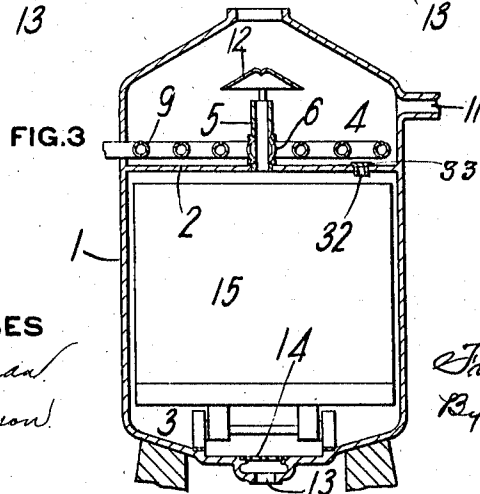
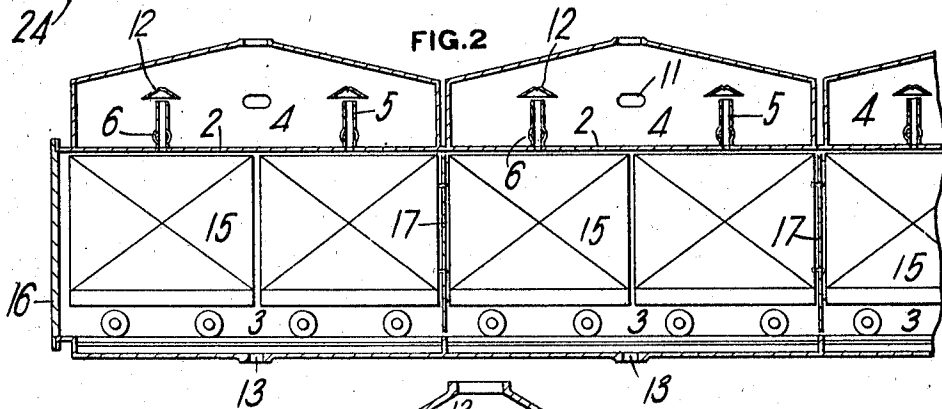
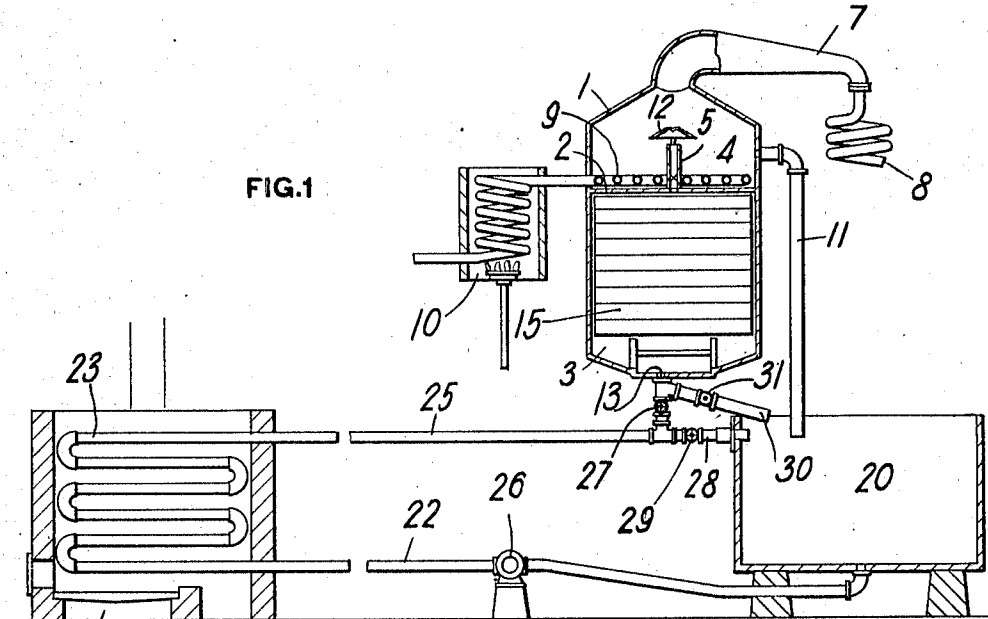


F. POPE.
 APPARATUS FOR EXTRACTING PRODUCTS FROM WOOD.
 APPLICATION FILED OCT. 6, 1909.

982,631.

Patented Jan. 24, 1911.



WITNESSES
Chas. Loderman
Edw. M. Johnson

INVENTOR
Frederick Pope
 By *Fred. W. Hunter*,
 Attorney

UNITED STATES PATENT OFFICE

FREDERICK POPE, OF MOUNT PLEASANT, GEORGIA, ASSIGNOR TO SOUTHERN MANUFACTURING COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR EXTRACTING PRODUCTS FROM WOOD:

982,631.

Specification of Letters Patent.

Patented Jan. 24, 1911.

Application filed October 6, 1909. Serial No. 521,394.

To all whom it may concern:

Be it known that I, FREDERICK POPE, a resident of Mount Pleasant, in the county of Wayne and State of Georgia, have invented a new and useful Improvement in Apparatus for Extracting Products from Wood, of which the following is a specification.

This invention relates to apparatus for extracting products from wood, and more particularly to apparatus for distilling coniferous woods, such as pine wood, for the purpose of extracting therefrom spirits of turpentine, pine oil, resin and other volatile products.

The general object of the invention is to provide apparatus circulating a hot bath over the wood and by means of which the products may be extracted from the wood in greater quantities, with less waste, at less cost, and more conveniently than in prior apparatus, and without injuring the fiber of the wood.

The specific object of this invention is to provide apparatus of simple construction, whereby a substantially uniform temperature can be maintained in the wood chamber or vessel to thereby secure a large yield of products from the wood as well as avoiding injuring the fiber of the wood, and whereby loss of heat from the circulating bath is prevented and the temperature of the bath and combined products is maintained during separation or distilling in order to recover from the bath all of the products which have been extracted from the wood.

Generally stated, the invention comprises a vessel or retort divided into two compartments, to-wit, a lower compartment in which the wood is treated with a bath, and an upper compartment for receiving the bath and combined products from the wood compartment and in which superheated steam is introduced for separating the products from the bath, together with the necessary heating and circulating apparatus, all as will hereinafter be more fully described and claimed.

In the accompanying drawings Figure 1 is a diagrammatic view representing the apparatus; Fig. 2 is a longitudinal section on an enlarged scale through the retort; and Fig. 3 is a transverse section through the same.

The principal new portion of the apparatus comprises a suitable retort or vessel 1,

which is divided by partition 2 into a lower compartment 3 in which the wood is treated with the bath, and an upper compartment 4 in which the extracted products are separated from the bath. The vessel may be constructed in any suitable way and in the drawings the details of construction are not illustrated. Communication between compartments 3 and 4 is provided directly through the partition 2 by means of one or more pipes or sleeve members 5 projecting up into the compartment 2 above the level of the bath contained therein. Each communication is provided with a suitable valve 6 whereby the opening may be restricted more or less in order to maintain and regulate pressure in the compartment 3.

The upper portion of separating compartment 4 is of hood or dome shape, and leading therefrom is a pipe 7 leading to the condenser 8 which may be of any suitable form and in which the volatile products are condensed. In the bottom of compartment 4 are perforated pipes 9 connected to a suitable source of steam, not shown, which steam will be superheated to a high degree, as by the heater 10. An overflow pipe 11 leads from compartment 4 at such height as to maintain in said compartment a suitable depth of bath. Directly over the inlet pipe 5 is a deflector 12 for splaying or spreading out the bath in a thin sheet. The inlet for the bath is at 13 through the bottom of the compartment 3, and is covered by the perforated strainer plate 14.

The compartment 3 is of sufficient size to provide for the entry therinto of cars 15 in or on which the wood to be treated is contained. Preferably the wood compartment 3 will be of considerable length, as shown in Fig. 2, the cars entering through one end which is then closed by means of door 16, and may be withdrawn through the same end or through the opposite end which will be closed by a similar door. Inlets 13 for the bath are provided at intervals in the bottom of this long retort. The compartment 3 is continuous from end to end, but the hoods and separating chambers are divided so as to provide a plurality of hoods and separating chambers, as shown in Fig. 2. The wood compartment is continuous so that the cars with wood can be run into and out of the same, but in order to divide the

same somewhat and get a more direct circulation of the bath upwardly through the wood I provide movable division plates 17, which are placed between certain of the cars containing the wood so as to come substantially at the points of division between the hoods or separating compartments 4. These plates are shown secured directly to the ends of the cars, so that when the cars are run into and out of the wood compartment the division plates are carried with them. Consequently, the bath entering through the bottom of the compartment 3 is compelled to travel practically straight upwardly through the wood into the separating compartments 4. The drawings show two communications 5 between the compartments 3 and 4, but obviously one or any other desired number may be provided.

In conjunction with the retort described, I provide the necessary heating, storing and circulating means for the bath, which, however, may be substantially as heretofore used. As shown, the overflow pipe 11 leads from the retort to a storage reservoir 20 under which may be provided a grate in order to heat the material for the bath when the apparatus is first started. From the storage reservoir 20 a pipe 22 leads to a heating coil 23 in a suitable furnace 24 and from the latter a pipe 25 leads to the inlet 13 of the retort. Pump 26 is provided between the storage tank and the heater in order to circulate the fluid. A valve 27 is provided in the pipe 25 at the inlet to the retort and a by-pass pipe 28 provided with valve 29 connects the pipe 25 directly with the storage tank. A drainage pipe 30 provided with valve 31 connects the bottom of the retort with the storage tank, and a drainage opening 32 which may be provided with a valve connects the separating chamber 4 with wood chamber 3. One or more heaters, storage tanks and pumps may be provided for the large retort shown. Preferably, two or more heaters, pumps, etc., will be employed.

The operation of the apparatus described is as follows: Cars loaded with the wood to be treated are run into the wood chamber 3, the division plates 17 being placed between certain cars to divide the wood chamber as above described. The door 16 is then tightly sealed. The material for the bath is placed in storage tank 20 either in a molten condition or it may be melted and mixed therein, and when melted, pump 22 is started and circulates the bath through the apparatus. In this position valves 31 and 29 are closed and valves 27 open, and valve 6 opened to the necessary extent to secure the desired pressure. The hot bath circulated by the pump fills the wood chamber 3 and then rises up through passages 5 into the separating chamber 4, entering the latter

under considerable pressure and striking the deflectors 12 and splayed thereby. The bath accumulates in chamber 4 until it reaches the height of outlet opening 11 and then flows into storage reservoir 20, whence it is again drawn by the pump and forced through the wood compartment. Steam superheated substantially to the temperature of the bath (and this may vary from 300 degrees to 360 degrees Fahrenheit) is introduced through pipes 9 and passes up through the bath and separates therefrom the volatile products, and also agitates the bath and thus aids mechanically in the separation. The separated products pass through pipe 7 and condenser 8 where they are condensed. After the wood has been subjected to the action of the bath for the necessary length of time the valve 27 is closed, and valves 29 and 31 are opened. The pump continues in operation, but the circulation now is from the storage tank through the pump, through pipes 25 and by-pass pipe 28 to the storage tank. The bath in the wood chamber is drained out through drainage pipe 30, being strained through plate 14. The bath in the separating chamber need not be drained therefrom unless desired, in which event the valve in drainage opening 32 will be opened. When the bath has been entirely drained from the retort the door 16 is opened, the cars containing the wood are run out, and cars loaded with a fresh supply of wood run into the wood chamber, when the foregoing operation will be repeated.

Various forms of bath may be used in this apparatus, either a rosin bath, or a bath consisting of tar, pine oil and the residuum left by the fractional distillation of the products obtained by this process, like that described in my Patent No. 852,078, of April 30, 1907, or a bath whose principal elements are pitch and pine oil, such as described in my application filed May 16, 1908, Serial No. 433,230. Preferably the bath will be of a nature which can be heated up to 400 degrees Fahrenheit without injury to itself. The steam used in the separating vessel will be superheated substantially to the temperature of the bath used so as to avoid cooling the bath either in the separating chamber or in the upper portion of the wood chamber, and insures that all of the extracted products remain in the bath in gaseous form so that they will separate therefrom. The partition 2 is only a thin wall, and consequently the temperature in the wood chamber is communicated to the separating chamber, thus assisting in maintaining the portion of the bath in the separating chamber at the necessary high temperature to prevent condensation of any of the extracted products in the bath. This is of very great advantage, as it enables practically all of the products which are extracted from the

wood to be recovered. The steam, however, does not come in contact with the wood, being prevented from contact by the partition 2, and consequently the fiber of the wood is not injured.

The apparatus is simple, doing in a single divided vessel what has heretofore required two separate vessels. The connecting piping heretofore necessary is entirely omitted and there is practically no loss of heat.

What I claim is:

1. Apparatus for extracting products from wood comprising a vessel divided into two compartments, one for containing the wood to be treated with a bath and the other for separating the products from the bath, connection between the two compartments, means for circulating the bath between the two compartments, and means for heating the bath on its way back to the wood compartment.

2. Apparatus for extracting products from wood comprising a vessel divided into two compartments, a lower compartment for containing the wood to be treated with a bath and an upper compartment for separating the extracted products from the bath, connections between the two compartments, means for circulating the bath from the separating compartment back to the wood compartment, and means for heating the bath on its way back to the wood compartment.

3. Apparatus for extracting products from wood comprising a vessel divided into two compartments, one for containing the wood to be treated with a bath and the other for separating the products from the bath, connections between the two compartments, means for circulating the bath from the separating compartment back to the wood compartment, means for heating the bath on its way back to the wood compartment, and connections between the wood compartment and the separating compartment arranged to maintain pressure in the wood compartment.

4. Apparatus for extracting products from wood comprising a vessel divided by a partition into two compartments, a lower compartment for containing the wood to be treated with a bath and an upper compartment for separating the products from the wood, a pipe leading through said partition and projecting upwardly into the upper compartment, an overflow pipe from said

upper compartment below the upper end of said inlet pipe, and means for circulating and heating the bath.

5. Apparatus for extracting products from wood comprising a vessel divided by a partition into two compartments, a lower compartment for receiving the wood to be treated with a bath and an upper separating compartment, a pipe leading through the partition and projecting upwardly into the separating compartment, a deflector over said pipe, an overflow pipe leading from said upper compartment below the top of the inlet pipe, and means for circulating and heating the bath.

6. Apparatus for extracting products from wood comprising a vessel divided into two compartments, a lower compartment for receiving the wood to be treated with a bath and an upper separating compartment, a communication between said compartments, means for circulating and heating the bath, perforated steam pipes in the bottom of the upper compartment, and a source of superheated steam for said pipes.

7. Apparatus for extracting products from wood comprising a chamber arranged to receive the wood to be treated with a bath, a plurality of hoods over said wood chamber, movable partition plates arranged to divide the wood compartments at the lines of separation of adjacent hoods, an inlet for the bath into the bottom of the wood chamber, an outlet for the bath from each of the hoods, means for circulating the bath up through said chamber and hoods, and means for heating the bath on its way back to the wood chamber.

8. Apparatus for extracting products from wood comprising a vessel divided by a partition into a lower chamber for containing the wood to be treated and a series of upper chambers for separating the products from the bath, movable division plates for separating the wood chamber into compartments to correspond with the separating chambers, communications between the wood chamber and each of the separating chambers, and means for circulating and heating the bath.

In testimony whereof, I have hereunto set my hand.

FREDERICK POPE.

Witnesses:

F. W. WINTER,
JAS. L. WELDON.