(No Model.)

J. C. MALLONEE.

PROCESS OF PRESERVING WOOD.

No. 386,999. Patented July 31, 1888.

Fig. 1.

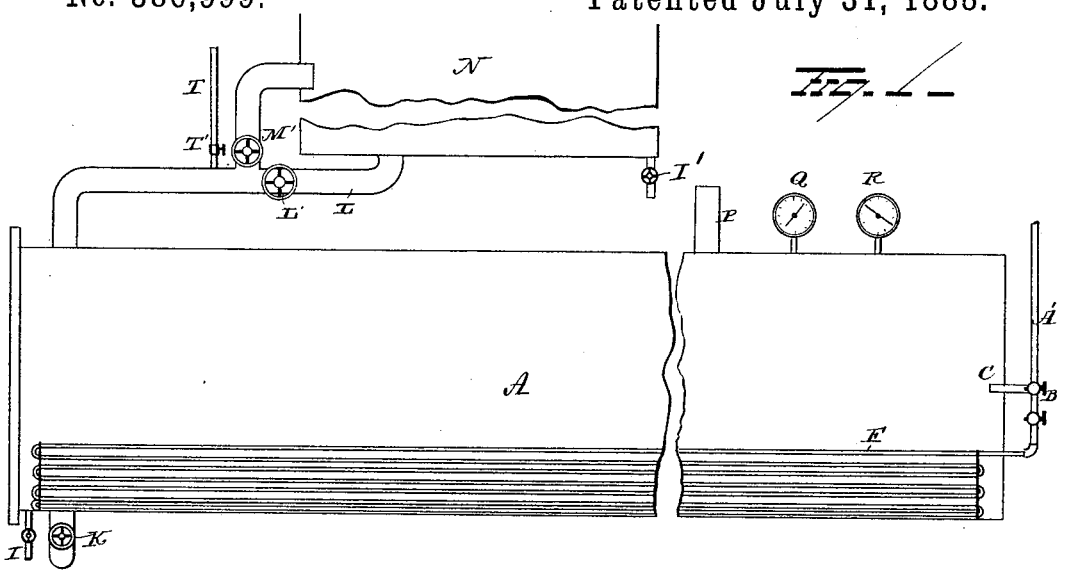


Fig. 2.

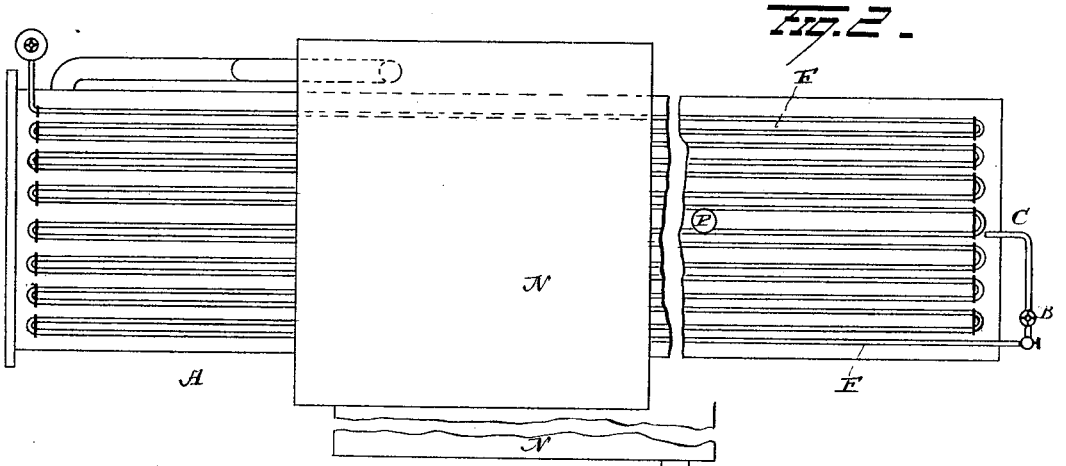
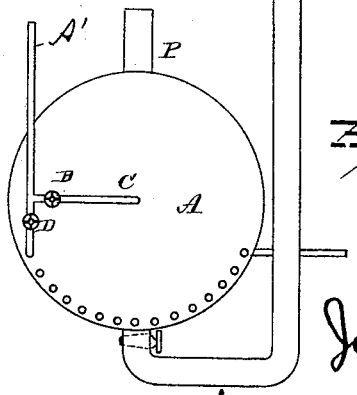


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN C. MALLONEE, OF CHARLESTON, SOUTH CAROLINA.

PROCESS OF PRESERVING WOOD.

SPECIFICATION forming part of Letters Patent No. 386,999, dated July 31, 1888.

Application filed July 16, 1887. Serial No. 244,535. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. MALLONEE, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in the Process for Preserving Wood; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved process for saturation of wood with preserving-liquids to prevent them from decaying.

Heretofore there have been in use two well-known processes known as the "vacuum process" and the "dry process," for the injection of metallic salts and creosote oils into wood, for the purpose of preserving it from decay. In both these processes there exist defects that prevent their general use for the purposes intended.

The object and nature of my present invention are to devise a new method or process to carry the same into effect, that will be entirely free from the defective features incidental to the two processes mentioned, and that will perfectly accomplish the saturation of the pores or cells of timber exposed to its action, rendering it non-liable to rot or decay without possible injury to the fiber; and, further, the plant employed to utilize my improved novel process is simplified and cheapened, as compared to the devices employed in other processes, vacuum or dry.

My apparatus is inexpensive, simple in construction, effective in use, avoids the danger of carbonization of the fiber of the wood, and requires less labor in its operation.

In the drawings making a part of this specification, Figure 1 is a side elevation in section of the steaming and impregnating apparatus. Fig. 2 is a plan view of the steam-cylinder in which the wood is placed to submit it to treatment, the several pipes and valves being shown in position. Fig. 3 is an end elevation of the boiler and attached parts.

I will first state, briefly, the essential features of my invention and point out its salient novel points, and afterward give a specific detailed description of the mechanism employed and its operation as applied to the supersaturation of wood with creosote or other liquid to preserve it from decay.

In my process I discard the use of exhausting and forcing pumps or any other complicated machinery that adds to the cost of a plant and involves the employment of skilled labor to operate it. I provide a metal cylinder and place in it a continuous coil of steam-pipe. I also make provision for the introduction of steam of a comparatively low temperature into and through the interior of the cylindrical sealed chamber, into which wood to be treated is placed.

First the wood is thoroughly steamed, as in the vacuum process. Then the steam that is in the cylinder is exhausted and high-pressure steam is passed through the coil to perfectly dry the wood and expand the cells that have had the albuminous matter previously extracted. After this has been effected and all insect larvæ or animalcules destroyed, the preserving-oil is admitted to enter the pores and perfectly fill them, this being accomplished by the heating of the steam-coil and expanding the creosoting materials. This is a brief summary of my improved process. It is apparent that it is a common-sense application of natural laws to effect the desired result with the least possible handling and without the use of costly appliances—such as pumps and steam-engines—to drive them.

Referring to the drawings, A represents the cylinder I employ. This is made of boiler-plate of a thickness to insure proper strength and of length suited to the length of timber to be operated upon. The ends may both be provided with sealed doors, that will afford access to the interior of the cylindrical chamber; or one end may be permanently closed, while the other is furnished with a door, as stated, the latter method of construction being preferred.

In case large amounts of timber are to be operated upon a track is placed in the cylinder, and the latter is so located as to allow a car to enter it from a railway leading to it.

A steam-pipe, A′, that leads steam from a steam-generator (not shown) is made to enter by a branch, C, to furnish steam to the interior of the cylinder A, a valve, B, closing this branch pipe, (see Fig. 3,) and below the branch C a valve, D, is located that controls the in-

flux of steam into the continuous tubular steam-coil F, which is located near the inner surface of the cylindrical shell A at the lower side of the same, as shown, although I do not restrict myself to such a position or construction of the coil, as it is evident that many changes may be made in its form, and its position may also be varied. I prefer to place the coil where shown, as better adapted to distribute the heat radiated from its surface. At the opposite end from where the steam is admitted into the coil F a drip-pipe, I, is placed to discharge condensed steam from the cylinder A, it being connected to the shell of this cylinder and made to tap it.

When the cylinder A is charged with timber that is to undergo treatment, the same is placed in the cylinder regularly with provision for steam-circulation afforded by keeping the wood apart on strips that are introduced between successive layers. After closing the door to seal the chamber hermetically, the steam is admitted directly into this chamber at a pressure of about sixty pounds, and this pressure is kept up for a period of time that may vary from one to five hours, depending upon the nature and quantity of wood that is to be operated upon. I prefer the pressure of about sixty pounds, but do not desire to exactly limit my process to the employment of that exact pressure. I find, however, that good results are afforded by using steam of that pressure or temperature.

If steam is taken from a steam-generator that carries a higher pressure than sixty pounds, as is probable, owing to the fact that higher steam-pressure is needed in the coil F, a provision must be made to maintain the desired pressure of sixty to one hundred pounds, which is afforded by the discharge-pipe P, placed on top of the cylinder A. This pipe P is fitted with an automatic relief-valve constructed similarly to a spring safety-valve or flip-up valve in common use; hence it is not necessary to show its manner of construction. The steam that enters when it reaches a pressure of sixty to one hundred pounds, as may be desired, will so remain, and an excess of pressure will raise the valve and discharge it through the pipe P. The condensed steam that will accumulate as boiling water in the bottom of the chamber A, together with the steam, will effectually dissolve the albuminous matter in the cells of the wood, the fixed air will be expelled, and all embryo insects, larvæ, and animalcules that injure the wood will be destroyed. This completes the first step of the process. The steam is now cut off from direct entrance to the cylinder A by closing cock B. Steam of high pressure—say from sixty pounds to one hundred pounds per square inch—is now admitted into the steam-coil F, and is circulated therein until a heat is attained ranging from 200° to 500° Fahrenheit. This heat will vaporize the water remaining in the bottom of the cylinder, and should be maintained for from thirty to sixty minutes to insure a thorough heating and softening of the wood fiber. The vapor-pipe P is now gradually opened by lifting its valve, as is also the drip-pipe I, to relieve the cylinder A of all internal pressure, and the heat maintained by circulation of steam in the steam-coil F, which steam must be of high pressure to insure great heat. The heat from the steam-coil F is kept up to the maximum degree until no more vapor escapes from the vapor-escape pipe P, and when this point is reached it indicates that the timber or lumber undergoing treatment is thoroughly deprived of all moisture and its pores or cells open and free to receive the preservative oil. The cock D is now closed to cut off steam from the coil F and the interior of the cylinder A allowed to cool off to 400° Fahrenheit, or somewhat less. The drip-cock I is also closed to seal the bottom of the cylinder. The cocks L′ and K control the discharge of creosote-oil from the tank N through the pipe L, said tank N being preferably located in fixed position above the cylinder A a proper distance to cause the liquid it contains to be discharged by gravity into the bottom of the cylinder, as shown in Figs. 1 and 3, this operation being continued until the cylinder A is completely filled with creosote-oil or other preservative that may be preferred. The vapor-pipe P, remaining open to facilitate the introduction of the oil by allowing the air in the cylinder to escape, is now closed, and steam of high pressure is again admitted into the coil F. When the oil is heated by means of the steam-coil F, it will be expanded in volume and be forced throughout the entire cellular structure of the wood, the increase of pressure being indicated by the pressure-gages Q R. When the desired pressure is attained in the cylinder A, the steam-cock D is closed to cut off steam from the coil F. The pressure in the cylinder A will rapidly decrease by reason of the absorption of the wood in the cylinder, which will cause a vacant space to form in the upper portion of the chamber A. The valves L′ M′ are allowed to remain closed, as they were when the high-pressure steam was last introduced into the coil F, and the lower cock, K, is opened, as is also the valve T′ on a small steam-pipe, T, which latter is connected to a steam-generator and taps the oil-conducting pipe L.

The introduction of steam into the pipe L will force its contents by direct steam-pressure into the cylinder A to replenish that taken up by the wood. When the space is filled in this manner, the cock T′ and cock K are closed and the steam admitted to the coil F to expand the oil in the cylinder A.

The operation described is repeated until the gages Q R show a continuous pressure, which will indicate that the wood is thoroughly impregnated or filled throughout its structure with the preserving oil or liquid. The charging of the wood having been completed, the operation of relieving the cylinder A of the oil with which it is filled is accomplished by simply opening the cocks M′ and K,

which will cause a free passage from the cylinder A to the tank N to be afforded. The direct steam branch pipe C is now opened and steam admitted through its valve B into the cylinder A. The volume of steam by its pressure will speedily expel all the oil from the cylinder through the heat-pipe L and cause it to rise and enter the supply-tank N, from whence it had previously been drawn.

The operation of expelling the oil from the cylinder A will occupy but a few minutes time, and as a certain amount of free steam will also enter the tank N with the oil, it, when condensed into water being heavier than the oil, may be drawn off from the bottom of the tank N by opening the cock on drain-pipe I′ preparatory to another operation. At this stage the cylinder head or door may be opened and the timber or lumber taken out, and it will be found thoroughly saturated with the creosoting-oils.

Many slight changes might be made in the mechanical details of the mechanism I show to carry into effect my improved process without a departure from the spirit of my invention. Other means of obtaining the requisite heat and pressure may be utilized and a different preservative liquid be employed; hence I do not limit myself strictly to the exact mechanism or the use of creosote, although I give preference to it or other products of resinous distillation for the purpose.

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

1. A process for preserving wood, consisting in subjecting the wood to the action of steam to open the cells of the wood, then drying the wood, and then filling a chamber containing the wood with the preservative liquid and expanding the latter by heat and forcing it into the cells of the wood, substantially as set forth.

2. In a process for preserving wood, consisting in first subjecting the wood to the direct action of steam to open and expand the cells, then drying the wood by the radiant heat of high-pressure steam, and then filling the chamber containing the wood with a liquid preservative and applying heat to the latter and expanding its mass and forcing a portion thereof into the cells of the wood, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN C. MALLONEE.

Witnesses:
L. M. HUMMEL,
J. N. MALLONEE.