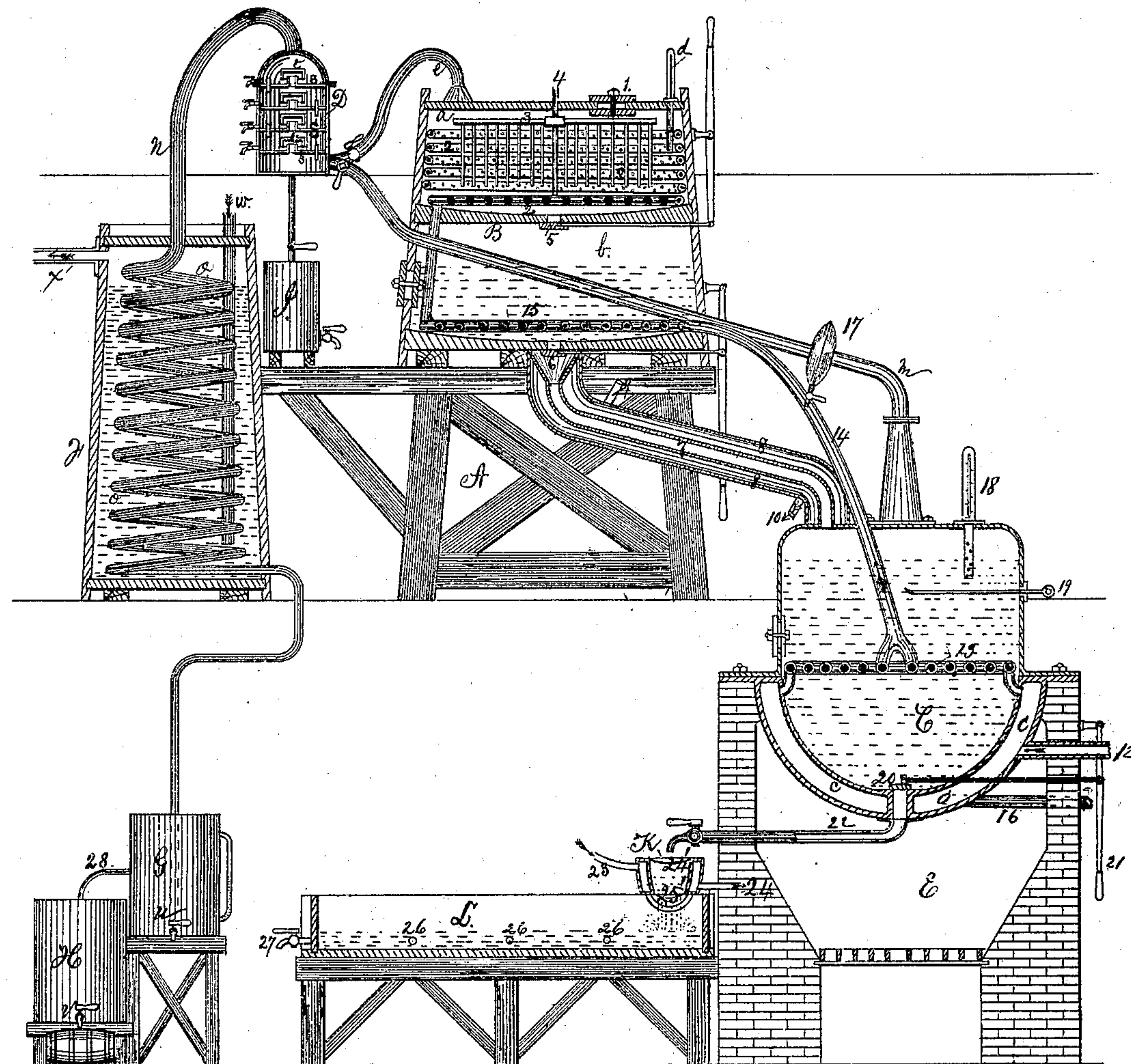


A. K. LEE.

## Improvement in Apparatus for Distilling Turpentine.

No. 131,550.

Patented Sep. 24, 1872.



WITNESSES.

INVENTOR

H. A. Fentress  
L. J. Christen

Archibald T. Lee



# UNITED STATES PATENT OFFICE.

ARCHIBALD K. LEE, OF GALVESTON, TEXAS.

## IMPROVEMENT IN APPARATUS FOR DISTILLING TURPENTINE.

Specification forming part of Letters Patent No. 131,550, dated September 24, 1872.

*To all whom it may concern:*

Be it known that I, ARCHIBALD K. LEE, of the city of Galveston, in the State of Texas, have made certain Improvements in an Apparatus for Distilling Turpentine, and for bleaching the resin or residuum thereof, of which the following is a full, clear, and exact description, when taken in connection with the accompanying illustrative drawing constituting a part of said description or specification.

My present invention relates to an improvement upon my apparatus for distilling turpentine, for which Letters Patent of the United States were granted to me August 1, A.D. 1871, and is designed to embody certain changes from the said invention which a practical experience has demonstrated as necessary. The object sought to be attained by my invention is primarily the production of—from the chips, blocks, or pieces of pine wood, from the sawdust of the same material, or from the crude turpentine which is obtained from pine trees—a perfectly pure, limpid, and a far more superior article of the spirits of turpentine than can be produced by any of the known means in use at the present time; and, secondly, the purification, defecation, and bleaching of the resin or residuum thereof, so as to produce in the highest degree the most desirable, marketable, and therefore profitable, article of resin for the requirements of commerce, manufactures, and the arts. My improvement is as simple in construction as any ordinary spirit-distilling apparatus, and accomplishes the results for which it is designed to the extent of producing, in an economical and effectual manner, an article of turpentine perfectly inodorous and entirely free from the pyroligneous acids and other impurities which usually pertain to the spirits of turpentine produced in the stills as at present constructed and in general use throughout turpentine-producing countries. My improvement, moreover, produces, in the process of the distillation of the turpentine as above mentioned, a residuum or resin perfectly divested of all those discolorations, foreign substances, and other impurities which so much depreciate the value and usefulness of common resin for the purposes of the arts, manufactures, or commerce. For the reasons above stated my invention becomes of infinite value, not only to the manufacturers of the

spirits of turpentine and resin, but to the public in general.

An important feature of my invention, as will be hereinafter explained, is, that the process of distillation and production of the results above mentioned, when once commenced, are uniform, uninterrupted, and continuous, so long as the crude material is supplied thereto.

The construction, arrangement, and mode of operation of my improvement will be more readily understood by referring to the drawing, whereon all that pertains thereunto is plainly and clearly shown, and whereon it is shown mainly in vertical section.

A is a frame-work of timber, upon which is placed the receiving and heating receptacle B, which is divided into two chambers, *a* and *b*. The said receptacle B is provided with a man-hole, 1, through which, at intervals, is received the raw or crude turpentine into the said chamber *a*, where it is heated and thinly liquidized by means of steam emitted in jets from the steam-pipe coil 2, therein continued from the superheating steam-chamber *c* placed under and constituting a part of the evaporating vessel or still C. The process of heating and thinly liquidizing the crude turpentine received into the chamber *a*, as aforesaid, is furthermore facilitated by stirring the said crude turpentine with the revolving rake 3, which operation is performed by hand or steam power applied to the upper extremity of its vertical shaft 4. The charge of crude turpentine thus stirred, heated, and liquidized to the extent necessary, is allowed egress from the said chamber *a* through the slide-valve 5, and is received into the aforesaid chamber *b*, whence, by means of the slide-valve 6, it may be drawn, at the pleasure of the operator or as required, directly through the supply-pipe 7 into the said evaporator or still C. Surrounding the said supply-pipe 7 is a steam-jacket, 8, which receives steam by an inlet steam-pipe, 9, connecting with the steam-boiler, not necessarily shown on the drawing, because constituting no part of my invention. The condensed steam of the said steam-jacket 8 is allowed egress therefrom at will through the outlet-pipe 10, which must be provided with a stop-cock for this purpose. The object of thus surrounding and inclosing the said supply-pipe 7 with steam, is to maintain at all times the



liquid resin contained therein at the same temperature as that contained in the aforesaid chamber *b*, whence it is drawn. The chamber *a* is furthermore provided with a thermometer, *d*, which is intended to indicate the degree of temperature of the crude turpentine therein contained, to the end that the operator may regulate the supply of steam thereto, and thus prevent the said crude resin from attaining a degree of heat to the extent of vaporization. Should, however, by any chance of neglect, vaporization of the crude resin in the chamber *a* ensue, the said vapor will be allowed exit therefrom through the pipe *e*, and be received into the bottom chamber of the column or separator *D*. The evaporator or still *C*, before mentioned, is provided throughout its lower semicircular base with a superheating steam-jacket or chamber, *c*, also before indicated, into which steam is supplied from the steam-boiler by the inlet-pipe 12, connected therewith. The steam thus received and contained within the said steam-chamber *c* is superheated by means of fire maintained within the furnace *E*, constructed for this object. The steam thus superheated serves to vaporize the liquid and crude turpentine contained within the still *C*, as well, likewise, as to supply the steam-coil 13, a continuation of which forms the pipe 14, steam-coil 15, and coil 2, the last of which was before mentioned. The steam jacket or chamber *c* is provided with a pipe, 16, which has a stop-cock whereby condensed water may be withdrawn from the said chamber *c*.

The vapor which is produced by the boiling or vaporizing process effected within the still *C* by means of the superheated steam in the chamber *c* and coil 13, continued therefrom, is conveyed to the condenser *F* through and by means of the pipe *m*, the aforementioned separator *D* and pipe *n*, a continuation of the latter forming the condensing coil or worm *o*, which is likewise continued to the receptacle *G*, whence, by the connecting-pipe 28, it may be conducted to the vessel *H*, from which may be drawn, the spirits of turpentine into barrels or other vessels prepared for its reception.

It will now be perceived and readily understood by any person familiar with the distilling process, that as the vapors are generated from the raw or crude material in the boiling-chamber *C* by means of the steam in the chamber *c* and coil 13, to which allusion has already been made, and as they ascend the said enlarged pipe *m* they will, by reason of their contact with the surfaces of the said pipe, which being in the outer air and exposed relatively to a lower or cooler degree of temperature, to some extent be condensed, and therefore divested of a considerable portion of their heavier or liquid particles, which, by their own superior gravity will naturally fall back to the boiling-chamber, leaving only the uncondensed or lighter vapors to pass on through the said pipe *m* to the said column or vessel *D*.

The said vessel *D* is provided with condensing-plates *s*, so contrived and arranged as to receive the vapors against their lower surfaces, and, in their passage are also forced through an accumulated stratum of liquid upon their upper surfaces by means of the inverted cups *t*, placed over their outlets or perforations, as plainly shown in the drawing.

The contact of the vapors with the pipe *m* and the lower surfaces of the condensing-plates, above described, and their passage through the liquid upon their upper surfaces, as above described, will completely free them of all the woody, vinegar, or pyroligneous acids or other impurities which they contain at this stage or condition of the distilling operation, and the vapors which remain will pass on to be liquidized by the aforesaid condensing-worm *o* placed within the vessel *F*, which is immersed in cold water for the accomplishment of this purpose, and finally be discharged into the vessel *G*, whence they may be withdrawn into barrels by means of the stop-cock *u*, or further conveyed as before mentioned to the vessel *H*, and thence withdrawn by means of the stop-cock *V*. The vessel or tank *F*, in which the condensing-worm *o* is placed, is supplied with a constant stream of cold water by means of the inlet-pipe or feed-pipe *w*, which conveys the cold water down to the bottom of this vessel, and as it becomes warm by its absorption of the heat from the worm *o* will ascend to the outlet-pipe *x*, where it may be wasted, or, if desired, rendered available for the supply of the steam-boiler, which it is necessary to use in connection with my apparatus. The condensed and impure liquid which will naturally accumulate in the bottom of the vessel *D* may be drawn into the vessel *I*, thence into barrels or wasted, as may be desired. An egg or expanded joint, as shown at 17 on the pipe *m*, is introduced for the reception of the heavier liquid particles which may be thrown off from the evaporating-chamber *C*. These will accumulate in the lower part of the said expanded joint whence they may be drawn off or returned to the bottom of the evaporating-chamber *C* by means of a pipe provided for this purpose. The evaporating-chamber *C* is provided with a thermometer, at 18, and with a proof-stick, as at 19. The said chamber *C* is furthermore provided with the slide-valve 20, operated by the lever 21. This slide-valve opens communication with the pipe 22, by means of which the residuum or resin, which is the product remaining after the process of evaporation and production of the pure spirits of turpentine is complete. The resin, still in a liquid or partially liquid condition, is drawn continuously, if desired, into the strainer *K*, which is surrounded with a steam-jacket, as shown, into which steam is supplied through the pipe 23, and from which the condensed-steam water is conveyed by the pipe 24. The said strainer *K* is provided, moreover, with the movable perforated straining-plates 24' and 25', which



serve to prevent the passage of any chips, stones, or dirt into the resin-receiving vat, shown at L. This vat is also provided with steam-pipes, shown at 26, to which steam may be supplied from the boiler in any convenient manner. From the chamber L the liquid resin is drawn into barrels by means of the stop-cock 27, as clearly shown.

The continuous contact of the crude resin from the time at which it enters the receiving-chamber *a* aforesaid, until it is discharged from the vessel H in the form of the spirits of turpentine, or from the vat L in the form of liquid resin, with steam or steam vapor, effects the bleaching and purification of the resin, for which I claim my apparatus to be applicable. Sulphurous-acid gas or the fumes of burning sulphur may be introduced into contact with the resin to assist the steam in the promotion of this object.

It will be plainly evident that all the pipes

with which the turpentine is to come into contact during the process of distillation, as well as the still or evaporation chamber, should be of copper, while the receiving and condensing vessels may be of wood.

Having described my apparatus, its arrangement, and its mode of operation, what I wish to secure by Letters Patent is the following—

1. The vessel B when divided into the compartments *a* and *b*, and each constructed as stated, and the pipes *e* and 7, the same combined and arranged so as to operate substantially as described.

2. The vessel B, constructed as stated, still C, and vessel D, when the same are connected together, and the whole so combined and arranged as to operate substantially as described.

ARCHIBALD K. LEE.

Witnesses:

L. J. OLMSTEAD,  
JAMES C. KIDDELL.