

UNITED STATES PATENT OFFICE.

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ART OF COLORING OR TRANSFORMING WOOD.

933,436.

Specification of Letters Patent.

Patented Sept. 7, 1909.

No Drawing.

Application filed May 11, 1908. Serial No. 432,222.

To all whom it may concern:

Be it known that I, WILLIAM A. HALL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented or discovered certain new and useful Improvements in the Art of Coloring or Transforming Wood, of which the following is a specification.

This invention or discovery relates to the art of coloring or transforming wood, so as to produce, from comparatively inexpensive woods, products closely resembling black walnut, mahogany or other high priced woods, both in appearance and texture.

The invention or discovery is carried into effect by forcing a coloring matter into and throughout the body of the wood, and in this forcing process the coloring matter is largely deposited in the grain cells and more porous portions of the wood. This forcing treatment of the wood leaves the latter more or less streaky, and some of the harder parts of the wood are but very slightly colored, and in order to secure the best results and produce a commercially desirable product it is necessary that the process by which the coloring matter is forced into the wood should be followed by a subsequent process whereby the coloring matter is properly diffused in the wood. This diffusion of the coloring matter in the wood, as described in my application No. 373,152, filed May 11, 1907, is effected by boiling the wood in the coloring solution, and preferably at comparatively high temperatures, subsequent to the color-forcing operation; but I have discovered that this diffusion of the coloring matter in the wood may be more economically effected, and with quite as good or better results, by steaming the wood which has already been permeated by the coloring solution, instead of boiling the wood, as heretofore.

In carrying the invention or discovery into effect the wood to be treated will preferably be in the form of boards or planks of any convenient size, and should be thoroughly seasoned or dried; as any sap or moisture in the wood tends to act as a cushion to prevent the coloring matter from being forced into and throughout the same. The dried wood is then preferably subjected, in a closed receptacle, to a vacuum action sufficiently

powerful and continued sufficiently long to remove from the wood practically all of the air therein contained, so as to make the wood absorbent or receptive to the coloring solution or fluid to be applied later. It is preferable, during the vacuum process, to subject the wood to a moderate heat of approximately 90° F., which has a tendency to open the pores and enable a better withdrawal of the air by the vacuum pump. Any desired coloring solution is then drawn or pumped into the receptacle, while the vacuum is maintained, until the receptacle is full, or the wood therein is fully immersed in the solution. The coloring solution employed may be applied either hot, warm or cold, according to its characteristics, and the solution will be taken up more or less rapidly by the absorbent wood from which the air has been withdrawn by the vacuum process. A high hydraulic or other pressure (preferably from 300 to 800 pounds to the square inch) is then applied and maintained until the more porous portions of the wood are impregnated throughout with the coloring solution, the time required for this impregnating step of the process being from two or three hours to ten to twelve hours, or more, according to the thickness or hardness of the lumber under treatment and the amount of pressure maintained. This high pressure causes the coloring solution to permeate the wood, but in this coloring-forcing step of the process the coloring matter will be largely deposited in the more porous portions of the wood, as in the sap wood and the concentric rings and grain cells, leaving, however, more or less uncolored portions or streaks and particularly in the heart portions of the wood.

Any suitable coloring materials or solutions may be employed to artificially color the wood, according to the colors which it may be desired that the lumber should have. For example, if it be desired to produce an imitation mahogany, a liquid coloring matter which will preferably contain spruce bark extract, hemlock bark extract, or mahogany bark extract, will be employed. The coloring matter with which the wood is thus impregnated will then be diffused in the wood by steaming the colored wood, and this may be done either in the cylinder or receptacle in which it has been treated, as

above described, or in a separate chamber or receptacle, preferably the latter. The length of time necessary to effect the diffusion of the color by steaming will depend upon the hardness and thickness of the lumber, but generally from six to fourteen hours will be required; and in this steaming process a temperature in the vicinity of 212° F. will preferably be maintained. This process of effecting the diffusion of the color in the wood by steaming has several advantages over the process of effecting the diffusion by boiling the wood in the coloring solution, as described in my application No. 372,152, hereinbefore referred to. If the wood be boiled in the coloring solution sufficiently long and at a sufficiently high temperature to effect a proper diffusion of the coloring matter in the wood the coloring solution itself is generally altered and often destroyed by the heat, thus rendering the surplus liquid unfit for use a second time; but where the surplus coloring solution is withdrawn from the cylinder immediately after the wood has been thoroughly impregnated, and without having been submitted to any high degree of heat, such surplus liquid can be used for impregnating other wood; and it is necessary, if the diffusion be effected by boiling, to boil the wood in the coloring solution for the reason that if it were boiled in water a considerable portion of the coloring solution would be leached out of the wood, reducing, to a large extent, the amount of stain or dye adjacent to the surfaces of the wood. If the surplus coloring liquid be drawn out of the cylinder in which the wood has been treated of course the steaming process can be and, in some instances, will be done in the same cylinder, without removing the wood therefrom. However, as the vacuum and pressure cylinders in which the wood is impregnated by the coloring solutions are expensive, it is much more economical commercially to reduce the time during which they are occupied by the lumber as much as possible; and to this end it will be found advantageous to remove the wood, as soon as it has been properly impregnated with the coloring material, to other and less expensive receptacles for the steaming operation to effect a proper diffusion of the color.

The wood when first removed from the cylinder into which it has been impregnated by the coloring solution is in a more or less streaky condition, and the coloring matter is very largely deposited in the more porous and sap portions of the wood, leaving the harder heart portions of the wood much less impregnated with the coloring solution; so that the sap portions of the wood are then darker than the heart portions. By the steaming process, however, the coloring solution is so diffused throughout the wood that

the heart portions of the wood may be actually darker than the sap portions; while by the methods heretofore employed in diffusing the coloring material by boiling, the sap portions of the wood were darker than the heart portions thereof. Moreover as it has been found necessary in diffusing the color, by boiling, to maintain relatively high temperatures of from 225° to 275° F., or thereabout, the wood itself, as well as the coloring solution, is liable to be more or less damaged by the high temperatures thus employed; whereas by the steaming process herein described for effecting a diffusion of the color this liability of injuring the wood by high temperature is entirely avoided. Moreover it has been ascertained that the steaming process above described has more effect in developing the "grain" of the wood, and thereby rendering the same more conspicuous or prominent, than results from the boiling process which I have previously practiced.

Having thus described my invention or discovery I claim and desire to secure by Letters Patent:

1. The herein described process for coloring or transforming wood, consisting in forcing a coloring solution into and throughout the more porous portions of the wood by pressure, and then subsequently diffusing the coloring material in the wood by subjecting the latter, with the coloring matter therein, to the action of steam.

2. The herein described process for coloring or transforming wood, consisting in forcing a coloring solution into and throughout the more porous portions of the wood by pressure in a closed receptacle, withdrawing the surplus coloring solution from said receptacle, and then subsequently diffusing the coloring material in the wood by subjecting the latter, with the coloring matter therein, to the action of steam.

3. The herein described process for coloring or transforming wood consisting in subjecting the wood to the action of a vacuum in a closed receptacle for the purpose of removing the air therefrom and rendering the same absorbent, then forcing a coloring solution into and throughout the wood by high pressure, and then subsequently subjecting the wood, with the coloring solution therein, to the action of steam for the purpose of diffusing the color in the wood.

4. The herein described process for coloring or transforming wood consisting in subjecting the wood to the action of a vacuum in a closed receptacle for the purpose of removing the air therefrom and rendering the same absorbent, then forcing a coloring solution into and throughout the wood by high pressure, withdrawing the surplus coloring solution from said receptacle, and then sub-

sequently subjecting the wood, with the coloring solution therein, to the action of steam for the purpose of diffusing the color in the wood.

5 5. The herein described artificially colored wood having the coloring matter therein properly diffused throughout the wood and the grain cells fully developed, with the harder heart portions of the wood of a color

as dark as or darker than the sap portions 10 thereof.

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

WILLIAM AUGUSTUS HALL.

Witnesses:

C. M. SWEENEY,
J. D. KLINGE.