

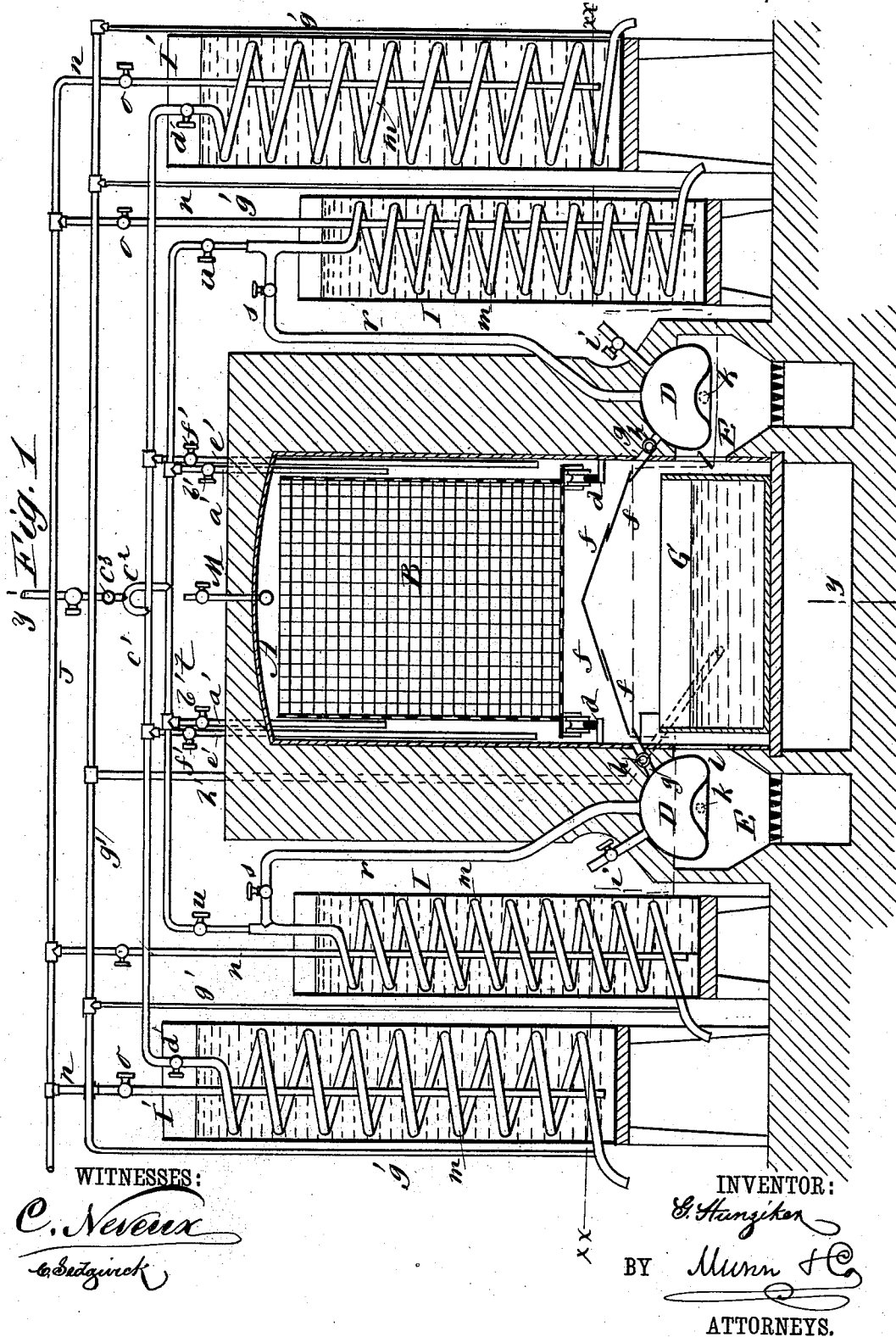
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G. HUNZIKER.
APPARATUS FOR DISTILLING WOOD.

No. 375,490.

Patented Dec. 27, 1887.



(No Model.)

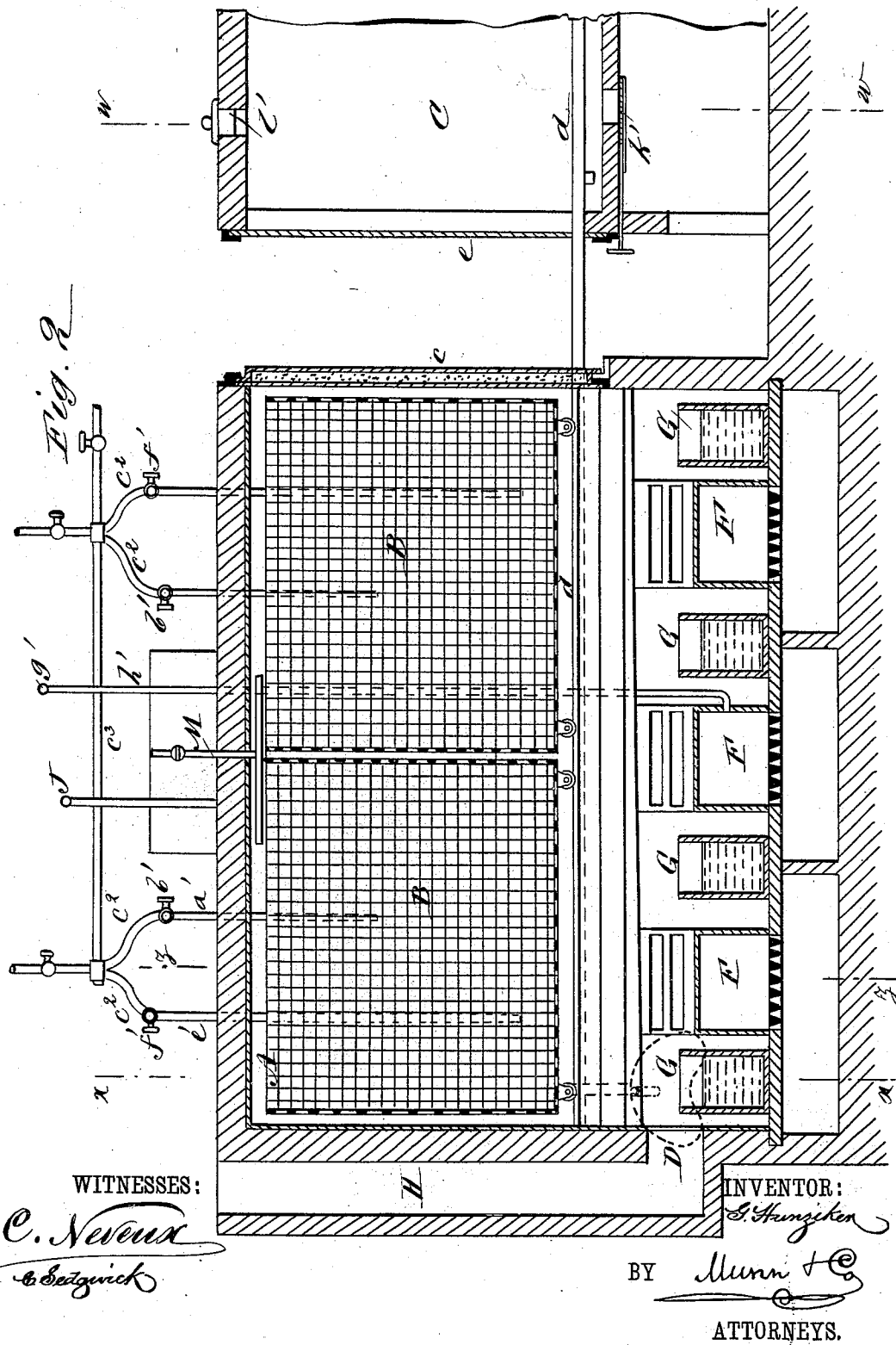
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WITNESSES:

C. Neveu
 & Sedgwick

C. Sedgwick

INVENTOR:

G. Hunziker

BY

Munn & Co

ATTORNEYS.

(No Model.)

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Fig. 4

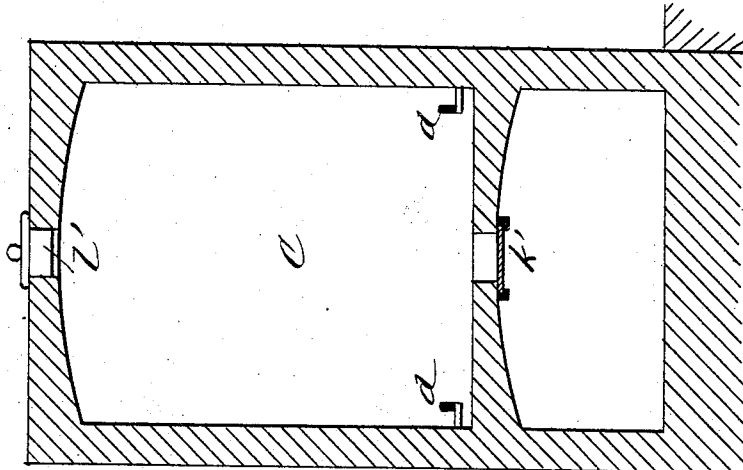
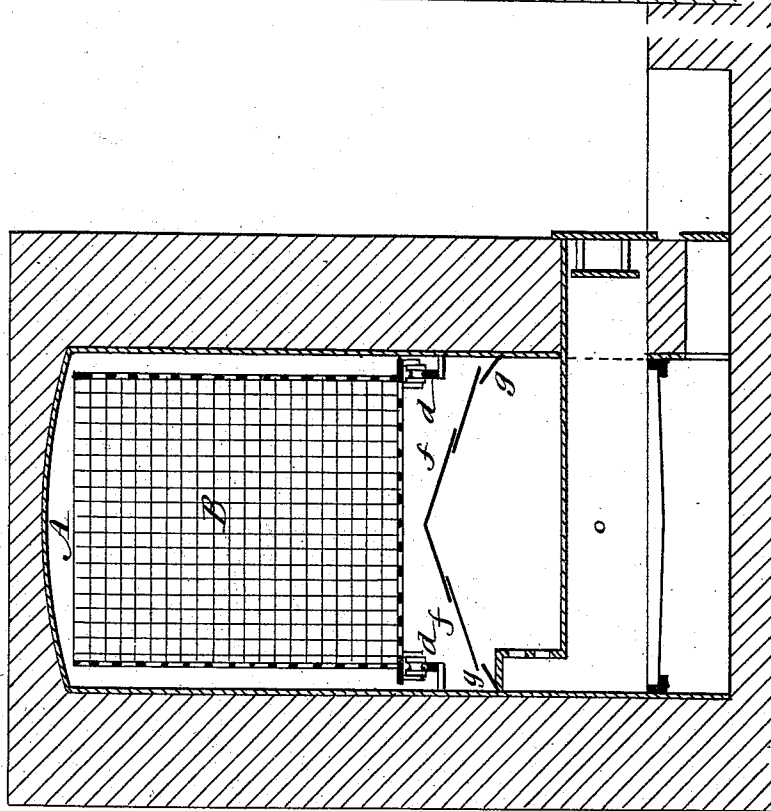


Fig. 5



WITNESSES:

C. Xeroux
L. Sedgwick

INVENTOR:

G. Hunziker

BY

Munn & Co

ATTORNEYS.

(No Model.)

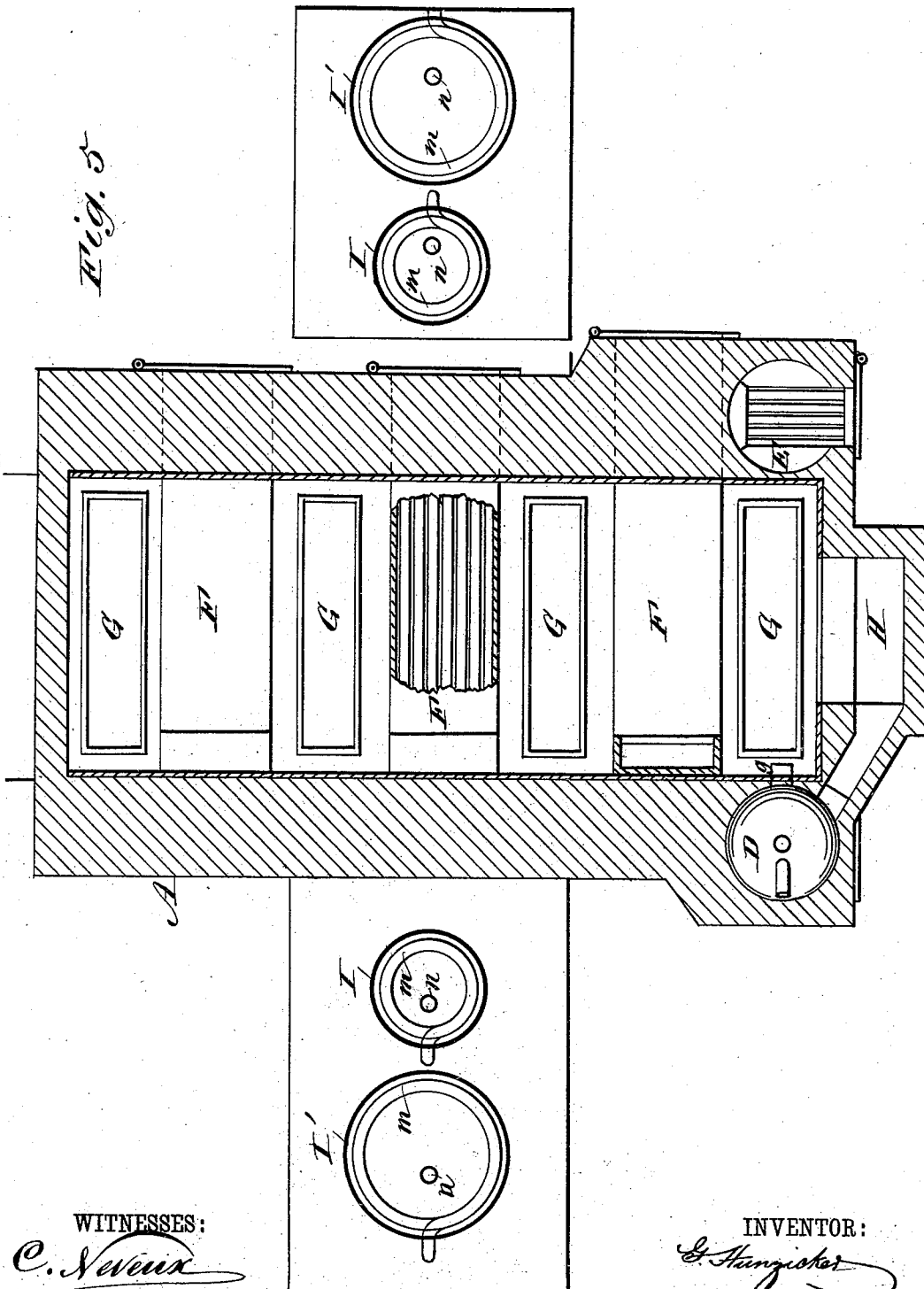
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Fig. 5



WITNESSES:

C. Seix
C. Sedgwick

INVENTOR:

G. Hunziker

BY

Munn & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

GASPER HUNZIKER, OF CLOVERDALE, CALIFORNIA.

APPARATUS FOR DISTILLING WOOD.

SPECIFICATION forming part of Letters Patent No. 375,490, dated December 27, 1887.

Application filed July 12, 1887. Serial No. 244,076. (No model.)

To all whom it may concern:

Be it known that I, GASPER HUNZIKER, of Cloverdale, in the county of Sonoma and State of California, have invented new and useful Improvements in Apparatus for Distilling Wood, of which the following is a full, clear, and exact description.

This invention, while it has certain features in common with other processes and apparatus for distilling wood, including the apparatus for which Letters Patent No. 78,743 were issued to me on June 9, 1868, essentially differs therefrom in several respects. It, for instance, embraces a cage on wheels for running the wood to be distilled on rails into an oven having a specially-constructed bottom to aid in the passage of the heat to the oven and escape of the products of distillation, but it includes various novel features and combinations of parts in connection with the oven and its connected still or stills, substantially as hereinafter described, and pointed out in the claims, whereby a much more perfect result is obtained; and not only is the same apparatus capable of being used for distilling turpentine from pine wood and a better-colored rosin produced, but is also applicable to the distilling of various other woods—as, for instance, cedar-oil from cedar-wood and wood-alcohol from oak, beech, and other hard woods—as herein set forth.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a vertical section upon the line *x x* in Fig. 2 of an apparatus embodying my invention. Fig. 2 is a vertical section of the same upon the line *yy* in Fig. 1. Fig. 3 is a section upon the line *z z* in Fig. 2, and Fig. 4 a vertical section upon the line *w w* in Fig. 2. Fig. 5 is a sectional plan view on the irregular line *xx xx* of Fig. 1.

A indicates the oven, into which the open-work carriages or cages B, carried by wheels and containing the wood to be distilled, are run upon opening a door or doors, *c*, said carriages traveling upon rails *d d*, which connect with or are extended into a vault, C, at the front end of the oven, said chamber or vault being provided with a door or doors, *e*, and

serving to receive from the oven the charcoal or wood after it has been distilled. The bottom *f* of the oven is of a double or reversely inclined construction and is composed of a series of open overlapping plates, which connect on opposite sides of the oven with gutters or ducts *g*, provided with cocks *h*, and terminating in retorts or receivers D D. These retorts are each provided with a supply duct and cock, *i*, for charging them from the outside, when required, and with a discharge cock or pipe, *k*. Said retorts or receiving portions of the stills are here represented as being heated direct by means of fire-places E or steam-coil, but they might be heated indirectly by diverting the heat—as, for instance, through side openings, *l*, controlled by suitable dampers—from the flues or heating-chamber of the fire-places or furnaces F, which char or heat the wood under distillation in the oven or, rather, carriages B therein. These fire-places E and F, it will be seen, are distinct from each other.

G G are water-tanks arranged in suitable proximity to the fire-places F to supply vapor to the charge in the carriages B.

H is the chimney for the escape of the products of combustion from the furnaces and to give the necessary draft.

I I and I' I' are the condensers of the stills, and *m m* the worms therein.

J is a water-supply pipe for supplying cold water by branch pipes *n n*, controlled by cocks *o o*, to the condensers at or near their bottom.

The worms *m m* of the inner condensers, I I, are connected with the retorts D D by pipes *r r*, having cocks *s s*, and are connected with each other by a pipe, *t*, provided with cocks *u u*, and with the interior of the upper portion of the oven A by pipes *a' a'*, having cocks *b' b'*.

The worms *m m* of the outer condensers, I' I', are connected with each other by a pipe, *c'*, controlled by cocks *d' d'*, and with the interior of the lower portion of the oven by pipes *e' e'*, having cocks *f' f'*. The pipes *e' t* are connected with each other by branch pipes *e''* and with a pipe, C³, connecting the several series of pipes *a' e'*.

The outlet portions of the several worms *m m* are connected back of their discharge ends by a pipe or pipes, *g' g'*, with each other, and

by a branch pipe, *h'*, with the furnace of the oven, for the purpose of conducting to the furnace combustible gases escaping through the worms.

5 M is a pyrometer applied to the oven A.

In the application of the apparatus to the distillation of pine-wood, mainly for the extraction of the turpentine and the making of rosin, I first charge the oven A, by the carriages B, with the wood, and the water-tanks G with about eight to ten gallons of water for each cord of wood. The oven-doors are then closed and secured, after which the fires are started in the fire-places F and the oven heated 15 up to about 275° Fahrenheit, and kept at that heat, as indicated by the pyrometer M. The condensers I I', of course, are previously filled for the purpose. This being done and the suitable connections being opened, the resinous mass from the wood will soon begin to trickle down the inclined bottom *f* of the oven and to pass into the copper retorts D D, when turpentine will speedily make its appearance at the outlets of the worms *m m* of the first pair 25 of condensers, I I, to which the vapors, for the time being, are exclusively directed, connection being cut off with the worms in the other condensers, I' I', and connection now is also cut off between the retorts D D and the worms 30 in the first pair of condensers, I I, and the passage of the vapors, such little as there are, stopped from going over from the retorts D D, and said vapors allowed to go back into the oven A and to be carried by the pipes *a'* and *t*, on opening the cocks with which said pipes are 35 provided, to the worms *m m* in the condensers I I. After about two and a half to three hours of such treatment the turpentine will begin to assume a yellowish cast, and rosin-oil, mixed with some pyroligneous acid, commence to 40 make its appearance. At this stage of the process the tarry matter coming from the inclined planes or oven-bottom *f* must now be stopped from running into the retorts D D, and, by turning suitable cocks, must be directed to a tar-receiver. The fires are now 45 started under the retorts D D and the vapors from the latter directed to the first condensers, I I, by opening the cocks *s*, and the vapors from the oven A passed by the pipes *e' c'*, on opening the cocks *f' d'*, to the worms of the second condensers, I' I'. At this stage the rosin in the retorts D D is parting with all the turpentine which was left and rosin-oil makes 50 its appearance, and the vapors are then also directed, by opening the cocks for the purpose, to the second condensers, I' I', and the process continued until the rosin is boiled enough, when the fires under the retorts D D are withdrawn. Here it should be observed, 60 however, that so soon as the fires under the retorts D D have been started, as before described, the heat in the oven A is increased until the pyrometer M indicates 500° Fahrenheit, or thereabout. This is the most effective charring heat to produce the largest amount of charcoal, and such increased heat

is kept up until the wood is thoroughly charred. By allowing some of the gases or smoke to escape from the oven—as, for instance, by a pipe 70 applied to the top of the oven—it will readily be seen by the color of the escaping gases whether the wood is charred sufficiently or not. Such color should be a light blue, and the process should be kept up, showing this color, for 75 about one hour, which will make a very equal charcoal all through. During this high-heat part of the process a large quantity of gas will be produced and condensed in the second and larger condensers, I' I'. The condensed mass 80 will be principally pyroligneous acid, creosote, and rosin-oil, which, in some localities, is of value. It can, if profitable, be redistilled after the rosin has been discharged from the retorts D D during the charring process, 85 such distillation being made in a separate condenser, and, preferably, in a separate retort, or it may be done in the retorts D D. The result of this latter distillation gives three layers of the product, the bottom layer being 90 crude creosote, the next layer pyroligneous acid, and the top layer a light oily substance, often coated with a film of a white sheet of paraffine.

At the conclusion of the whole process and 95 after the oven A is opened, the carriage or carriages B, containing the charcoal, are run into the air-tight chamber C until the heat of the charcoal has subsided, when it may be cooled off by opening suitable vents for the introduction and passage of air—as, for instance, by opening a valve, *h'*, in the bottom 100 of said chamber and removing a plug, *l'*, in the top of it. While this is being done, however, one or more other carriages loaded with prepared wood are run into the oven to repeat or continue the process, which, if the wood is 105 cut short enough, can be repeated every twenty-four hours, if the oven be a large one, a smaller oven working somewhat faster. 110

In distilling hard wood by the apparatus—as, for instance, oak or beech—the process is somewhat varied, the first heat not exceeding 250° to 260° Fahrenheit for about two hours. The product of condensation by the first part 115 of the process when redistilled produces the best wood-alcohol, and is drawn off separately. The same retorts, D, can be used for such redistilling during the process. After the heat for charring the wood is started, it can 120 safely be kept up to 550° Fahrenheit until the charring is completed. The condensed substance is redistilled and more wood-alcohol produced, as well as creosote and pyroligneous acid, and out of this pyroligneous acid 125 acetate of lime and acetic acid can be produced. To make the wood-alcohol more salable, before putting it on the market it should be rectified.

In distilling cedar-wood to produce cedar-oil the process is similar to that pursued for 130 distilling hard wood, with this difference: The quantity of water in the tanks G to be evaporated during the first part of the process

must be larger, the redistilling being done with a great deal of water to get the oil pure, and the heat for nearly four hours should be kept at no more than 260° Fahrenheit during the distilling of the oil. The charring part of the process is the same as for pine-wood.

The steam or vapor derived from the tanks G serves to have a diffusing effect in the first part of the process, and in distilling pine-wood prevents discoloration of the rosin. The charging of the retorts, too, to finish the redistillation of the rosin is effected by gravity.

The pipes *a' e'* within the oven, it will be observed, receive the vapors at different points and altitudes. This will serve to secure an equal heat, and said pipes can be closed at pleasure to secure equal charring all through the mass of wood under treatment.

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

1. In an apparatus for distilling wood, the combination, with the furnace-oven and still connected therewith, of water-tanks arranged below the oven and near the furnace, substantially as herein shown and described.

2. In an apparatus for distilling wood, the combination of an oven having its bottom inclined from the center to each side, a retort at each side of the oven, and ducts leading from the lower outer edges of the oven-bottom to the said retorts, substantially as herein shown and described.

3. In an apparatus for distilling wood, the combination, with the oven and water-tanks

for supplying vapor thereto, of inner condensers connected together, pipes leading from the connecting-pipe down into the oven, outer condensers connected together, and pipes leading from the connecting-pipe and extending down into the oven a greater distance than the pipes from the pipe connecting the inner condensers, substantially as herein shown and described.

4. In apparatus for distilling wood, the combination of the oven A and its furnaces F, the open-plate oven-bottom *f*, the retorts D, connected with said oven, the condensers II', with their worms *m*, and the pipes *r, t, a', e', e', and g' h'*, with their respective cocks or valves, essentially as shown and described.

5. In an apparatus for distilling wood, the combination of an oven, retorts communicating with the oven, and inner and outer condensers connected with each other, the inner condensers being connected with the retorts, substantially as herein shown and described.

6. In an apparatus for distilling wood, the combination of an oven, retorts communicating with the oven, inner and outer condensers connected with each other, the inner ones being connected with the retorts, and pipes leading from the pipes connecting the condensers down into the oven, substantially as herein shown and described.

GASPER HUNZIKER.

Witnesses:

P. K. YONGE,
J. R. BROWN.