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*Ira Hayford.*

PATENTED MAR 22 1870

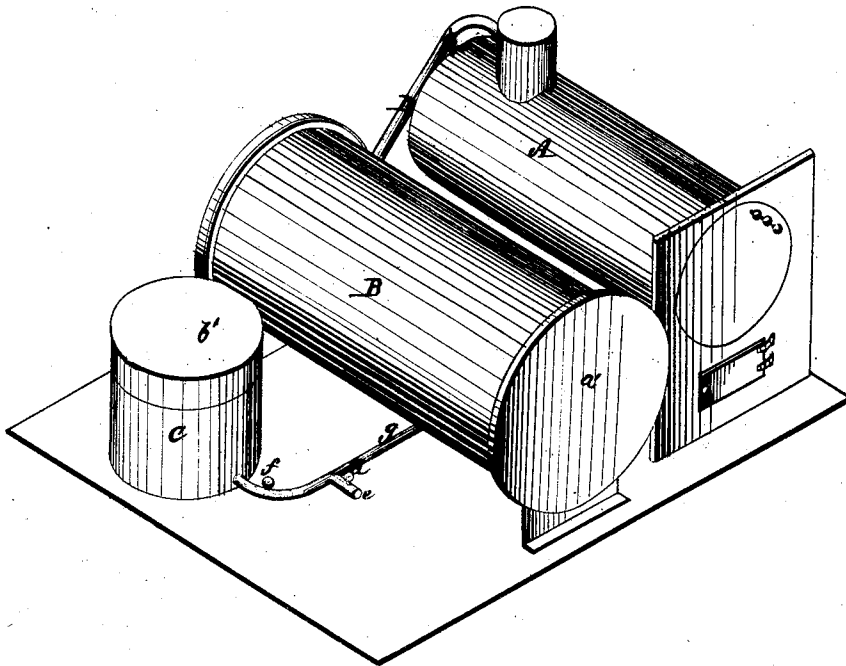
*Wood Preserving Process.*

Witnesses:

*E. L. Lewis*  
*Edw. Griffith.*

*Ira Hayford*  
*by his Attorney*  
*Fredrick Curtis.*

*Fig. 1.*



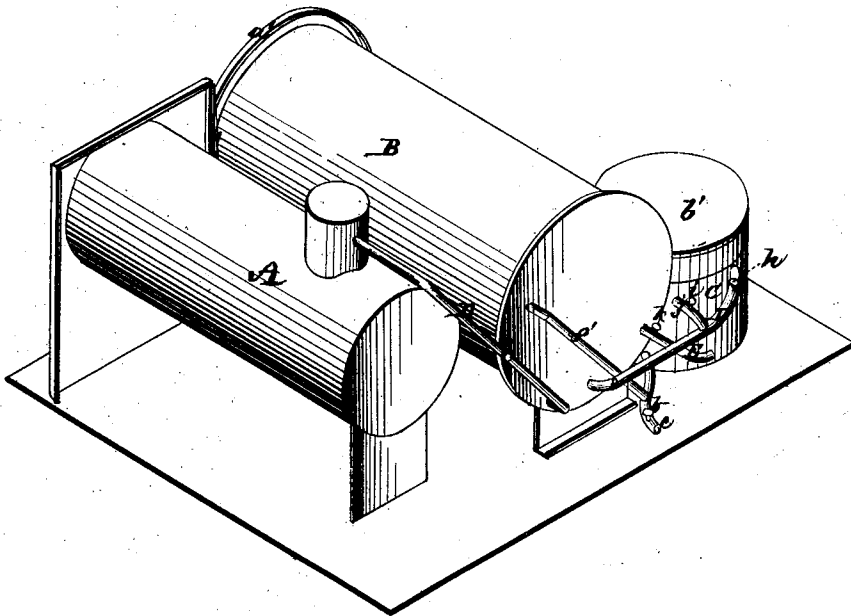
*Ira Hayford.*

Witnesses.

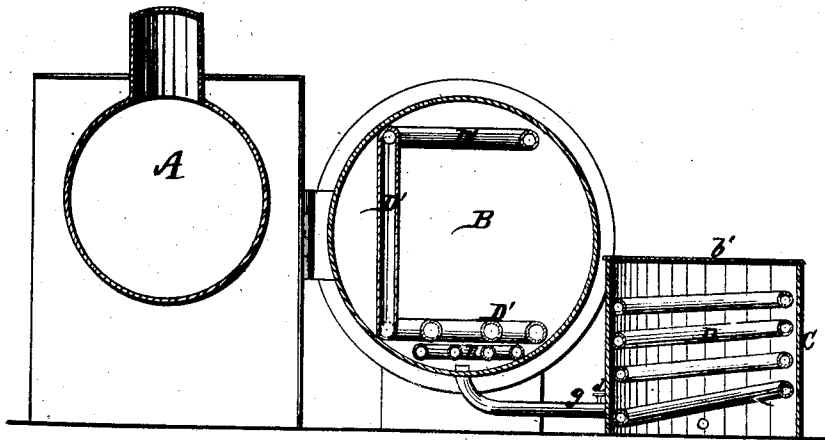
*E. H. Lewis*  
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*Fig. 2.*



*Fig. 4.*



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Witnesses.

*E. L. Brown*  
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Fig. 3.

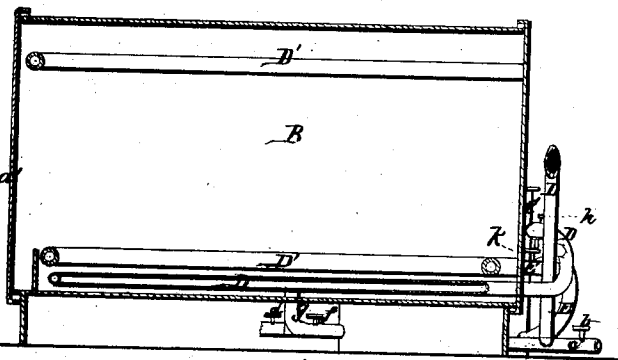
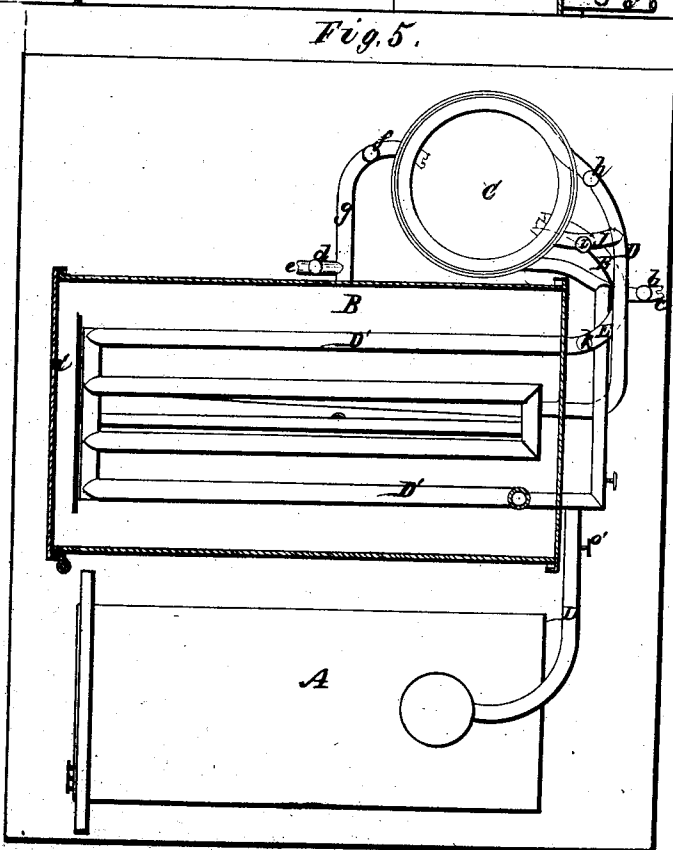


Fig. 5.



# United States Patent Office.

IRA HAYFORD, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 101,012, dated March 22, 1870.

## IMPROVEMENT IN THE PROCESS AND APPARATUS FOR TREATING WOOD.

The Schedule referred to in these Letters Patent and making part of the same

To all to whom these presents shall come:

Be it known that I, IRA HAYFORD, of Boston, in the county of Suffolk and State of Massachusetts, have made an invention of a new and useful Process for Treating Wood, in order to preserve as well as to improve the appearance of the same; and do hereby declare the following to be a full, clear, and exact description thereof, due reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a perspective representation;

Figure 2, a like view; and

Figure 3, a longitudinal section;

Figure 4, a vertical section through the cistern and retort, as well as the steam-generator; while

Figure 5 is a horizontal section, taken longitudinally of the said retort.

In the drawings—

A denotes a steam-generator, of any well-known or desirable construction, while alongside of this generator is disposed a horizontal cylindrical retort, B, this retort being composed of metal, sufficiently strong to withstand an internal pressure of from one to two hundred pounds per square inch, and being provided with a door, *a*, formed of such metal and so applied to the retort as to be capable, when secured in place, of sustaining a pressure equal to that of the body of the said retort.

In close proximity to the retort B will be seen at C an upright cistern or tank, this cistern being composed of material and possessing strength similar to that of the retort B, since it is subjected to the same pressure, a cover, *b*, being applied to it, which, when the apparatus is in operation, is to be securely bolted and confined in place.

D denotes a steam-conduit leading from the generator A, such conduit being conducted into the retort B, and caused to traverse its greater area in an irregular or serpentine direction, the interior of this conduit creating a large radiating surface, in order to maintain a high temperature within the retort.

The conduit D after circulating throughout the retort B is returned to the outside of the same, and thence carried into and compelled to course about the interior of the cistern C, and then effect its exit at the opposite extremity of said cistern, the purpose of thus carrying the steam-conduit about the interior of the cistern being to heat its contents, and maintain them in a state of liquefaction.

After leaving the cistern C, the conduit is made to enter the upper part of the retort B, in order to convey steam into the same.

As it enters the interior of the retort B, the conduit D makes part of or is prolonged into a second irregular or serpentine pipe, D', this pipe D' being first carried to and spreading over the lower portion of the retort

above the conduit D, thence upward and expanding over the upper portion of the inner area of such retort, the lower surfaces of the upper portions of the pipe D' being foraminous or pierced with numerous small holes, in order that the preservative agents hereinafter referred to be contained in such pipe may descend in a shower or spray upon and envelop the wood placed in the retort, it being understood that the extreme termination of the showering-pipe D' is within the retort.

Between the cistern C and the retort B the conduit D is provided with a blow-off pipe, shown at *c* in the drawings, this blow-off pipe being furnished with a cock, *h*.

In addition to this blow-off pipe *c*, the conduit D is formed with a branch or offset, *j*, which leads into the cistern C, and serves under certain conditions to admit steam directly into the interior of the same.

In addition to the conduit D, which joins or unites with the upper part of the showering-pipe D', within the retort B, a second and short pipe or conductor, E, connects the lower extremity of the pipe D' with the interior of the cistern C, a cock, *k*, being placed in this pipe, as shown in the drawings.

A cock, *o*, is placed in the conduit D immediately after its exit from the retort B, while a third cock, *h*, is also placed in the conduit D, immediately before its entrance into the cistern C.

A cock, *i*, is placed in the branch or offset *j* of the conduit D.

In addition to the various pipes hereinbefore enumerated, a return feed-pipe, *g*, effects free communication, when its cock, shown at *f* in the drawings, is open, between the bottom of the retort B and that of the cistern C, this feed-pipe *g* being formed with a blow-off branch, *e*, which in turn is turned with a cock, *d*.

The generator A is for the purpose of generating steam which is used in the apparatus, as hereinafter explained.

The retort B is to contain the wood to be treated while undergoing the process of being-steamed, as it is generally called, and of receiving its charge of foreign substances with which it is to be impregnated.

The cistern C, as before stated, is to contain the chemical agents or other materials with which the wood is to be impregnated, whether dead oils, so-called in some of their varieties or products, paraffine, palm-oil, or other oleaginous matters, or any desirable substances.

I am aware that many and various processes are in existence for preserving wood from decay, and from changes of conditions in its bulk by the action of the atmosphere, as well as to improve its texture and appearance.

No far as my knowledge extends, however, no means

has heretofore been originated for varying and regulating the amount of material to be injected into the pores of the wood, and as some of the substances now employed in treating wood are expensive, and in view of the fact that wood will absorb twice its own weight of such substances, the value of my invention becomes apparent when the fact is understood that this proportion of preservative agents is greatly in excess of what is necessary, or even desirable, and only adds to the expense of the process.

With this knowledge, my invention may be said to consist chiefly in providing a means of varying and regulating the quantity of materials admitted to the retort, and consequently injected into the wood, although my invention possesses other characteristics and novel features which enhance its value.

The employment of an auxiliary or independent cistern or receptacle, into which the preserving agent is placed previous to its entrance to the retort, enables me to charge the wood with the quantity desired, in order to accommodate the wishes or necessities of the owners of the lumber.

Hence, should such parties desire a certain amount of lumber charged with a given quantity of preserving material, my process enables me to effect such object. As this quantity of material varies considerably in different instances, I am enabled to regulate the expense of the preparation of the wood to suit circumstances.

Having thus described the mechanical construction of the apparatus in which I carry out my present invention, as well as explained the nature and purposes of such invention, or the process which embodies such invention, I will now refer to the mode of treatment of wood as carried on in pursuance of the object herein stated, prefacing such explanation by the remark that, upon starting with the process, the cocks *a* *h* *o* hereinbefore mentioned are opened, and the cocks *d*, *f*, *i*, *k*, and *b* closed.

Steam is generated in the boiler A. The wood in the determined quantity is to be deposited within the retort B upon racks suitably disposed therein, or upon a car which is trundled into such tank, while the requisite and predetermined quantity of preservative material, with which such wood is to be charged, is placed within the cistern or receiver C, the door of the generator B as well as the cover of the cistern being securely fixed in place, thus tightly sealing their contents.

Steam from the generator A passes into and through the conduit D and into the retort B, such steam, in its transit through this tortuous channel, heating and liquefying the contents of the cistern C, as well as permeating and expanding the pores and cellular structure of the wood, and expelling therefrom the moisture or sap and gases, and coagulating the albumen, the ensuing evaporation, condensation, and escape of the vapors within, and from the pores and cells, leaving the wood in a porous and soft state, highly favorable to receive and absorb the preserving agents.

This preparatory treatment of the wood having been effected, the cock *a* of the conduit D is closed, and the cock *b* of its blow-off or exhaust-pipe *c* opened, the steam, by this means being shut off from entering directly the retort B, and allowed to escape into the atmosphere, or otherwise utilized, the object in continuing this circulation of steam being to maintain the temperature of the cistern C, and the liquefaction of the contents.

Simultaneous with the act of closing the cock *a* be-

fore mentioned as shutting off direct supply of steam to the retort B, the cock *d* of the escape-pipe *e* is opened to permit of exit of vapor, condensed water, impurities from the wood, &c., from such retort, and create a vacuum therein, the cock *f* of the feed or return-pipe *g*, of which the pipe *e* is a branch, being at this time and previously closed.

After the escape from the retort of excess of steam, condensed water, sap, and impurities from the wood, as explained, the cock *d* is to be tightly closed, thus perfecting and maintaining the desired vacuum, or partial vacuity of the retort B.

The cock *d* having been closed as explained, and the requisite vacuum obtained within the retort, the cocks *h* and *b* of the conduit D are closed, and the cock *i* of the branch or offset *j*, which up to this time has remained closed, as well as the cock *k* of the connecting-pipe E, which has also been closed, are opened, thus permitting steam from the generator A to pass directly under pressure into the cistern C, and drive from it the preservative or other substances contained therein these contents being forced into and through the meandering showering-pipe D', and from thence precipitated upon and about the wood below, and into the pores and cells of which they enter.

The excess of these last-mentioned substances above what are absorbed at first by the wood, falls to the bottom of the retort.

The proper time having elapsed for this first act of charging the wood to be consummated, the cock *i* of the offset pipe *j*, before mentioned, is closed, or returned to its original position, and the cock *f* of the return feed-pipe *g* opened for the first time, the cocks *h* and *a* being also opened as originally stated, and the cocks *b* and *k* closed as at the starting point of this explanation.

These last-mentioned positions of the various cocks allow the steam from the generator A to enter the retort B, and derive from it the preservative agents or impregnating substances which have accumulated upon its bottom, through or by means of the return-pipe *g* back into the cistern C, where they collect in readiness to renew their journey to the retort, as at first explained, which brings us to our starting point.

This entrance to and discharge from the retort of the impregnating agents is to be continued until the wood has entirely absorbed the same, when it is to be removed, and is ready for use.

My process is equally applicable to the treatment of wood for arresting its decay for a great length of time for the various purposes of building bridges, wharves, &c., for railway-ties, pavements, and for a multitude of uses which it is not considered herein necessary to enumerate, or for preparing wood for innumerable applications in the fine arts.

#### Claims.

1. The process herein described, for treating wood for various useful or ornamental purposes.
2. An apparatus for treating wood by impregnating its pores and cellular structure with various agents, so constructed or provided and operating as to be enabled to vary and determine the amount of impregnating materials injected into the wood, for the purpose hereinbefore stated.

IRA HAYFORD.

Witnesses:

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EDW. GRIFFITH.