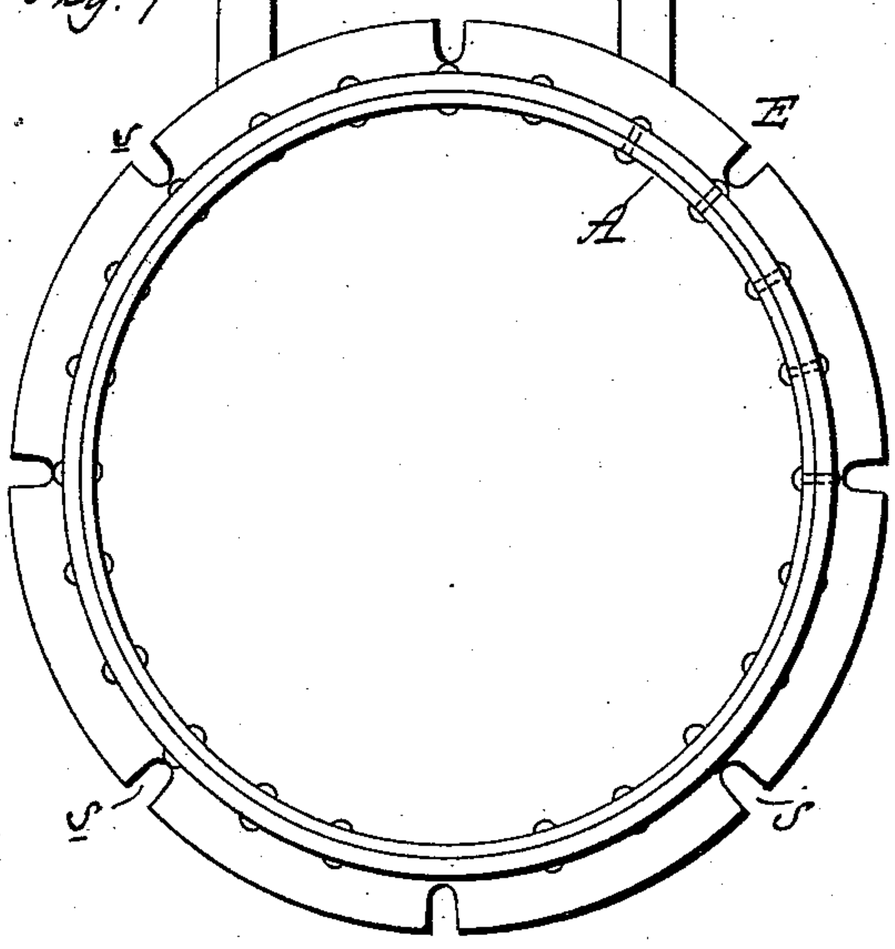


Fig. 7



Witnesses
Geo. F. Downing
S. G. Nottingham

Inventor
Eberhard Koch

By his Attorneys
Leggett and Leggett

UNITED STATES PATENT OFFICE.

EBERHARD KOCH, OF NEW ORLEANS, LOUISIANA, ASSIGNOR OF ONE-HALF TO CHARLES J. ALLEN, OF SAME PLACE.

APPARATUS FOR DISTILLING WOOD.

SPECIFICATION forming part of Letters Patent No. 421,029, dated February 11, 1890.

Application filed May 7, 1887. Serial No. 237,462. (No model.)

To all whom it may concern:

Be it known that I, EBERHARD KOCH, of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Apparatus for Distilling Wood; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in apparatus for the economical distillation of wood to remove the alcoholic and resinous elements therefrom and subsequently carbonize the fiber of the wood for use as charcoal.

Letters Patent of the United States No. 316,794, dated April 28, 1885, were granted to me for an improved apparatus to effect the economical distillation of wood rich in resin, resinous oils, and spirits, to remove this organic matter by the action of superheated steam that is made to permeate the mass of wood fiber in a hermetically-sealed chamber and be led off to a proper condensing-coil. Practical operation of this apparatus demonstrated the necessity of improvement in mechanical features of the patented device to facilitate the continuous operation of the apparatus and remove gaseous products more readily. I therefore made application for patent for improvement in apparatus for wood distillation, filed March 1, 1887.

The object of my present improvement is to perfect the details of the furnace that heats the distilling-retorts.

A further object is to provide a more practical cooling-chamber for the reception of the cars after the carbonizing process is completed.

A further object is to furnish a superheater that is adapted to supply the highly-superheated steam to one or several retorts suitably arranged to work in series or singly, as may be required.

With these objects in view my invention consists in certain features of construction and combinations of parts that will be hereinafter described, and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 is a side elevation of the connected apparatus for wood distillation. Fig. 2 is a front end elevation of the wood-distilling apparatus, showing the relative position of the superheater. Fig. 3 is a plan view of a battery of the retorts set in series and a corresponding series of cooling-chambers with track-connections between these separate chambers on the same horizontal plane. Figs. 4, 5, 6, and 7 are enlarged details of the retort.

In Fig. 1 a view of one of the retorts with its furnace and connected parts is shown, and as several are generally employed that are arranged parallel to each other and walled in with masonry to provide suitable furnaces, the construction of one of these furnaces will answer for the series, as they are duplicates in regard to proportion and formation of their inclosing-walls.

A represents the retort, which consists of a cylindrical or square chamber, preferably made of sheet-iron, rolled steel, or cast-iron of proper thickness to insure stability. The diameter of the retort is such as to permit the introduction in it of a car in which wood to be distilled is placed. The retort A is supported horizontally by any suitable means to permit its free expansion and contraction without disturbing the surrounding walls. Retort A is surrounded by a masonry wall B, which is of such a proportionate length and width as to afford a space for the free circulation of heat around the exterior surface of the metallic retort A. The wall B, that forms the inclosing-chamber for retort A, is arched and returned to closely conform to a flanged ring E, which is riveted to the shell of the retort A at its front end. The enveloping masonry chamber B is thus sealed at its front end by its joint with the ring E. The ring E has its front face of such a breadth as to afford a good bearing-surface for the hinged door F, which is secured to swing upon ears integral with or rigidly secured to the ring E. The door F may be made to swing sidewise as an ordinary door, or be hinged at the top edge to swing upwardly. The door F is preferably faced true to correspond with the true

face of the ring E, and has an asbestus ring interposed between these surfaces to afford a tight joint. The ring E and door F have their peripheral edges notched to form open slots *s s*, &c., into which bolts of proper size are introduced to clamp the door F and flange E together. As will be seen, this construction of the door F and its connection with the front of the retort A provides a ready means of access to the interior of the latter for the introduction and removal of cars loaded with wood to be distilled, or the carbonized wood that is to be removed into a cooling-chamber, as will be explained.

Beneath the lower surface of the horizontal metallic wall of the cylindrical retort A the deflector wall or plate G is located. This wall must be such a relative distance below the bottom of the retort A as to afford a flue or heat passage G′ between them. The wall or plate G forms the crown or top surface of the fire-chamber H, and is constructed either of an arch of masonry preferably with a level top surface, or piers of masonry may be provided that extend to a suitable height to receive a flat metallic plate, which is thus made to extend from one side wall of the furnace to the other and provide a deflector to prevent direct contact of the flame proceeding from the fire-chamber H, that is placed near the front wall of the furnace B.

The deflector G is made, preferably, of the same length as the retort A, and in consequence the heat arising from the combustion of fuel in the fire-chamber H will pass around the rear edge of this deflector-wall and enter the flue G′, surround the lower half of the cylindrical shell A of the retort, pass forward to the front portion of the retort, thence upwardly and rearwardly through the spaces G^2 afforded above and around the upper portion of the retort, thence downwardly at the rear of the retort and outwardly to enter the flue J beneath an evaporating-pan, and from this flue enter the base of the chimney K, that forms the draft-flue of the fire-chamber H. It will be seen that by this construction of the furnace B the heat-currents are made to envelop the entire surface of the retort, while its lower surface is afforded adequate protection against the direct contact of flame from the fire-chamber I.

The construction of the stand-pipe L, water-jacket L′, and condenser L^2 has been previously described in my application for patent, dated March 1, 1887, and does not form any part of my present invention.

In order to furnish superheated steam in requisite quantity to the several superheating-retorts of the battery or series, a vertical chamber M is erected near to the steam-generator N, and also convenient to the battery of retorts. This chamber or jacket is provided with one or more coils of pipe M′, that are placed within the chamber M in proper position to receive heat from a fire-chamber below it, the coils M′ being connected to the steam-generator N, and by a main pipe and branches therefrom to separate retorts of the battery or series, the supply-pipe O and branches O′ having proper valves to admit steam into any or all of the retorts in the series, as may be required. By this arrangement and combination of the superheater with the retorts A the operation of superheating steam may be economically and efficiently conducted for one retort, or any number that may be in series, so that the operation of the distilling-plant is under perfect control, and any number of retorts can be operated at once, as may be expedient or desirable.

When the charge of wood in a retort is thoroughly carbonized, the car containing it must be removed to permit a fresh car-load to take its place and undergo distillation. If the car were exposed for any length of time to the atmospheric air, the highly-heated contents would ignite and be consumed. To avoid the liability of combustion just mentioned a cooling-chamber P, of sheet-iron or brick, is constructed for each retort, and these buildings are placed directly opposite their respective retorts in line with them, so that a railroad-track made to reach from the interior of a retort A will extend into its cooling-chamber to afford an easy means of transport of the wood-car from the retort to the chamber, as shown in Figs. 1 and 3 of the drawings, and it will be noticed in Fig. 1 that the tracks are on the same horizontal plane between the retorts and cooling-chambers.

A turn-table R is placed in each track at a point midway between the cooling-chambers and retorts, to facilitate the introduction of cars into the retorts, as a railroad-track S is laid in the avenue between the chambers and retorts, upon which the cars are transported to and from the distilling-plant.

It should be stated that a tight door is affixed to each cooling-chamber, to afford a means of closing them air-tight when the cars that contain carbonized wood are placed in them to cool.

Many slight changes might be made in the constructive features of this improved wood-distilling plant without exceeding the scope of my invention; hence I do not wish to limit myself to exact methods of construction shown; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace-chamber for wood-distilling apparatus, the combination, with a metallic retort surrounded by walls, of a flame-deflector for directing the heat and products of combustion to the rear of the retort, a return-flue surrounding the lower portion of the retort for conducting the heat to a point near the front of the retort, and flues or spaces for conducting the heat rearwardly

over the retort and downwardly behind the retort to a stack or chimney, substantially as set forth.

2. In an apparatus for distilling wood, the combination, with a furnace, a retort therein, flues leading under, over, and behind said retort, and a cooling-chamber in a plane with and opposite the retort, of a railroad-track extending from the retort into the cooling-chamber, and a turn-table located between the retort and cooling-chamber, substantially as set forth.

3. In an apparatus for distilling wood, the combination, with a furnace, a retort therein, a flame-deflector for directing the heat and products of combustion to the rear of the retort, a return-flue surrounding the lower portion of the retort for conducting the heat to a point near the front of the retort, and flues for conducting the heat and products of combustion rearwardly over the retort and downwardly behind the retort to a chimney, and a cooling-chamber located opposite the retort, of a track extending from the retort into the cooling-chamber, and a turn-table located between the retort and cooling-chamber.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EBERHARD KOCH.

Witnesses:

JAMES F. HENRY,

CHAS. W. LEWIS.