

UNITED STATES PATENT OFFICE.

FREDERICK POPE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO
WILLIAM C. CLARK, OF PITTSBURG, PENNSYLVANIA.

PROCESS OF EXTRACTING PRODUCTS FROM WOOD.

No. 852,078.

Specification of Letters Patent.

Patented April 30, 1907.

Application filed September 6, 1906. Serial No. 333,532.

To all whom it may concern:

Be it known that I, FREDERICK POPE, a citizen of the United States, and a resident of the city, county, and State of New York, have invented a certain new and useful process of extracting products from wood in order to obtain therefrom the resin, oils, and gaseous products without harm to the wood fiber, of which the following is a specification.

One of the objects of my invention is to produce a process by which valuable products may be obtained from wood in greater quantity, with less waste, with less cost and more conveniently than has heretofore been done by any process now employed.

Other objects will appear from the following description:

I will describe my process as applied to the treatment of coniferous woods for the purpose of obtaining turpentine, resin, pine oil and other products therefrom.

In carrying out my process the wood is placed in a closed chamber or a vessel and treated under moderate pressure of say ten pounds to the square inch, in a bath which is mobile at usual temperatures, which volatilizes only slowly at a temperature lower than the temperature at which the desired products volatilize, which is heated outside the vessel and is circulated over and around the wood being treated.

The operation is not destructive of the wood, but leaves it in good condition for treatment with creosote so that it may be used in wood pavement or for other purposes.

During the operation of the process the bath is so confined and is subject to such pressure as to prevent any vaporization. Such portions of the bath as are slowly vaporized are separated from the desired product after extraction and returned to the bath. The volatile products are separated in the vaporizing chamber while the resin and the like are retained in the bath until the excess is drawn off.

The accompanying drawing represents a side view of the preferred apparatus for carrying out my process:

Referring now to the drawing, the part lettered A is a coil in the warming furnace.

This furnace is provided with the usual grate bar *r*, and it is also provided with baffle plates *t* which extend between the branches of the coil as shown in the drawing.

B is a closed vessel or chamber in which the wood to be treated for the purpose of extracting the products is placed through a door *p*.

C is a vaporizing chamber in the bottom of which is a perforated steam pipe *s*.

D is a reservoir having located under it grate bars *r'* with a pipe which leads from this reservoir D to a pump E. From this pump to the coil A is a pipe *g*. This coil A is connected to the chamber B by a pipe *h*. In this pipe *h* is a valve *y* connected to the pipe *h* by a T connection and there is a pipe *i* which leads to and is connected with the vaporizing chamber C. In this pipe *i* near its connection with the pipe *h* is a valve *z*. Leading from the top of the chamber B to the vaporizing chamber C is another pipe *j*.

k is a pipe which leads from the vaporizing chamber C to the reservoir D.

l is a pipe which leads from the bottom of the closed chamber A into the reservoir D. In this pipe near the chamber B is a valve *x*.

m is a pipe which leads from the top of the vaporizing chamber C to a condenser not shown.

The wood from which the products are to be extracted is placed in cars which are run into the vessel B through the door *p* when the door is closed. The bath is formed in the reservoir D, fire is applied on the grate bar *r'* for the purpose of mixing the constituents of the bath, and may afterward be allowed to die out. The pump E is set in motion and the bath is drawn through the pipe *f* and forced through the pipe *g* into the coil A over a fire on the grate *r* where the bath is heated in the coil A to a temperature of about 360° F. From this coil A the bath passes through the pipe *h*, through the valve *y* which has been opened into the closed vessel or extractor B, where it circulates about and around the wood which has been placed in the said vessel. As soon as the vessel B is completely full the bath passes through the pipe *j* into the chamber C and spreads out over the splay *n* which meets incoming steam escaping through the perforated pipe *s* leading from

a boiler not shown. When the extraction is complete the valves x and z are open and the valve y closed, whereupon the bath in the extractor B flows through the pipe l into the reservoir D. During this time the pump is kept in action to circulate the bath through the warming furnace, the vaporizing chamber and the pipes, the bath and the apparatus by this being kept hot during the operation. When the bath has flowed out of the extractor B into the reservoir D the door p is open and the car carrying the treated wood is removed and a new charge is placed in the extractor or chamber B.

I have found that the most efficient bath and one that will not freeze at ordinary temperatures or waste unduly by vaporization is a composition of pine tar carefully strained and washed with hot water and steam, the heavy residuum of my process after refinement and pine oil. These ingredients are combined in the proportion of 9 parts of tar, 1/2 part of the residuum and 1/2 part of pine oil, total 10. This bath is especially adapted for outdoor temperature of from 60° to 70° F. In winter it is desirable to increase the amount of the residuum and decrease the amount of pine tar, making the proportions pine tar 8, residuum 1, and pine oil 1. One reason that I use pine oil is to soften the pine tar which is alone too hard to freely flow through the pipes. In using the pine oil, I have discovered that it vaporizes to a certain extent. I therefore use the residuum to retard the evaporation of the oil. The residuum referred to is obtained as follows: Beyond the vaporizing chamber C in which the material extracted from the wood is collected, other steps follow: First, the separation of the water and the refinement of the product extracted from the wood. In this process of refinement, there is first driven over at moderate temperatures a light oil, at slightly higher temperature heavy oil, and then a still heavier oil at about 580° F. There is left a heavy dark colored residuum which is not vaporized at any further temperature up to 800°. This heavy residuum is an excellent material with which to retard evaporation of the oil in the bath as hereinabove referred to. Further, to prevent this evaporation of the bath or any of its constituents, I conduct the process of extraction in the closed chamber under pressure, and I conveniently secure this pressure in the extractor or closed chamber by placing the vaporizing chamber C and the mouth of the pipe j on a somewhat higher level than the extractor B.

No vaporization takes place in the extractor, as the fluid therein is under pressure, but on entering the vaporizing chamber C the volatile products pass off through m to the condenser, and some of them are mechanically carried over by the steam entering

through the perforated steam pipe s . The bath is thus freed from the volatile products and passes through the pipe k into the reservoir D to be used over and over again, while the volatile constituents of the bath vaporize so slowly that it is but little diminished. To compensate for the small loss of the bath a quantity of pine oil recovered from the refining of the turpentine is occasionally restored to the reservoir.

It might be well to call attention to the fact that the proportions of the bath which I use may be varied somewhat during summer and winter, but the essential properties of the bath are mobility at ordinary temperatures and its low volatility.

I am aware that resin has been used for the bath and that in volatility it is satisfactory, but it presents the practical difficulty of freezing up in the valves and clogging up the pipes and bringing the operation to a standstill. Pine oil is much more searching. With my improved bath I not only avoid these difficulties, but I obtain a larger output from the wood, materially cut down the time of treatment and avoid cooling the bath or allowing the temperature to run down, and without cooling any part of the apparatus except the extractor, and by proper insulation the loss of heat from the extractor is reduced to a minimum.

What I claim as new and desire to secure by Letters Patent, is:

1. The process of treating wood which consists in placing wood in a closed vessel, circulating through the vessel a hot bath which is mobile at usual temperatures, which slowly volatilizes, and which is maintained in the vessel at a pressure sufficiently high above atmospheric pressure to prevent any substantial escape of vapor from the vessel.

2. The process of treating wood for the purpose of extracting products therefrom, which consists in placing the wood in a closed vessel, circulating through the vessel a hot bath which is mobile at usual temperatures, which slowly volatilizes, which is a solvent, and which is maintained in the vessel at a pressure sufficiently high above atmospheric pressure to prevent any substantial escape of vapor from the vessel.

3. The process of extracting oil, turpentine and resin, from wood, which consists in circulating through the vessel a hot bath which is mobile at usual temperatures, which slowly volatilizes and which is maintained in the vessel at a pressure sufficiently high above atmospheric pressure to prevent any substantial escape of vapor from the vessel.

4. The process of extracting products from wood, which consists in circulating through the vessel a hot bath of pine tar, heavy residuum of wood extraction and pine oil.

5. The process which consists in placing

the wood in a closed vessel, circulating through the vessel above atmospheric pressure a hot bath of pine tar, heavy residuum of wood extraction and pine oil, separating
5 the products extracted from the bath and then separating the products by distillation.
In witness whereof, I have hereunto set my

hand and seal at the city of New York, in the county and State of New York, this 28th day of August, 1906.

FREDERICK POPE. [L. S.]

In presence of—

JOHN J. RANAGAN,
HENRY BOSSORG.