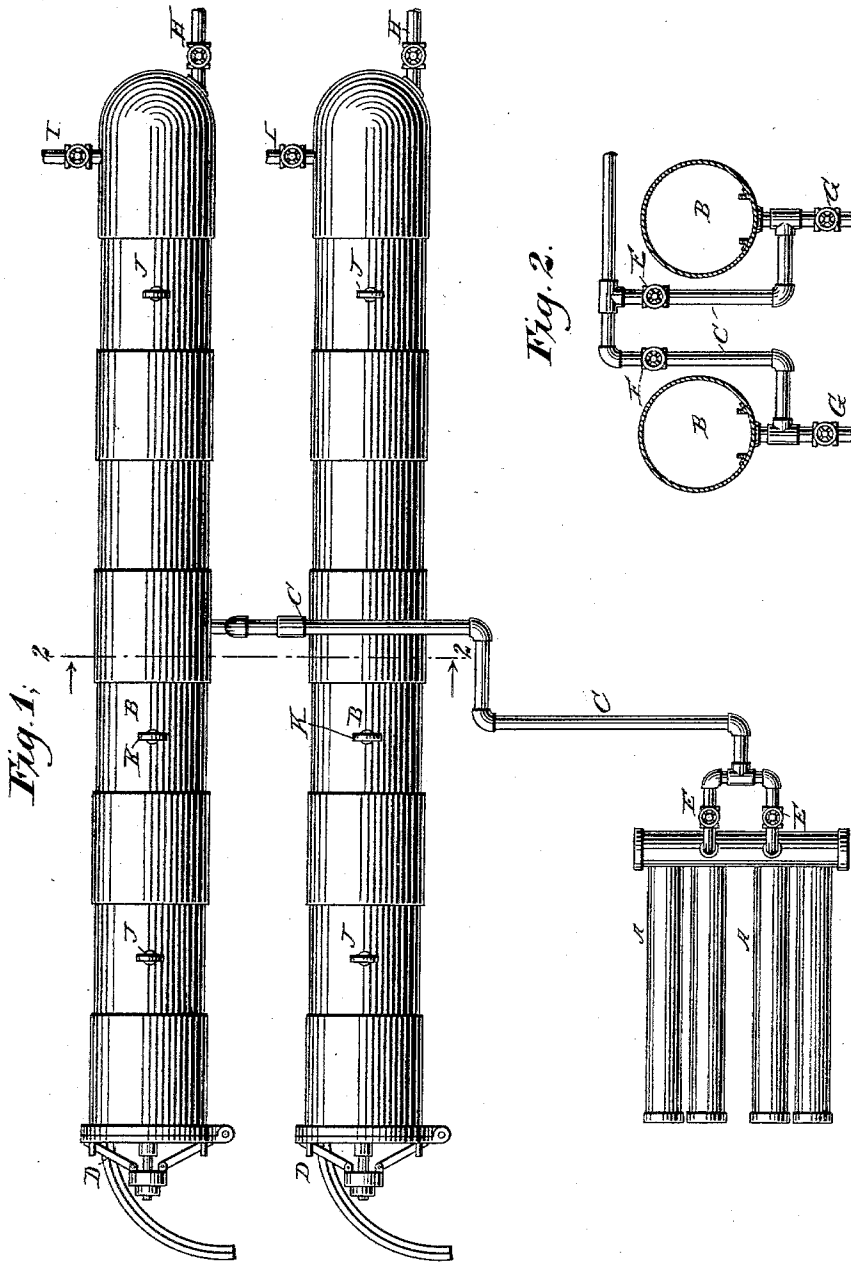


(No Model.)

J. T. LLOYD.
VULCANIZING WOOD.

No. 566,591.

Patented Aug. 25, 1896.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN T. LLOYD, OF NEW YORK, N. Y., ASSIGNOR TO ANDRIES BEVIER,
OF SAME PLACE.

VULCANIZING WOOD.

SPECIFICATION forming part of Letters Patent No. 566,591, dated August 25, 1896.

Application filed May 31, 1895. Serial No. 551,155. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. LLOYD, of New York city, in the county and State of New York, have invented a new and Improved
5 Process for Preserving Wood, of which the following is a full, clear, and exact description.

The object of my invention is to so prepare wood by creating within it a compound of
10 creosote and other antiseptics that it will resist the attacks of the *Teredo navalis* or any other form of animal or vegetable life to which wood is ever liable.

The invention consists in the novel steps
15 of the process, as hereinafter fully described, and pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference
20 indicate corresponding parts in both the figures.

Figure 1 is a plan view of an apparatus that may be employed in carrying out the process, and Fig. 2 is a section taken substantially on the line 2 2 of Fig. 1.
25

My process employs live steam at a high pressure and temperature brought in direct contact with the wood. The object of the high heat, which ranges from 325° to 500°
30 Fahrenheit, is to destroy all of the inherent germs and bacteria, coagulate the albuminous sap, and to produce and retain in every portion of the wood an oily tarry resinous compound of creosote and other antiseptic materials in an insoluble condition, in
35 contact with which no form of animal or vegetable life can exist. The fact is recognized that the *Teredo navalis* will not attack that portion of wood which has been impregnated with creosote so long as the creosote remains in it. Creosote has heretofore been forced
40 into the outer portions of wood, and necessarily but to a limited extent, producing but a superficial protection. The checking of a pile or its abrasions by physical forces will expose the untreated part, which the *Teredo* will attack and destroy. Creosote such as is used in treating or impregnating the wood is more
45 or less soluble in water, and will wash out and leave the pile or timber unprotected.
50

In my process creosote compounds are pro-

duced within the wood by the intense heat which I employ, and are kept from escaping or vaporizing during the treatment by the application of sufficient steam-pressure to prevent it. This compound permeates every portion of the wood and is made insoluble by
55 uniting with solidified gums or resins and coagulated albumin. It cannot be washed out by the action of the water and no untreated part of the wood can be exposed.

In carrying out the process I preferably make use of the apparatus shown in the drawings, but any suitable apparatus may be employed for the purpose, and in any manner which will accomplish the object.
65

A A represent high-pressure boilers adapted to provide the steam used in the process.

B B are tanks or cylinders in which the wood is placed while being treated. One or
70 more can be used.

C are pipes through which live steam is conveyed from the boilers to the treating chambers or cylinders.

D are doors to the treating-cylinders.
75

E are steam-outlet valves from the boilers A A, and F are steam-inlet valves to the cylinders B, while G represent outlet-valves from the treating-cylinders.

H are valves for the admittance of cold air
80 when the wood is cooled down at the latter end of the treatment.

I are valves to allow of the escape of moisture when the cooling-down process is being performed.
85

J represent pyrometers, and K pressure-gages.

The wood is piled on cars and run into the cylinders B on iron tracks. The doors D are then closed, and the steam-valves E and F
90 are opened, the outlet-valves G being closed. This will admit steam to the cylinders B and in direct contact with the wood to be treated. The steam is regulated and pyrometers will indicate the proper temperature to which the
95 wood is to be subjected. When this heated steam has been applied to the wood for a proper length of time, its duration depending upon the nature of the wood to be treated, the steam-valves E and F are closed, while
100 the outlet-valves G are opened, allowing the escape of steam and pressure from the cylinder

ders. The air-valves H, together with the escape-valves I, are also opened at this time, and atmospheric air is allowed to enter through the valves H, circulate through the cylinders, and pass out at the escape-valves I, carrying with it the heated air in the top of the cylinders and any moisture which it may contain. The condensation which ensues during any part of this process is carried off through stop-cocks in the bottom of the cylinders, which do not appear in the drawings.

The success of the process depends upon the complete retention in the wood of all of its contents and their conversion by heat into an oily tarry creosote compound, so that the wood will effectually resist animal and vegetable attacks.

In carrying out this process it is absolutely necessary to subject the wood to sufficient heat to chemically change its contents into an oily tarry creosote compound as referred to, and to apply such pressure during the treatment as is necessary to prevent ebullition or vaporizing and consequent loss of the wood contents under the high degree of heat used, and also to prevent, by some medium, burning or scorching of the wood during its treatment and while subjecting it to a temperature high enough to burn or destroy it under ordinary conditions.

I am aware that various methods of vulcanizing wood have heretofore been practised in which a dry heat from steam-pipes has been used to transform the natural sap and juices of wood into stable antiseptic compounds, and in which an air-pressure has been contemporaneously employed to hold the said sap and juices in the wood against their tendency to evaporate when heated. I am aware, also, that superheated steam of a temperature of 300° has been admitted into direct contact with and circulated through the wood to preserve it by solidifying the resins. I have discovered, however, that the presence of air (at the high temperature required to transform the sap and juices into gummy or tarry products) involves the partial burning or oxidizing of the wood and both weakens and discolors the same. I have also found that the dry character of superheated steam causes it to rapidly absorb the juices which I desire to concentrate and retain in the wood, and which dry superheated steam when circulated through the wood rapidly takes away their valuable substances and depletes the wood of the very ingredients which I desire to retain and transform.

My invention proceeds upon the basis of employing a still or stagnant bath of steam (in contradistinction to a circulation of steam) and live steam (in contradistinction to super-

heated steam) of a temperature of 325° to 500° Fahrenheit, which is admitted to direct contact with the wood and without the presence of any added air in the main part of the process. The live steam that I use is the normally saturated but very hot steam that comes directly from the boiler with its normal amount of moisture, and which, while it may be as hot as or even hotter than superheated steam, does not have the dry, absorbent, and thirsty qualities of superheated steam, which will take up moisture from whatever it comes in contact with.

My process attains the following threefold result: first, the temperature result of transforming the sap and juices of the wood into the antiseptic creosote tarry-like substances; secondly, the pressure result of holding these developed antiseptic substances in the pores of the wood against evaporation or distillation, where they are fixed in such insoluble forms as to be permanent, in contradistinction to being absorbed and drawn out by a circulation of dry superheated steam; and third, the antioxidizing result of preventing the carbonizing or partial burning of the wood, which prevention is due to dispensing with the introduction of air or its equivalent, dry superheated steam, and in the place thereof using the wet live steam. The air which is admitted at the end of the antiseptic treatment in no way affects the wood prejudicially, as its sole use is for cooling the charge, and it is circulated over the wood and allowed to escape so as to carry off the moisture and prevent it from condensing on the wood as the charge cools down. Wood thus treated is well adapted for marine architecture, and is neither affected by decay nor insect life.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The process herein described of vulcanizing wood so as to retain therein the volatile and other antiseptic substances produced by the treatment, which consists in subjecting the wood in a closed chamber under steam-pressure only, that is, to the direct action of a still or stagnant body of live wet steam at a temperature varying between 325° to 500° Fahrenheit, whereby the substances contained in the wood are converted by the heat into insoluble antiseptic compounds, and these compounds held and permanently fixed in the fibers by the steam-pressure, and carbonizing of the wood prevented, substantially as herein shown and described.

JOHN T. LLOYD.

Witnesses:

CLINTON W. BIRD,
F. S. JUSTICE.