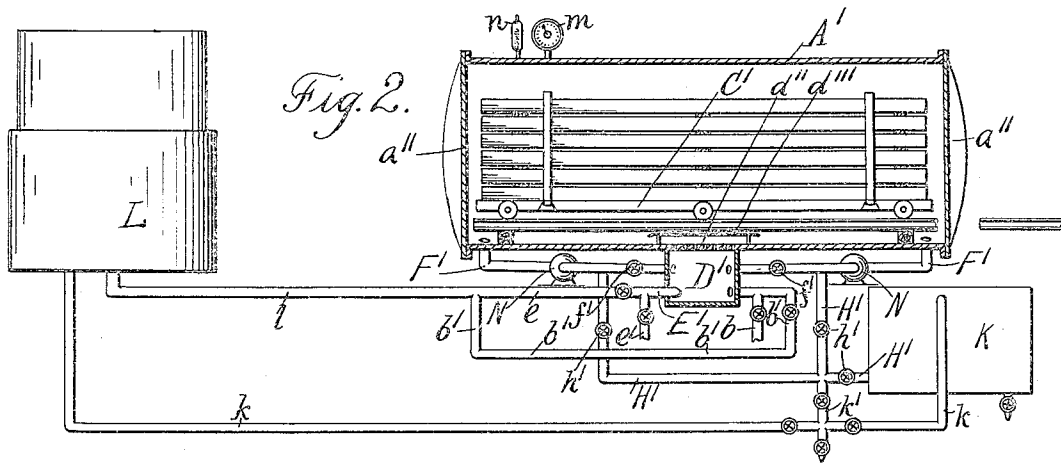
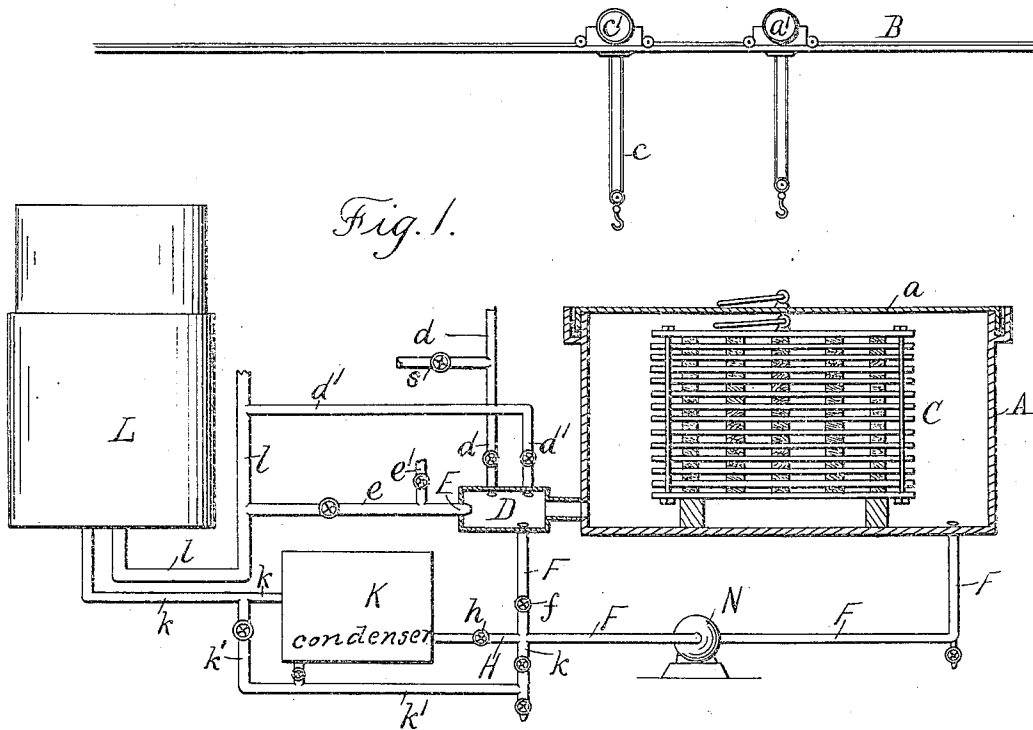


B. LOOMIS.  
 PROCESS OF DRYING AND SEASONING WOOD.  
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# UNITED STATES PATENT OFFICE.

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PROCESS OF DRYING AND SEASONING WOOD.

1,050,151.

Specification of Letters Patent.

Patented Jan. 14, 1913.

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To all whom it may concern:

Be it known that I, BURDETT LOOMIS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Processes of Drying and Seasoning Wood, of which the following is a specification.

This invention relates to the process of drying and seasoning wood to prepare it for the market or for subsequent treatment with preservatives, or with fireproofing or coloring solutions.

The object of my invention is to provide for thoroughly and uniformly drying and seasoning wood from the surface to center without checking or cracking or formation of hard crusts or shells near the surface of the wood.

I have discovered that, by the alternate operations of gradually heating wood by hot gas or products of combustion in a closed chamber and then gradually cooling the same by the gradual admission and circulation of cold gas or air, repeated as often as necessary, depending upon the size and kind of wood treated, the moisture will be expelled from the interior of the wood, and the operation of seasoning and drying perfectly effected without formation of hard crusts near the surface and without checking or cracking, resulting in the production of superior lumber, adapted directly for various uses, and particularly for subsequent treatment with preserving, fire-proofing or coloring solutions.

The matter constituting my invention will be defined in the claims.

I will now fully describe my invention with reference to the accompanying drawings which illustrate suitable apparatus for carrying out the process and in which—

Figure 1 represents a vertical longitudinal section of a tank and connections for treating comparatively small pieces of wood. Fig. 2 represents a similar section of a long tank for treating poles or other long heavy timber.

Referring now to Fig. 1, the treating tank A is made of metal or concrete and is provided with a tight fitting cover *a* which may be connected by ropes or chains with a trolley *a'* running on rails B. The material to be treated, such as boards, shingles or other forms of small lumber, will preferably be

placed in a cage C which is preferably provided at the top with a link which is connected by a rope or chain *c* with a trolley device *c'*. The trolley may be provided with a winding drum for raising and lowering the cage.

With the lower part of tank A, or at any desired height in the wall, I connect a combustion chamber D, having an air inlet pipe *d* for admitting an excess of air, and a gas inlet pipe *d'*, for admitting an excess of gas when required from the holder. A steam supply pipe *s* connects with pipe *d* for supplying steam, if required, to tank A. With the outer end of this combustion chamber connects a burner E having a gas supply pipe *e* and an air supply pipe *e'*. The gas pipe *d'* and *e* preferably connect with a main gas pipe *l* leading from a holder L and such pipes are provided with valves as shown. A circulating pipe F may connect with the bottom of tank A, or at other suitable points, and also with the combustion chamber D, and is provided with a valve *f*. A drip or discharge pipe H, having a valve *h*, connects with pipe F and leads to a condenser K, and a pipe *k* connects the condenser with the holder L. A by-pass pipe *k'*, provided with a valve, connects with pipe H and, passing around the condenser, connects with pipe *k* leading into the holder. By this arrangement of pipes tar-water and vapor may be passed off through pipe H to the condenser, or gas may be passed through pipe H and by-pass pipe *k'* directly into the holder, so that gas may be circulated from tank A into the holder and thence back through pipe *d'* into the tank. All pipes will be provided with valves where required for successfully conducting the operation.

A circulating pump N is connected in pipe F, by means of which a gaseous mixture will be more effectively drawn off from the treating tank A and caused to circulate through chamber D back into contact with the wood in the treating tank, or through the condenser, the holder and pipe *d'* back into the treating tank for cooling down the heated charge.

Referring now to Fig. 2, the treating tank is in the form of a long cylinder A' provided with removable heads *a''* and with a track for a car C', containing poles or other long heavy timber.

The combustion chamber D' is preferably made cylindrical and connected centrally to the bottom of tank A', it is provided at the top with a perforated plate *d''* and above the same with a baffle plate *d'''* for distributing gas and products of combustion, so that they will not impinge directly on the timber to be treated. The burner E' is provided with gas and air supply pipes *e* and *e'* and connects with the lower part of chamber D'. The burner nozzle may be connected tangentially to chamber D' for discharging the flame and products at a sharp angle against the wall and cause them to circulate around in the chamber before escaping through the perforated top plate. A pipe *b* for admitting cold air and a pipe *b'* for admitting cold gas connect with combustion chamber D'.

Gas and vapor circulating pipes F', having valves *f'*, preferably connect with the ends of cylinder A' and with the combustion chamber D'. Drip or discharge pipes H', having valves *h'*, connect with pipes F' and may lead to a condenser K or directly to a gas holder. These pipes serve for carrying off an excess of gas or vapor and returning it to the holder or for discharging tar-water or other liquid material expelled from the wood. A pressure gage *m* and a thermometer *n* may be applied to tank A' for indicating the pressure and temperature in the tank.

The process may be conducted substantially as follows: The cage C, being filled with loosely laid boards or other form of lumber, is lowered into the tank and the cover *a* tightly closed in any convenient manner. The holder L is preferably supplied with a mixture of producer-gas and water-gas, but other kinds of gas may be used. The holder may be supplied with natural gas where available. Gas and air are admitted to the burner through pipes *e* and *e'* and ignited and burned in the combustion chamber D. A small flame will at first be produced and gradually increased for gradually heating the wood in tank A. This heating may be continued for a period of one to six hours according to the size and character of the wood under treatment. The temperature will be gradually increased up to about 300° Fahrenheit. The range of temperature, however, will be greatly varied, according to whether the wood is comparatively dry or green. If the wood is comparatively dry, moisture in the form of steam may be admitted to the combustion chamber through pipes *s*, and *d*, and the heat may be moderated and controlled by supplying cold gas through pipe *d'* to prevent too rapid heating and checking or cracking of the wood. The material having been heated through to the desired temperature, not high enough to

injure the fiber, the tank and body of the wood is gradually cooled down by reducing the flame at the burner and gradually admitting cold air through pipe *d* or cold gas through pipe *d'*. Preferably, cold gas is admitted and mixed with products of combustion for gradually reducing the temperature so as not to suddenly contract the wood. If this operation of cooling is conducted gradually in an atmosphere of gas and products of combustion, the internal moisture in the heated wood will pass freely out through the surface and thus be expelled from the wood. If the temperature is too quickly reduced, the wood near the surface will become contracted and hardened or filled with crust, so that the internal moisture cannot get out. By gradually reducing the temperature, the internal heat drives out the moisture. At the same time, the cold gas or mixture of gas and air circulating in contact with the wood, takes up the moisture and carries it away. In this way the temperature is reduced to normal or about 60° F. This cooling operation may be conducted from one to six hours, according to the size and character of the wood under treatment. The wood having been cooled down and partially dried, I now commence heating again, gradually raising the temperature to the previous high degree. After a suitable time, when the wood has been thoroughly heated through, I again cool off the contents of the tank by means of cold gas and air or a mixture of the same circulated in the treating tank. In this way the internal moisture will be expelled from the wood and carried off by the circulating cooled gas. By using products of combustion with the contained moisture and carbonic acid, I prevent the formation of crusts or hard deposits in or near the outer surface of the wood. In both heating operations no crust or extra dried surface is formed. The heat can, therefore, at all times, easily penetrate to the central portion of the wood and the moisture and air at all times pass out from the wood and be carried away by the gas.

It is to be noted that the hydrogen in water gas or producer gas, when burned with oxygen, produces water, so that the products of combustion are moist. If necessary, extra moisture is added in the form of steam admitted through pipes *s*. The quantities of gas and moisture to be admitted to the treating chamber will be determined by the amount of moisture in the material, which must be removed. No exact rule can be given.

In order to better circulate the cooled gas or an aeriform mixture, I preferably employ a circulating pump N which may be connected in pipe F', as shown in Fig. 1, or in pipes F'', as shown in Fig. 2. By means of the

above described apparatus my process of gradually heating the wood in treating tank A by means of the circulating hot gaseous products, and then gradually cooling the wood for drawing out the moisture and carrying it off through circulating pipes to a condenser is conducted at substantially the ordinary atmospheric pressure in the treating tank. In practice I find that no pressure is required in heating a charge of wood by circulating in contact therewith hot gases or products of combustion, and in fact I obtain more satisfactory results by using a circulating pump which will draw off and cause circulation of the gases at or below the ordinary atmospheric pressure.

After the wood has been thoroughly dried and seasoned by the alternate gradual heating and the gradual cooling, repeated as often as necessary, the cold gas and air are shut off and there is admitted to the treating tank a supply of hot dry gas, which is passed over and in contact with the wood, thereby forming on or in its surface, a crust or hard dry shell which will prevent subsequent absorption of moisture by the dry seasoned wood.

After the wood has been dried and seasoned by my process, it will readily take up and absorb a preserving or fire proofing solution and can be readily stained or colored throughout its entire body. Wood can thus be stained or colored through and through so as to retain any desired coloring.

With some kinds of wood the alternate heating and cooling in an atmosphere of gaseous products may be performed in a comparatively short time, while with other kinds a longer time will be required, depending upon the kind and character of wood treated.

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

1. The process of drying and seasoning wood, which consists in alternately heating and cooling the charge in a closed chamber, by first heating it in an atmosphere of hot gas or gaseous products, and then cooling it and conducting off the moisture by circulat-

ing in contact therewith a cool gaseous or aeriform mixture, thereby drawing moisture to the surface of the wood and carrying it off, and repeating the operations until drying and seasoning are effected.

2. The process of drying and seasoning wood, which consists in heating it in a closed chamber by circulating in contact therewith, hot gaseous products, then gradually cooling it by circulating in contact therewith a cool gaseous or aeriform mixture, for expelling moisture from interior of the wood and carrying off the moisture, whereby the premature formation of exterior crusts and cracking are prevented.

3. The process of drying and seasoning wood, which consists in burning gas with air and circulating the resulting products in contact with the wood, thereby gradually heating it, then gradually cooling the wood by circulating in contact therewith a cool gaseous or aeriform mixture, carrying off the moisture and repeating the heating and cooling operations till the wood is thoroughly dried and seasoned without cracking or checking.

4. The process of drying and seasoning wood, which consists in alternately heating it in an atmosphere of hot gas or gaseous products, and cooling it in an atmosphere of cool gaseous or aeriform mixture, and after thoroughly drying, subjecting the wood to hot dry gas to form an exterior crust or hard dry shell for preventing the subsequent absorption of moisture.

5. In the process of drying and seasoning wood by subjecting it alternately to hot and cold gaseous products till dried throughout its body, the step or operation of forming an exterior crust or hard shell by subjecting the dry wood to the action of hot dry gas, to prevent the subsequent absorption of moisture.

In testimony whereof I affix my signature in presence of two witnesses.

BURDETT LOOMIS.

Witnesses:

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