

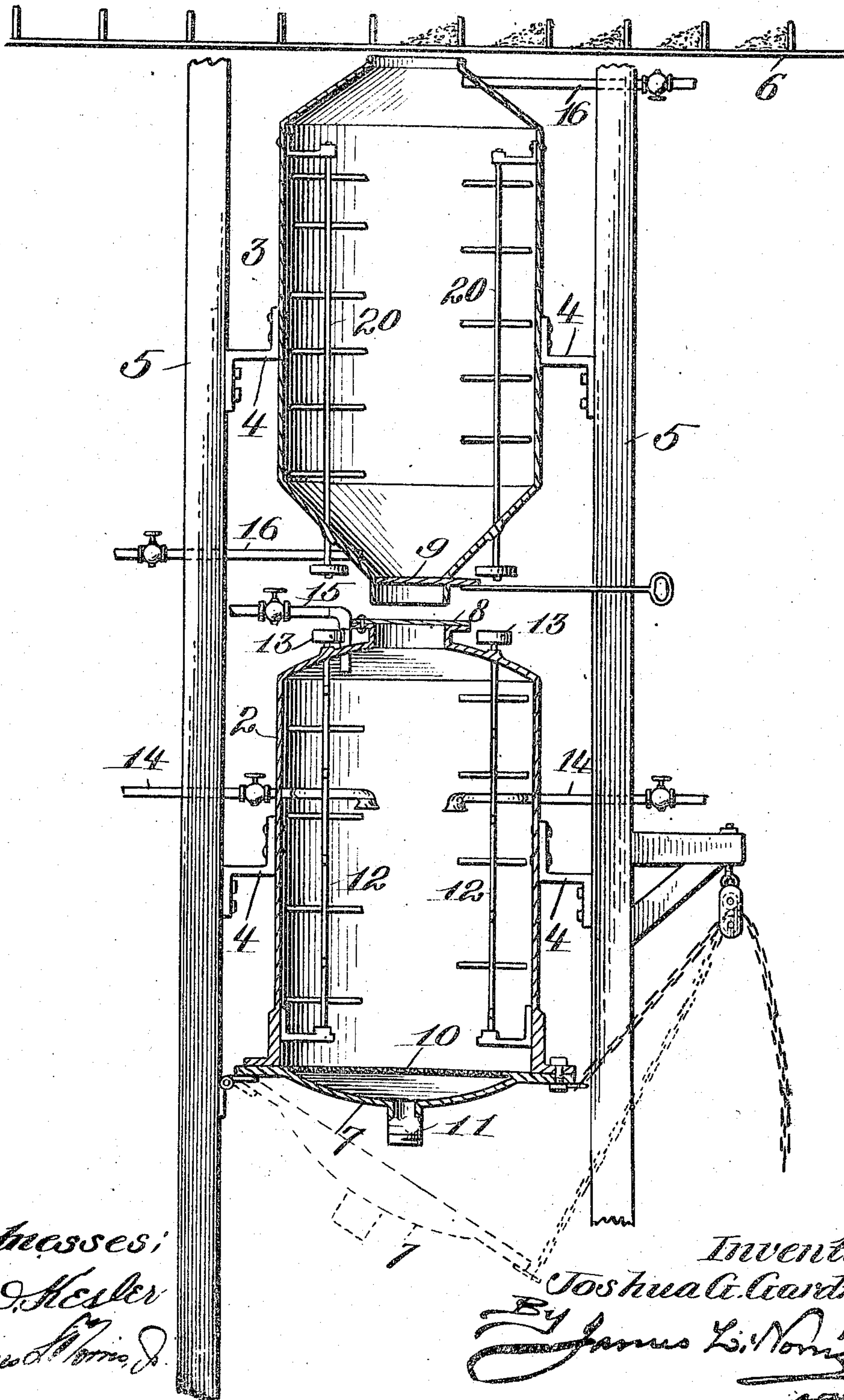
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J. G. GARDNER.

METHOD OF EXTRACTING TURPENTINE FROM WOOD.

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Witnesses:
C. D. Hester
James L. Morris

Inventor
Joshua G. Gardner
By James L. Morris
attorney

UNITED STATES PATENT OFFICE.

JOSHUA G. GARDNER, OF JACKSONVILLE, FLORIDA, ASSIGNOR TO PURE WHITE TURPENTINE COMPANY, OF JACKSONVILLE, FLORIDA, A CORPORATION OF FLORIDA.

METHOD OF EXTRACTING TURPENTINE FROM WOOD.

No. 881,787.

Specification of Letters Patent.

Patented March 10, 1908.

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To all whom it may concern:

Be it known that I, JOSHUA G. GARDNER, a citizen of the United States, residing at Jacksonville, in the county of Duval and State of Florida, have invented new and useful Improvements in Methods of Extracting Turpentine from Wood, of which the following is a specification.

This invention relates to a method of extracting turpentine from wood, especially when the latter is in a condition of sawdust or ground up wood.

Some of the advantages of the invention are the rapidity with which the turpentine can be extracted and the large yield thereof. I do not destroy any of the valuable properties of the turpentine, and in this way secure a product which can be marketed for use in mixing with paints and varnish.

In the drawing accompanying and forming a part of this specification, I illustrate in sectional elevation an apparatus suitable for carrying out my method. I do not however limit myself to the showing thus made, for certain variations may be adopted within the scope of my claims.

In the drawing I show a retort 2 and a bin 3 above the same, each in the main of cylindrical form. The retort and bin are connected to angle brackets, as 4, united rigidly in some desirable way to the vertical timbers 5 constituting a convenient framing for carrying the retort and bin. The sawdust or ground up wood is supplied in practice in some positive manner to the bin 3, and for this purpose I have illustrated a conveyer, denoted in a general way by 6, the conveyer serving to deliver the material through the open top of the bin. The sawdust, after the turpentine and other products have been extracted therefrom in the bin, can be utilized in a furnace as fuel. The retort 2 has a hinged bottom, as 7, which, during the extraction of the turpentine from the mass of sawdust in said retort, is closed. The diameter of the hinged bottom is substantially the same as that of the retort, so that, when the door or bottom 7 is opened, the contents of the retort can be rapidly discharged therefrom. The contents are, in fact, discharged in bulk from the retort. The top of the retort has a neck provided with a swinging cover, as 8, which, during extraction, is also closed, but which will be opened to charge the retort with the sawdust or ground wood

from the bin. The capacities of the bin and retort are equal, or substantially equal, in order to add to the efficiency of the apparatus, for, while I am extracting the turpentine from the mass of sawdust in the retort, I can be supplying to the bin a fresh mass of sawdust. In the bottom of the bin I arrange a valve, the valve being denoted by 9 and being of the sliding type. The valve will, of course, be closed when the sawdust is being delivered into the bin.

The retort has a false bottom 10 connected with the drop down door 7, but spaced from the same. The mass in the retort is sustained directly by the false bottom, the latter being of perforated or foraminous material, so as to provide for the passage of the vapor therethrough, which is impregnated with the turpentine, the vapor passing through a nipple or pipe section 11 connected centrally with the drop down door 7. An attachable connection, not illustrated, will, in practice, be united with the nipple or pipe section 11, the latter being shown as externally threaded for the union.

I subject the sawdust mass in the retort, while the process is being carried on, to agitation, and for this purpose show two stirrers, denoted in a general way by 12, and each consisting of a vertically disposed shaft having paddles thereon, the paddles being located at suitable intervals and being of such character that the two shafts will, when each has made one full turn, completely stir up the mass in the retort. The lower ends of the shafts of the stirrers 12 are stepped in bearings located near the bottom or drop down door of the retort. The upper portions of said shafts extend through the top of the retort and carry wheels, which may be band wheels, or something of an equivalent nature, as 13, by which the said stirrers or agitators can be operated.

Leading into the retort, substantially midway of the height thereof, are one or more steam pipes, as 14, having at their delivery ends roses of some suitable kind to deliver downwardly jets of steam, each pipe having a valve for controlling the flow of steam. Through the top of the retort a valved steam pipe, as 15, is led, having at its delivery end disposed to deliver downwardly a jet of the steam.

Into the bin 3 I extend steam pipes 16, the delivery end of one being located near

the receiving end of the retort, while the delivery end of the lower pipe is located near the discharge end of the said retort and discharges steam into said bin. The steam from the two pipes flowing into the bin thoroughly saturates the sawdust or ground wood in the retort, while the jet of steam from the upper pipe 16 so acts as to strike the dust as it drops into said bin, by reason of which the saturation of the sawdust in the bin is one that can be accomplished in a comparatively short space of time. When the sawdust is thoroughly saturated, this will be indicated by the odor thereof, at which point the steam is cut off from the pipes 16 and naturally from the bin.

By the preliminary saturation, I bring out the turpentine or soften or cook the wood, so that when the mass is delivered into the retort the extracting step is one that can be accomplished in a short space of time. When the sawdust is thoroughly saturated, the top or cover 8 of the retort 2 is opened and the valve 9 opened wide, so as to permit the saturated mass of sawdust or ground wood in the bin to drop bodily therefrom and in a heated condition into the retort. By the arrangement of piping I heat and saturate every particle of dust as it enters the bin. After having admitted the saturated and heated mass of dust into the retort 2, I open the valves in the several pipes 14 and 15, the steam from the pipes passing downward at vertically separated places through the mass of previously heated dust, the vapor, laden with turpentine, passing through the perforated false bottom 10 and out through the outlet pipe 11. When the mass in the retort 2 is thoroughly steamed I cut off the steam from the pipes 14, but permit the steam to flow through the pipe 15 and entirely through the mass. In order that the steam admitted into the retort shall reach every part of the contents thereof, I utilize the stirrers 12 which, while the steam is being admitted, are in motion so as to thoroughly agitate or loosen up the mass in order to permit the steam to strike every particle thereof. Should there be any tendency of the mass to arch, the stirrers will break the arch. After the turpentine has been thoroughly extracted from the sawdust or ground wood in the retort I open the hinged bottom or drop down door 7 and permit the entire contents of the retort to fall out at once or in bulk.

Ordinarily I arrange within the bin 3 stirrers or agitators, each designated in a general way by 20, and which are substantially like the agitators 12 hereinbefore described in detail. The agitators 20, as will be obvious, prevent arching of the ground up mass in the bin.

I desire to state at this point that I

adopted the title for my invention simply for convenience. I have described the method as utilized for the extraction of turpentine from wood. I do not however restrict myself in this particular, for the method can be employed for extracting other volatile substances and byproducts from ground up wood. One of these volatile products is methyl alcohol. By my method and apparatus I am enabled, without having recourse to destructive distillation, to recover valuable products from a substance (sawdust) which ordinarily goes to waste. By the invention I secure highly volatile products, such as turpentine and alcohol in a clean, pure condition, ready for the market, immediately after leaving the apparatus or after the cessation of the process. I have found that the color of the byproducts of wood is regulated entirely by the temperature. When the heat of the steam is substantially 212° Fah. turpentine and methyl alcohol, come over. The water color products come over between 212° and 225° Fah., and from 225° to 250° Fah. they begin to get yellow, and the pyroligneous acids come over. At 50° Fah. more the gases come over, such, for example, as marsh gas. At 50° Fah. more, the wood oils come over. From 380° Fah. to 400° Fah., all the by-products leave the wood, and are entirely black, such as pitch and tar.

It will be apparent, from what I have stated, that the main feature of the invention is in subjecting the sawdust or ground up wood to the action of a low degree of heat, or one sufficient simply to result in the extraction of highly volatile products, such as turpentine and alcohol therefrom.

From what has been hereinbefore stated it will be evident that my method consists in forming a mass of ground up wood into a dense body and confining the same in a vertical manner and then directing steam in a vertical direction downward through the confined dense mass. So far as I am aware, I am the first one to practice this method. By experiments extending over a long period of time I find that it is not possible to extract turpentine from a mass of sawdust by forcing the steam upwardly through the material. I direct the steam downward through the mass and am enabled not only by so doing to extract the turpentine from the woody material in a thorough manner, but I am enabled to do so in a short space of time. In fact, I have been able to extract a large quantity of turpentine from a mass of wood in as short a time as half an hour. To secure the best possible effect I prefer to loosen up the mass either mechanically or otherwise, so that the extracting steam can reach every part of the material to thoroughly remove the turpentine therefrom. From a consideration of the foregoing, it will be evident

that I have set forth mechanical means to open up paths for the steam through the mass, but this is not essential.

Having thus described the invention, what I claim is:

1. A method which consists in forming a mass of sawdust or ground up wood in a dense body and confining the same vertically and then during such confinement forcing steam downwardly entirely through the mass.

2. A method which consists of forming a mass of sawdust or ground up wood into a dense body, confining the mass in a vertical direction, forcing steam downwardly entirely through the mass and opening up paths in

the mass for the passage of steam there-through.

3. A method which consists in forming a mass of saw-dust or ground-up wood into a vertically confined body and then forcing steam through the mass solely in a downward direction.

In testimony whereof I have hereunto set my hand in presence of the subscribing witnesses.

JOSHUA G. GARDNER.

Witnesses:

WILLIAM P. SMITH,
JAMES ROYELL,
H. B. SMITH.