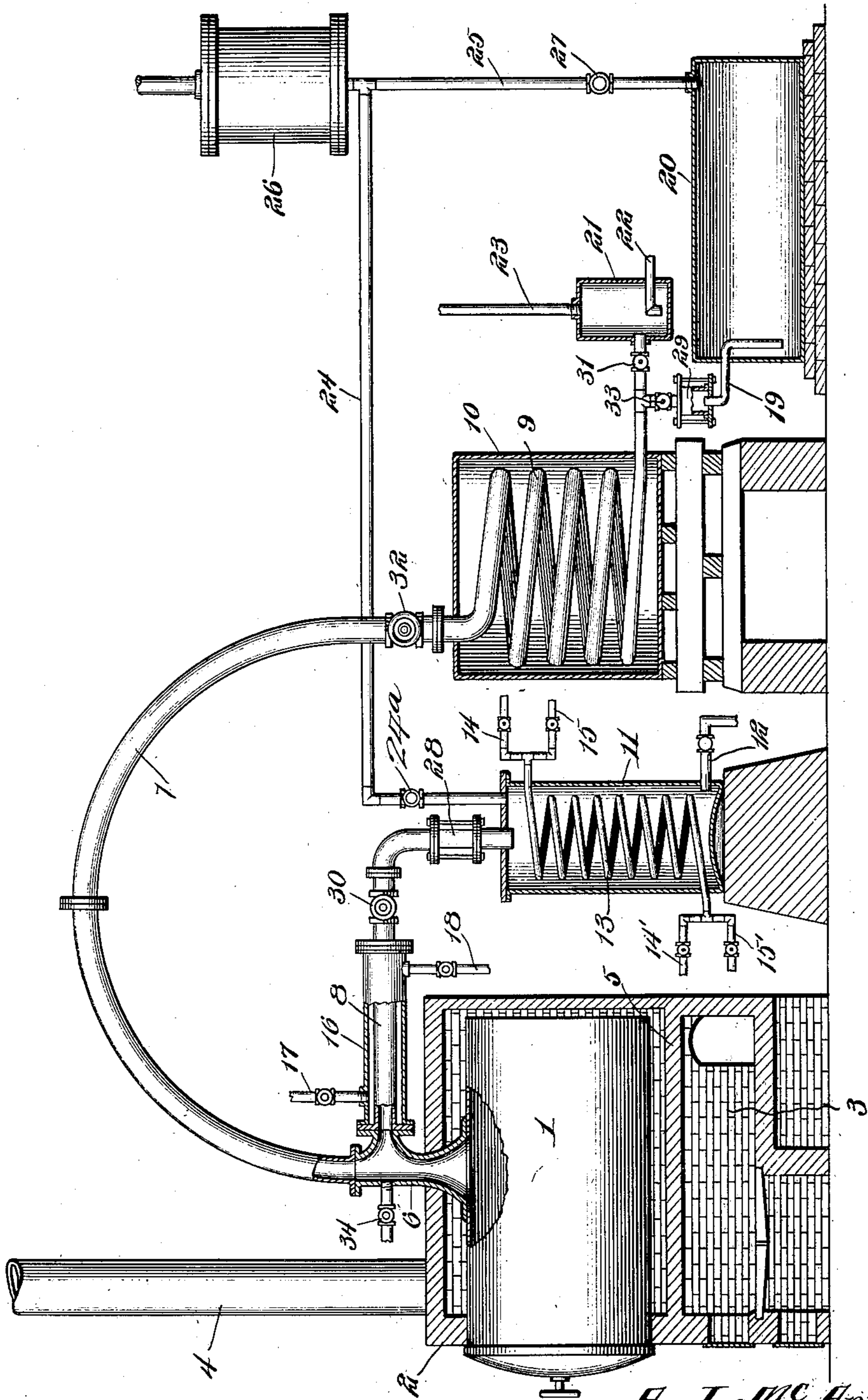


No. 855,330.

PATENTED MAY 28, 1907.

A. J. McARTHUR.  
APPARATUS FOR DISTILLING WOOD.

APPLICATION FILED JULY 11, 1906.



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## APPARATUS FOR DISTILLING WOOD.

No. 855,330.

Specification of Letters Patent.

Patented May 28, 1907.

Application filed July 11, 1906. Serial No. 325,623.

*To all whom it may concern:*

Be it known that I, ANDREW J. McARTHUR, a citizen of the United States of America, residing at Collins, in the county of Tattnall and State of Georgia, have invented new and useful Improvements in Apparatus for Distilling Wood, of which the following is a specification.

This invention relates to an improved apparatus for distilling wood to obtain turpentine, creosote, tar and the various essential oils, acids, etc., secured by the process of destructive distillation.

In the ordinary process of distillation, which is carried out in the system under normal atmospheric pressure, the wood is distilled at a very high temperature, which is necessary under such conditions to form and drive off the vapors. As a result the oils are, to a greater or less extent, decomposed or separated into their component gases, thus reducing and impairing the quantity and quality of the products.

The object of the present invention is to provide an apparatus, whereby this objection is avoided, the apparatus being designed for carrying on the distillation operation in a vacuum, thus enabling the vapors to be formed and driven from the wood at such a relatively low temperature that the decomposition of the vapors will be prevented. Owing to this fact a greater percentage and better quality of products may be obtained in a much shorter time than under the ordinary process. The apparatus is so constructed that it may also be used for distillation under the old process for the production of creosote and the other heavier oils.

The accompanying drawing shows, partly in section and partly in elevation, a distilling apparatus embodying my invention.

1 is a retort inclosed in an ordinary masonry setting 2, which is provided with a furnace 3 and a smoke stack 4. The furnace is separated from the retort by an intervening arch or bridge wall 5, at the sides of which are flues for the upward passage of the products of combustion into the chamber in which the retort is inclosed, the latter being spaced from the walls of the chamber so as to prevent the flames and products of combustion from coming directly into contact therewith.

Leading from the retort, in which the wood is placed for distillation, is a vapor outlet 6 with which communicate pipes 7 and 8.

The pipe 7 is arched and extends above the pipe 8 and conveys the turpentine and other like vapors to a condensing coil or worm 9 disposed within a condensing chamber 10, in which the condensing operation is carried out in the ordinary manner. The pipe 8 conducts the heavy vapors or oils to a resin or tar receiver 11 having a valved outlet 12. In this receiver is arranged a coil or worm 13 communicating exteriorly at each end with valved inlet and outlet pipes. As shown in the present instance, the upper end of the coil communicates with valved water and steam inlet pipes 14 and 15, while the lower end of the coil connects with valved water and steam outlet pipes 14' and 15', whereby water or steam may be circulated through the coil for the purpose of condensing or retaining in a fluid state the contents of the receiver. Surrounding the pipe 8 is a heating jacket 16 with which connect valved pipes 17 and 18 for the admission and exhaust of steam or any other suitable heating agent thereto, to keep the products flowing therethrough in a properly fluid or liquid state.

The coil or worm 9 communicates at its lower end through a turpentine delivery pipe 19 with a turpentine tank or receiver 20, and also with a trap 21 having an outlet or draw-off pipe 22 and a vent pipe 23, designed respectively for the withdrawal of the oils deposited therein and the escape of gases generated when the ordinary process of distillation is used.

The receivers 11 and 20 are connected by pipes 24 and 25 with a vacuum pump 26, through the action of which a vacuum may be formed in the system, the pipe 24 being provided with a valve 24<sup>a</sup> to cut off communication between the condenser 11 and pump, while the pipe 25 is provided with a valve 27, whereby the tank 20 may be thrown into and out of communication with the pump. The pipes 8 and 19 are respectively provided with glass sight feed devices 28 and 29 through which the vapors or liquids flowing there-through may be inspected, to note the character and condition of such vapors and liquids. A valve 30 is arranged in the pipe 8 to cut off communication between the retort and receiver 11 when turpentine and other lighter oils are to be made, a similar valve 31 being arranged between the pipe 19 and trap 21 to also cut out the same during such operation. Valves 32 and 33 are further provided to cut

off communication between the retort and coil 9 and between the coil 9 and receiver 20 when the ordinary distilling process is pursued in the manufacture of creosote and treatment of the heavier products. Communicating with the vapor outlet 6 is a valved relief pipe 34, whereby air may be quickly admitted to the system at the completion of the vacuum distilling operation or when it is desired to distil under the ordinary process.

In operation, the wood is placed in the retort 1, the valves properly opened and the pump 26 started to form a vacuum in the system, the vacuum established being as nearly absolute as possible. The fire is then started in the furnace 3 and heats the retort 1, the vapors escaping through the outlet 6 into the pipes 7 and 8, through which they are conducted to the receivers 11 and 20, the lighter vapors being condensed on their passage through the worm 9 in the condenser 10, while the heavier products are properly treated in the receiver 11. Owing to the fact that the operation is carried out in a vacuum, it is apparent that distillation will occur at a very low temperature, so that decomposition of the vapors will be prevented, whereby a larger amount and better grade of products is secured. When the ordinary process of distillation is employed the pump is cut out of the system by the controlling valves 24<sup>a</sup> and 25, as will be readily understood, and in distilling creosote and other heavier oils the valve 31 is opened to connect the trap 21 with the coil 9. By the arrangement of the valves shown, the tank 11 or tank 20 may be cut out of the system to permit the use of the apparatus for distilling light or heavy oils.

It will thus be seen that my invention provides, first, means whereby air may be exhausted from the system, so that the process of distillation may be carried out in a vacuum; second, independent condensers for the light and heavy products; third, means for cutting either of these condensers out of operation at will independently of one another; and, fourth, means for cutting out the pump, whereby the apparatus may be adapted for distilling and condensing light or heavy products or both under the ordinary process or in a vacuum.

I am aware that it has heretofore been common to employ pumps to withdraw the gases or vapors as they are formed from the retort and circulate them through the system, with the object of facilitating their passage from the retort to the condenser and securing a free discharge of the vapors from the retort, and that such pumps have also been used to force the low grade gases into the firebox for the purpose of utilizing the same as fuel. My invention differs radically in this respect from all prior distilling devices, in that the pump 26 is isolated from the system, that is,

is not disposed in the line of the vapor conduit, but provides a means whereby the air may be preliminarily exhausted from the system to form a vacuum therein, the distilling operation being thenceforth carried out in the vacuum so produced. By this means, the pump may not only be cut out of the apparatus when the ordinary process of distillation is to be employed, but, in serving as a means for the exhaust of air from the system, secures the advantages before set forth resulting from the distillation in a vacuum and, in addition, places the system in such a condition as to effect a much more complete and rapid carrying out of the process of distillation, for the reason that no air is present to admix with or retard the flow of the vapors.

Having thus described the invention, what is claimed as new, is:—

1. In a distilling apparatus of the character described, the combination of a retort having a vapor outlet, a turpentine condenser, a tar receiver, conducting pipes leading from the vapor outlet to said condenser and receiver, a hermetically closed turpentine tank or receiver communicating with the turpentine condenser, air exhaust pipes leading from the receivers, and a vacuum pump for exhausting air through said pipes, the latter being provided with valves for closing communication between the pump and receivers.

2. In a distilling apparatus of the character described, the combination of a retort having a vapor outlet, a turpentine condenser, a tar receiver, pipes leading from the vapor outlet to said condenser and receiver, a turpentine tank or receiver communicating with the turpentine condenser, valved exhaust pipes communicating with the receivers, a vacuum pump for extracting air through said pipes, and a valved relief pipe communicating with the vapor outlet.

3. In a distilling apparatus of the character described, the combination of a retort having a vapor outlet, a turpentine condenser, a tar receiver, valved conducting pipes leading from the vapor outlet to said condenser and receiver, a hermetically closed turpentine tank or receiver communicating with the condenser, valved air exhaust pipes communicating with the tar and turpentine receivers, a vacuum pump for exhausting air through said pipes, and a valved relief pipe for admitting air to the system.

4. In a distilling apparatus of the character described, the combination of a retort having a vapor outlet, a turpentine condenser comprising a vessel having a condensing coil therein, a tar receiver, valved conducting pipes leading from the vapor outlet to the coil of the condenser and to the receiver, a turpentine tank or receiver, a delivery pipe connecting the coil of the con-

denser therewith, a trap communicating with the coil, valves for cutting out the delivery pipe and trap, a vacuum pump, valved exhaust pipes connecting said pumps with  
5 the tar and turpentine receivers, and a valved relief pipe connecting with the vapor outlet.

In testimony whereof, I affix my signature in presence of two witnesses.

ANDREW J. McARTHUR.

Witnesses:

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