No. 737,994. PATENTED SEPT. 1, 1903.

C. W. BILFINGER & C. F. HALLOCK.

APPARATUS FOR THE MANUFACTURE OF TURPENTINE.

APPLICATION FILED APR. 25, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

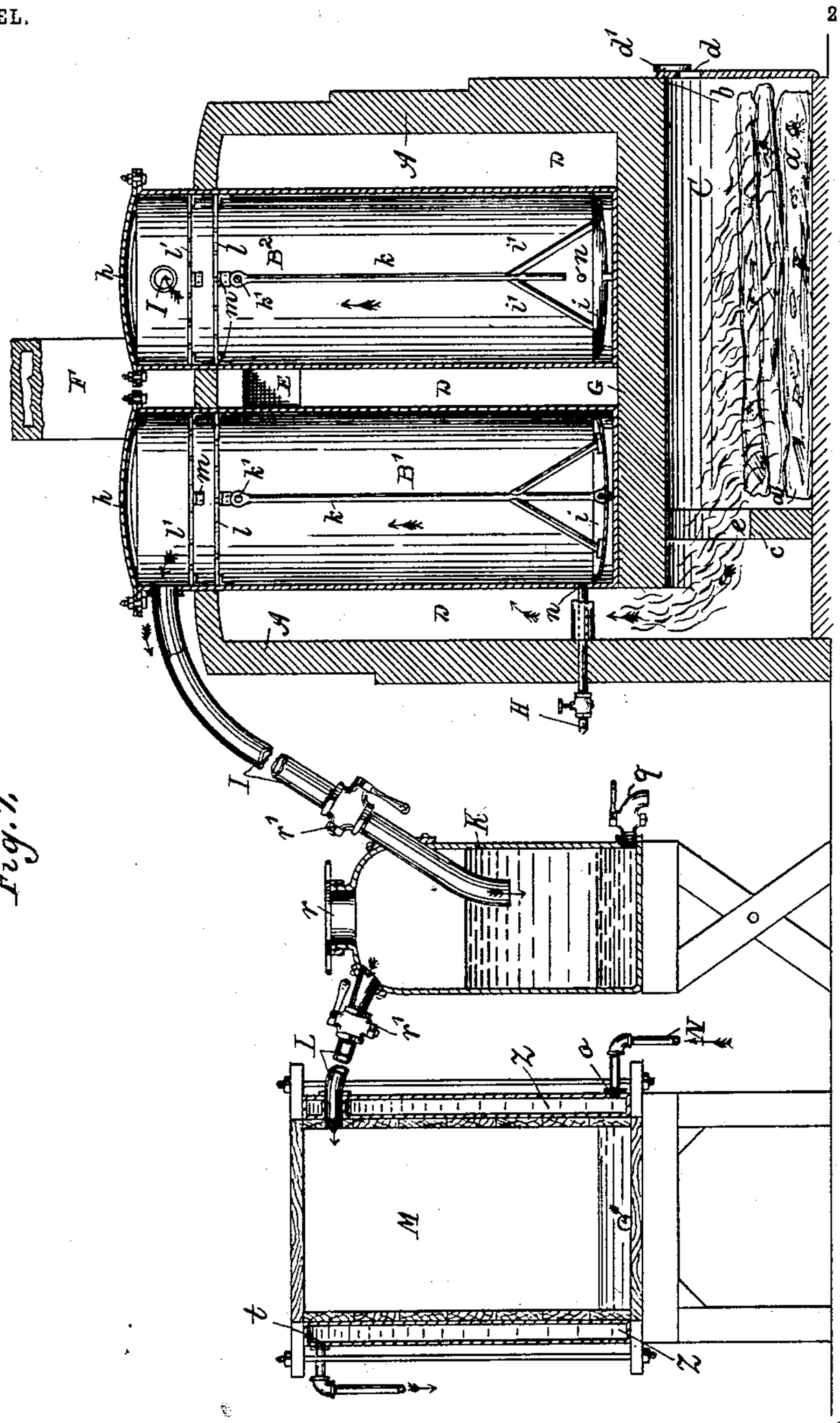

Fig. 1.

Witnesses:

John A. Paulson, by
Mastelmke

Carl W. Bilfinger
Clarence F. Hallock
Inventors

Schreiter & Mathews.
their Att'ys

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

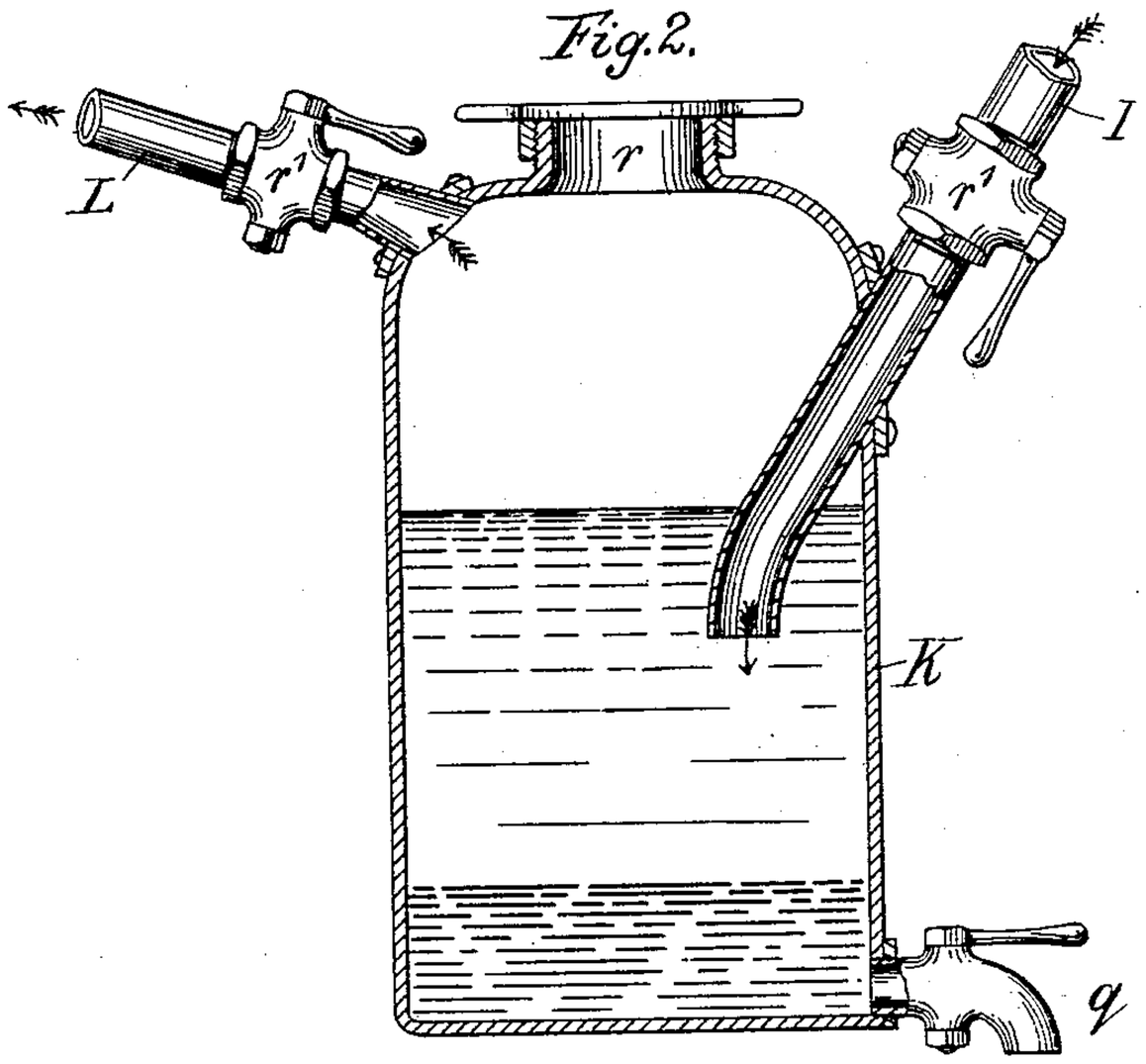
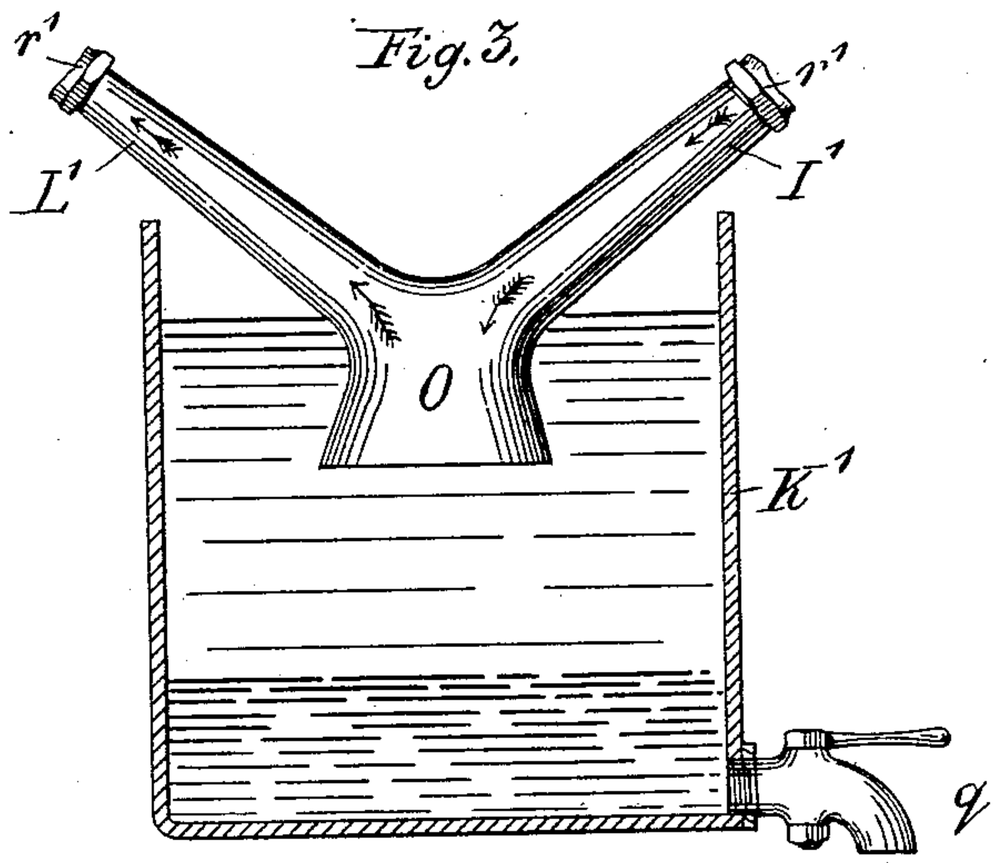


Fig. 3.



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UNITED STATES PATENT OFFICE.

CARL W. BILFINGER AND CLARENCE F. HALLOCK, OF MOULTRIE, GEORGIA.

APPARATUS FOR THE MANUFACTURE OF TURPENTINE.

SPECIFICATION forming part of Letters Patent No. 737,994, dated September 1, 1903.

Application filed April 25, 1903. Serial No. 154,289. (No model.)

To all whom it may concern:

Be it known that we, CARL W. BILFINGER and CLARENCE F. HALLOCK, both of the city of Moultrie, county of Colquitt, and State of Georgia, have invented certain new and useful Improvements in Apparatus for the Manufacture of Turpentine, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

Figure 1 is an elevation partly cross-sectional view of an apparatus constructed according to our invention. Fig. 2 is a sectional view, enlarged detail, of the separator; and Fig. 3 is a similar view like Fig. 2, showing a modified construction of the separator.

Our invention relates to the manufacture of turpentine by distilling wood and other substances containing such ingredients; and it consists of the hereinafter-described apparatus, and more particularly of the improvements embodied in the construction of such an apparatus, as are hereinafter more fully described, and pointed out in the claims.

The apparatus comprises an oven A, constructed of masonry. The oven consists of a chamber D, where retorts B′ and B² are set up, and the fire-box C, arranged underneath, as shown in the sectional view in Fig. 1 of the drawings. Fire-box C is separated from the chamber D by the arch G, supported on bridge-wall *c* and forming a platform upon which retorts B′ and B², &c., are set. This arch G does not extend through the whole width of the oven, there being left between its end and the rear wall of the oven a passage for the combustion-gases from the fire-box C through aperture *e* of the bridge-wall and into chamber D, as indicated by arrows in Fig. 1 of the drawings. The bottoms of retorts B′ and B², resting upon the arch G, are purposely excluded from direct contact with the combustion-gases.

The bottom of fire-box C, between the door and bridge-wall *c*, is laid with bricks, and the fuel material is deposited immediately thereon. There is no grate, and draft-air enters the fire-box through apertures provided in the upper part of the fire-box door above the fuel. The draft is regulated by dampers *d′*, which are of the same construction as those used on ordinary furnace-doors.

The described construction of the fire-box C is advisedly selected for our apparatus. We have found it best suitable for the attainment of the objects of our invention. The object of so constructing the fire-box is to produce and securely maintain a low degree of heat, no higher than necessary to extract oily vapors of such oils and of such volatile substances as produce pure turpentine when condensed and to prevent the evaporation of heavy oils and such decomposition of the distilled material as would result in producing gas.

In apparatus for manufacture of turpentine wood and the residue of distillation are used almost exclusively as fuel. Such fuel is to be used in our apparatus, that being the most economical utilization of it under the present conditions of this industry. Such fuel material would be rapidly consumed if used in a furnace provided with a grate and would produce a much higher temperature while it lasts, and, again, such firing would require a frequent replenishing of the fuel-supply, and as each replenishing of fuel varies materially the temperature of the oven it thus affects detrimentally the progress of the distilling process, since the variations in the intensity of the heat produce conditions which are detrimental to an efficient and economical utilization of the raw material. It results in overdistillation—that is, an evaporation of the heavy oils, production of gases, decomposition of valuable substances and of such substances as deteriorate the quality of the turpentine product. By the use of such a fire-box in the apparatus herein described we are enabled to produce such a partial decomposition of wood as is required for the most economical manufacture of turpentine and the mentioned detrimental effects are avoided. By our improved apparatus the process of the manufacture of turpentine may be carried on continuously by unskilled labor without such risks as would be involved in the running by such unskilled labor of apparatus requiring the constant attendance of expert help for regulating the temperature and making the necessary changes from one stage of the process to another.

Retorts B′ and B² are cylindrical vessels

made of boiler-iron and are set in upright position on the arch G, their upper ends projecting from twenty to twenty-four inches above the top of the oven. They are closed by removable lids *h* to facilitate their charging with material to be distilled and the discharge of the residue.

In each retort there is provided a lifter comprising a plate *i*, joined by braces *i'* to rod *k*, having an eye *k'* at its upper end. This lifter is inserted in each retort before the material which is to be distilled is dumped into it. When the distillation is completed, the residue is removed from the retort by inserting in the eye *k'* the hook of a lifting apparatus and then hoisting the lifter. Thus all residue contained in the retort is removed by one operation.

Near the upper ends of retorts B' B, &c., perforated screens *l* and *l'* are supported on brackets *m*. These screens are located beneath the outlet-conduits I, and their object is to prevent the rising to the top of the retort of any smudge or other particles of the distilled materials and to prevent such particles from being carried into the outlet-pipes I with the vapors. As will be farther on explained, we employ steam to expand the vapors of the oils and to force them from the retort. The steam, being forcibly injected into the retorts, causes smudge, if there is any, and other particles of the distilled material to rise with the vapors. Such particles of smudge and of other materials impair the quality of the product and must therefore be prevented from entering the conduits I. This we effect by the screens *l* and *l'*. The perforations in those screens are arranged according to the material used for distillation and are preferably so located in each screen as to alternate with the perforations of the other screens. The resinous and oily vapors adhering to the screens render them sticky to a very high degree, and thus all particles of smudge and other impurities are caught on the screens. Screens *l* and *l'* must be removed every time the heater is recharged, and they can then be readily cleaned by exposing them to heat while the retorts are being recharged.

In a suitable place some short distance above the upper level of platform G the wall of the oven is perforated, and steam-conduit H is inserted therein. This conduit is connected, by one of the branches *n*, with the interior of each retort, preferably near the bottom thereof, and steam is injected into the retorts at intervals. The object of injecting this steam is to "raise (expand) the vapors" produced by the distillation and to drive them into the conduits I at the tops of the retorts. The oils producing turpentine distill at a temperature of from 300° to 320° Fahrenheit. By the injection of steam into the retort these vapors are expanded, or, as it is termed, "raised," without overheating them and driven through the conduit I into the separator K. The steam imparts to the vapors an impetus, driving them toward the top and out of the retorts, and supplies the necessary pressure, which otherwise would have to be produced by the application of a higher degree of heat upon the retorts and which would result in partial decomposition of the richest vapors of the oils. The injection of steam near the bottom of the retorts also facilitates the extraction of such lighter oils and prevents the carbonization of the materials in the retort.

Conduits I connect the interior of each retort with the separator K. (Shown in enlarged detail view in Fig. 2.) Conduits I are arranged in a downwardly-sloping direction from the top ends of the retorts B' B², &c., to the separator K. The latter is a closed vessel wherein conduits I enter. Near the top is connected therewith another conduit L, communicating with the condenser. A charging-aperture *r* and an outlet-pipe *q*, with a stop-cock, complete the arrangements of the separator. Conduits I and L are provided with stop-cocks *r'* in suitable positions.

The object of the separator K in our improved apparatus is to eliminate from the vapors all of the so-called "heavy" oils and tar, if any should be driven out from the retorts with the vapors of the oils. The separator is partly filled with paraffin-oil, and the termini of conduits I are diverted into the paraffin-oil some distance below the level thereof. This paraffin-oil is the mineral oil derived by pressing paraffin-wax and commonly used in manufacture of lubricating-oil and is heavier than turpentine-oils and lighter than so-called "heavy" oils or tar. Moreover, paraffin-oil heated to a certain temperature has the capacity of absorbing tar and heavy oils, while it does not absorb any turpentine-oils. The vapors of heavy oils and tar condense at a considerably higher temperature than the vapors of oils producing turpentine. Paraffin-oil requires approximately 600° Fahrenheit to evaporate. The paraffin-oil in the separator K is heated by the inflowing steam and heat vapors, but not beyond the boiling-point of the heavy oils. Thus when the vapors from the retort enter the separator K the vapors of heavy oils, tar, and other impurities are condensed and absorbed by the paraffin-oil, while the vapors of oils producing turpentine remain in their vaporous state, rise above the level of the paraffin-oil, and finally pass through the conduit L into the condensing-box M. Paraffin-oil saturated with the heavy oils and tar is from time to time withdrawn through cock *q* at the bottom of the separator K and is utilized for manufacture of lubricating-greases. Fresh paraffin-oil is supplied from time to time through the charging-aperture *r* in top of the separator. The process of thus separating the vapors of heavy oils and tar from the vapors of turpentine-oil is not claimed here, being reserved as the subject-matter of a separate application for Letters Patent.

The separator K need not necessarily be a closed vessel. In Fig. 3 is shown a modified form of this apparatus, consisting of an open tank K′, filled with paraffin-oil, and a three-way conduit connected therewith. The branch I′ is the conduit from retorts B′ B^2, &c., and the branch L′ is the conduit connecting with the condensing-box M. The third branch O enters into the tank K′, its terminus reaching beneath the level of the paraffin-oil filled therein. In this modification the vapors are not discharged into the paraffin-oil. They only pass along the surface of the paraffin-oil within the conduit. This arrangement will be found sufficient where the distillation is not carried on under a high pressure; but the other system of separator, as above described, is preferable.

Conduit L conveys the purified vapors of turpentine-oils from the separator K to the condensing-box M. This condensing-box is a wooden vessel surrounded by a metallic jacket Z, connected with a cold-water conduit N, the inflow of the cooling-water being at *o* near the bottom of the jacket and the outflow connection being at *t*. The cooling-water is driven in and circulated in the jacket by a pump and of course may be used over again. The water-conduits are provided with stop-cocks in suitable places for governing and regulating the flow of cooling-water. In this condensing-box the purified vapors of turpentine-oils are condensed. The condensed product is pure turpentine. It accumulates in the condensing-box M and is withdrawn from time to time.

We claim as our invention—

1. An apparatus for the manufacture of turpentine comprising an oven; a fire-box in the oven; a chamber above the fire-box and separated therefrom by a platform; an air-draft into the upper portion of the fire-box; an opening in the bridge-wall of the fire-box, and between the platform and the rear wall of the oven; and an outlet for the combustion-gases from the chamber; retorts set upon the platform in the chamber and projecting at their upper ends above the top of the oven; steam-conduits leading into the retorts; and conduits for the discharge of the products of distillation leading from the projecting upper ends of the retorts.

2. An apparatus for manufacture of turpentine comprising an oven; a fire-box in the oven; an air-draft inlet into the upper portion of the fire-box; a chamber separated from the fire-box by a platform; an outlet for the products of combustion leading from said chamber; retorts set in said chamber upon the platform projecting at their upper ends above the top of the oven; steam-conduits leading into the lower ends of the retorts; conduits for the discharge of the products of distillation leading from the projecting upper ends of the retorts; and perforated partitions in the retorts below the upper conduits.

3. An apparatus for manufacture of turpentine comprising an oven; a fire-box in the oven; an air-draft inlet into the upper portion of the fire-box; a chamber above the fire-box and separated therefrom by a platform; an outlet for the products of combustion leading from said chamber; a retort set in said chamber upon the platform and projecting at its upper end above the top of the oven; a steam-conduit leading into the lower end of the retort; a conduit for the discharge of the evaporated products of distillation leading from the projecting upper end of the retort; perforated partitions set in the retort below the conduit; a separator connected to the conduit, said separator having an upper filling-opening, and a discharge-outlet at or near the bottom thereof; a condenser and a conduit connecting the separator at its upper end with said condenser.

CARL W. BILFINGER.
CLARENCE F. HALLOCK.

Witnesses:
F. J. BIVINS,
F. A. WADDILL.