K. FUJINO.

APPARATUS AND PROCESS FOR DRYING WOOD.

APPLICATION FILED SEPT. 28, 1920.

1,413,018. **Patented Apr. 18, 1922.**

FIG. 1.

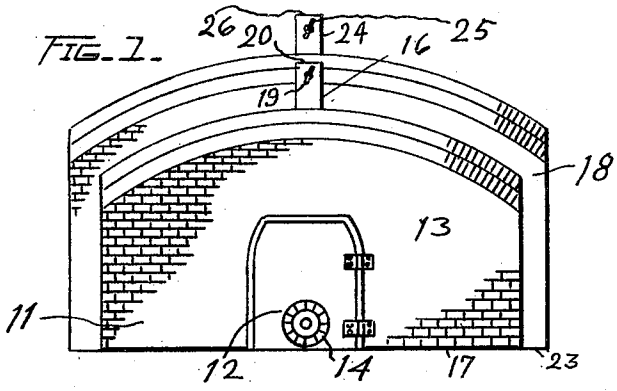


FIG. 2.

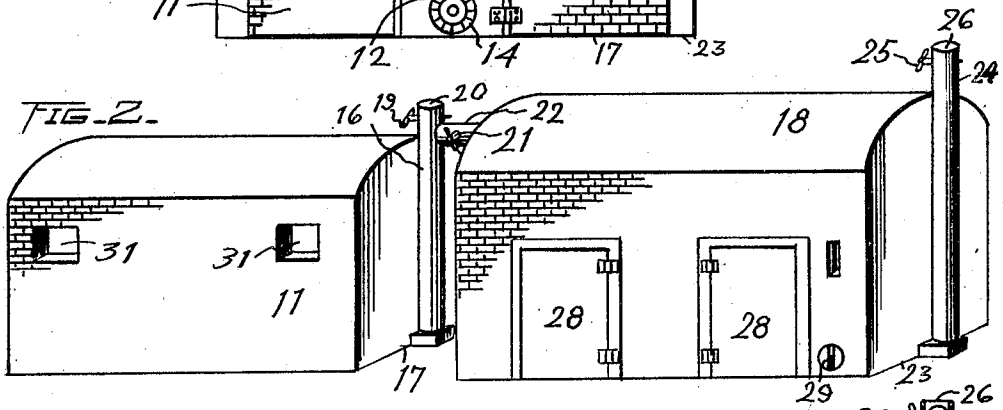
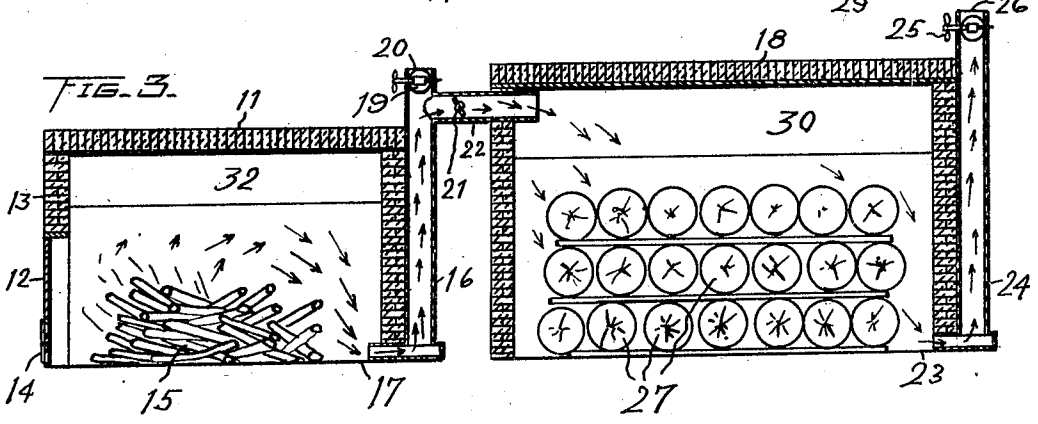


FIG. 3.



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APPARATUS AND PROCESS FOR DRYING WOOD.

1,413,018. Specification of Letters Patent. Patented Apr. 18, 1922.

Application filed September 28, 1920. Serial No. 413,392.

To all whom it may concern:

Be it known that I, KAKUJI FUJINO, a subject of the Emperor of Japan, residing in the city and county of Los Angeles, and State of California, have invented a new and useful Apparatus and Process for Drying Wood, of which the following is a specification.

This invention relates to an improved apparatus and process for drying wood. An object of the invention is to provide a process whereby a better quality of lumber is produced, and whereby all the preservative elements in the wood are retained.

Another object is to provide a process whereby the volatile elements in the wood are extracted and replaced by preservative elements derived from the carbonization of green wood.

Another object is to provide a process in which the wood is subjected to smoke, gases and vapors derived from the carbonization of green wood or brush of like character.

Another object is to provide an apparatus in which the smoke utilized in the process is derived from a charcoal manufacturing furnace.

Another object is to provide an apparatus comprising a combustion chamber for the carbonization of green wood and means conveying the products of such carbonization to a wood drying chamber containing the wood to be dried.

Another object is to evolve a process whereby a by-product of charcoal is produced.

Various other objects and advantages will be more fully apparent from the following description of the accompanying drawings which form a part of this disclosure, and which illustrate a preferred form of embodiment of the invention.

Of the drawings:

Figure 1 is an end view of a wood drying apparatus embodying the present invention;

Figure 2 is a perspective view of the apparatus;

Figure 3 is a longitudinal section through the apparatus. Perfect desiccation of wood without injury to its structure should consist of perfect preservation of its fibrous and other insoluble components intact, coupled with a perfect removal of its soluble components.

In utilizing for this purpose the products of the carbonization of green wood in a charcoal manufacturing furnace I employ a smoke containing such volatile elements as acetic acid, methyl alcohol, acetone, creosote, tar, etc., which are distilled from the green wood by heat and which has a better dissolving effect on like elements contained in the green wood to be dried. Smoke produced from any other material than green wood would not contain such elements as would have an efficient dissolving action on the like elements in the lumber and would not, therefore, give the superior results sought.

Among the constituents of wood we find fibrous matter and wood juices, besides lignos, sugars, starches, gums, tannin, chromatin material and proteids, all of which vary in quality and quantity according to the kinds of woods, climate, soil and time of cutting.

Taking these facts into consideration I discovered that smoke derived from the carbonization of a certain kind of green wood or brush had a vastly more efficient effect upon lumber of the same kind, that is, smoke derived from green oak gave a much better result in the curing of oak lumber than smoke derived from any other source, likewise smoke derived from green maple gave the best result in the curing of maple lumber. Therefore, in the present invention it is preferable to cure the lumber by the application thereto of the products of the carbonization of green wood having approximately the same chemical components as the wood to be cured.

By the use of this apparatus and process I have provided a means for economically drying lumber in a manner which produces a high quality product which will not develop cracks on exposure to the weather, which will retain its natural color, odor, and preservative elements, and which has absorbed additional amounts of such elements.

In general terms my improved apparatus subjects the lumber to be dried, to smoke produced by the slow carbonization of green wood, the smoke gradually varying in its vapor contents and temperature from a low temperature saturated smoke to a high temperature dry smoke, and also varying in its chemical components as they are progressively distilled from the green wood by the increasing heat of combustion.

In the process the smoke first acts to expand the fibrous structure of the lumber and to dissolve certain soluble elements contained therein and subsequently as the smoke increases in temperature and decreases in vapor contents the soluble and volatile elements in the lumber are abstracted. Circulation in the lumber drying chamber is then prevented with said chamber filled with dry smoke of high temperature and is maintained closed until the temperature therein reduces to normal, with the result that the lumber becomes impregnated by preservative elements carried by the high temperature smoke in the form of gases, such gases being reduced to their natural state during the cooling to normal temperature.

In the drawings, 11 designates a charcoal furnace providing a combustion chamber 32, and 18 designates a kiln providing a drying chamber 30. The wall 13 of the furnace 11 is provided with a door 12 through which the combustion chamber 32 is charged with the charcoal producing material 15, and near the base 17 the door has a damper 14 through which air may be admitted to control the fire. A pipe 16 communicates with the chamber adjacent the base 17 and extends upwardly, said pipe having an open end 20 provided with a damper 19. A cross pipe 22 is also provided with a damper 21 and connects with the pipe 16 to direct the products of combustion into the upper portion of the drying chamber 30. An exhaust pipe 24 communicating with the chamber 30 adjacent the base 23 extends upwardly and has an open upper end 26 provided with a damper 25. 27 designates a pile of lumber in the form of logs, which has been placed in the drying chamber for drying. Doors 28 afford access to the drying chamber for removing the dried lumber and for charging the chamber with material to be dried and a thermometer 29 is provided for indicating the approximate temperature of the drying chamber. The furnace 11 is provided with windows 31, through which the operator may from time to time examine the contents of the combustion chamber 32.

By this arrangement I have provided a combustion chamber or charcoal furnace in which green wood is carbonized by a slow combustion in a substantially dead air space, only enough air being admitted to efficiently promote the carbonization of the green wood and drive off the soluble and volatile elements thereof. In the operation of my apparatus the pile of green wood in the combustion is fired at the top, this assuring a very slow combustion by reason of the downward progression of the fire being in opposition to the natural upward progressive tendency of fire and heated elements.

In use, the drying chamber is charged with the material to be dried and the combustion chamber charged with the charcoal producing material. The damper 19 is closed and the damper 14 is regulated to provide sufficient draft to sustain the slow combustion desired, and the dampers 21 and 25 of the drying chamber are regulated to control the passage of the products of combustion through the drying chamber. The approximately green or freshly cut material 15 is fired at the top of the pile, and will at first produce a dense saturated smoke of relatively low temperature carrying the soluble constituents of the green wood. Such smoke discharging into the drying chamber acts to expand the pores of the lumber and dissolve the soluble and volatile elements therein and convey them out through the exhaust pipe 24. As the heat produced in the combustion chamber increases the character of the smoke changes for the reason that as the fire becomes hotter different chemical elements contained in the green wood are given off. It has been found that each of such chemical elements has its most efficient dissolving action on like chemical elements in the lumber to be dried and as the lumber to be dried is normally in a green state it will for this reason be evident that the chemical elements distilled from the green wood in the combustion chamber will most effectively dissolve and carry off the soluble and volatile chemical elements contained in the lumber in the drying chamber.

At higher temperatures the combustion gives off various preservative elements such as wood-tar and creosote and as the material in the combustion chamber reaches the condition of a burning mass producing no more smoke the dampers 21 and 25 of the drying chamber are closed to retain said chamber filled with the smoke and gases of relatively high temperature. The chamber 30 is maintained in such smoke filled air tight condition until its temperature is reduced to normal and the lumber has become impregnated with the preservative elements.

After the dampers 21 and 25 are closed, the dampers 14 and 19 of the combustion chamber are regulated to properly complete the charcoal producing operation.

Having described my invention, I claim:

1. The process of drying wood, consisting of subjecting the wood to be dried to the action of the soluble and volatile products derived from the carbonization of green wood.

2. The process of drying wood, consisting of subjecting the wood to be dried to the action of the soluble and volatile products derived from the carbonization of green wood of like character.

3. The process of drying wood, consisting of carbonizing green wood by the application of a gradually increasing heat to produce smoke progressively varying in vapor

contents, temperature and chemical components, subjecting wood to be dried to such smoke, and subsequently maintaining the smoke of highest temperature in contact with the wood to be dried until its temperature reduces to normal.

4. In a wood drying apparatus, a combustion chamber having draft means only adjacent its base, means for supplying a limited amount of air to said chamber, a drying chamber having an exhaust opening adjacent its base, a pipe conveying products of combustion from the lower portion of the combustion chamber to the upper portion of the drying chamber, means for closing said exhaust opening, a damper for closing said pipe, and means between said damper and the combustion chamber for effecting a discharge of the products of combustion to the atmosphere when the damper is closed.

5. In a wood drying apparatus, a combustion chamber, means for supplying a limited amount of air to said chamber, a drying chamber having draft means only adjacent its base, a pipe conveying the products of combustion from the bottom portion of the combustion chamber to the top portion of the drying chamber, an exhaust pipe extending from the bottom portion of the drying chamber, and dampers for controlling the draft through both chambers and for controlling communication between the chambers.

In testimony whereof, I hereunto affix my signature, this 7th day of September, 1920.

KAKUJI FUJINO