

UNITED STATES PATENT OFFICE.

AXEL FRANCK-PHILIPSON, OF JACKSON, MICHIGAN, ASSIGNOR TO FRANCK-PHILIPSON & CO., OF CHICAGO, ILLINOIS, A FIRM CONSISTING OF AXEL FRANCK-PHILIPSON AND OTTMAR M. KREMBES.

PROCESS OF BLEACHING WOOD.

1,068,580.

Specification of Letters Patent.

Patented July 29, 1913.

No Drawing.

Application filed February 17, 1913. Serial No. 749,019.

To all whom it may concern:

Be it known that I, AXEL FRANCK-PHILIPSON, subject of the King of Denmark, residing at Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Processes of Bleaching 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 the bleaching of wood, either in finished shapes or in the rough, and more particularly to the simultaneous bleaching of the wood and removal of sap.

While bleaching liquids have long been used with success in connection with other materials, it has not been practicable heretofore to bleach pieces of wood economically as the time required both for the bleaching proper and for drying the piece of wood thereafter has required an installation of very large size in proportion to its output. Moreover, the long immersion in the bleaching liquid required for bleaching the more highly colored saps or sappy veins of the wood was apt to swell, warp or otherwise distort the wood from its original shape, thereby rendering it unsuited for its intended purpose without the application of further labor for reshaping it.

One object of my invention is to provide a bleaching process sufficiently rapid to insure a large output in proportion to the size of the dipping vats; also, a process in which the liberation of gaseous bleaching fluid by decomposition of the bleaching bath is restrained or retarded whereby the liberated gas is maintained longer in contact with the wood than would otherwise be the case.

Another object is to provide a bleaching process in which the bleaching action of the dipping liquid penetrating into and remaining on the surface of the wood may be continued for some time after the wood is removed from the liquid and in which this continued action aids to some extent in drying the wood.

Further objects are, to provide a bleaching process for wood which will not require a subsequent chemical treatment or rinsing of the wood, and a process in which the bleaching agents employed will leave no

residue of a character which will materially affect the finishing materials subsequently applied to the treated surface, such as varnish, paint, shellac, oils, paraffin or wax.

I attain these objects by means of the novel steps and means hereinafter more fully described consisting, briefly, in using a bleaching liquid, having added thereto a substance adapted to increase the viscosity of the liquid and thereby diminish the rapidity of its penetration into the pores of the wood, and acting at the same time to retard escape of liberated bleaching-gas bubbles, whereby the latter are maintained a long time in contact with the surface of the immersed wood. I further attain these objects by adding to the liquid after immersion of the wood, an element promoting decomposition of the said liquid and liberation of the bleaching gas, and by means of which the rapidity of decomposition is governed.

In carrying out my process, I preferably employ as a bleaching agent dilute peroxid of hydrogen. I prefer to have it rendered alkaline, and to produce this alkaline effect and also to effect the viscous condition referred to above I employ an alkaline silicate, preferably sodium silicate. Being slightly alkaline in reaction, the silicate of soda readily serves as a substitute for an alkaline hydrate in rendering the solution alkaline. The proportions of the various ingredients used in such a mixed solution may be varied somewhat according to the size of the pieces treated, kind of wood, etc. Thus a bleaching bath for wood, which is satisfactory for some purposes but which is too slow in the great majority of instances, may be composed of water 40 parts more or less; peroxid of hydrogen (8 vol.) 8 parts, more or less; dilute silicate of soda (one part to three parts water, more or less) 1 part.

By varying the relative proportions of ingredients, the solution may be made to require more or less time and act to a greater or less extent. A bath of the proportions given will, when tepid (80 to 120 degrees Fahr.), give fairly good results depending upon the nature of the wood to be bleached, the temperature being preferably varied according to the latter.

Most woods (unless in quite thin forms) when subjected to a bleaching liquid of the above-mentioned composition will be

bleached in from twelve to twenty-four hours, which length of time would be prohibitive in commercial practice as it would enable the dipping vats to be used only once or twice every twenty-four hours. I, therefore, prefer to expedite the action as follows: After the alkaline silicate in the mixed solution of peroxid of hydrogen and silicate of soda has had time to partially penetrate the surface of the wood, I preferably accelerate the bleaching action of the liquid by adding thereto a solution of potassium permanganate, which latter reacts upon the peroxid of hydrogen to effect the simultaneous decomposition of both bleaching agents, thereby rapidly liberating nascent oxygen in large quantities additional to that liberated by the action of each bleaching agent upon the organic coloring matters contained in the various portions of the wood. Thus, when using the formula heretofore mentioned, I first permit the peroxid-silicate solution to partially penetrate the body of the wood, and then gradually add one part of cold water having about two per cent. of potassium permanganate dissolved therein.

The rapidity of the oxygen-releasing reaction between the two bleaching liquids depends upon the rapidity with which the permanganate solution is added to the bath. If it is all poured in at once, it will be found that all the oxygen will be liberated in an interval of a half hour, more or less, and by adding slowly the time required may be increased to three hours, more or less.

The rapidity with which the oxygen is liberated is the controlling factor in the rapidity with which the bleaching is effected and this must be varied to suit the circumstances of each case. Thus, in bleaching very small articles such as toothpicks, and so-called "veneer ware" and similar very small or very thin articles, it is essential that the immersion in the bath should be as brief as possible. But these articles have a very large surface area compared to weight and volume and are, therefore, very easily and quickly affected. In treating them the bath should be regulated to liberate the oxygen fairly rapidly and continuously in a period varying from one-half to three hours more or less, these articles being kept immersed three minutes, more or less, all depending upon the nature and color of the wood. Other articles, such as wooden spoons, bowls and kitchen utensils having a heavier body in proportion to surface area, will readily stand somewhat longer immersion and an accordingly slower bath. The slower the decomposition, the less likelihood that gas will escape without performing its oxidizing function, hence the speed of the operation is accelerated as much as possible to shorten the time and retarded as

much as possible to save material, the resultant mean varying in each case according to particular conditions. Some products, also such particularly as matched maple or oak flooring finished ready to lay, will be in better condition inversely to the duration of immersion. Hence, in bleaching products of this character an extremely active bath is desirable, the activity being regulated more or less by the depth of color of the wood, the deeper the color the more strenuous must be the attack to eliminate the same in a given interval.

By thus using an added bleaching agent adapted to decompose the original bleaching agent in the dipping bath, I am enabled to utilize practically all of the oxygen in the peroxid of hydrogen, instead of being limited to the proportion which can be utilized by the direct action of the organic matters of the wood on the peroxid, which proportion usually amounts to only fifty to sixty-five per cent. Moreover, by greatly expediting the bleaching action, I am able to treat a large number of successive charges of wood every twelve or twenty-four hours in the same dipping vat; or, in the case of small items, I may even treat them while being moved through a vat on a suitable conveyer.

Instead of limiting the amount of the potassium permanganate or other accelerant to that required for reducing the time of the bleaching action to the desired period, I preferably supply an excess of the permanganate continuously and remove the wood before the decomposing interaction of the permanganate and the peroxid has ceased. When the wood is removed from the liquid, some of the mixed solutions will cling to the latter and the aforesaid bleaching ingredients in the same will continue to react on each other so as to prolong the bleaching action after the wood has been placed in the drying room.

To facilitate both the sap extraction and bleaching action of the mixed liquids of my process, the immersed pieces of wood are preferably spaced apart so as to permit free access of the liquids to all parts of the submerged pieces. Likewise, after removal from the bleaching bath, they are preferably set on end in the drying room, whereby any vertical currents of air will facilitate the drying action caused by the vaporizing of the interacting bleaching liquids.

By "wood" as herein used, is meant pieces of this material of appreciable size as distinguished from masses of fiber or fine particles such as are used in the manufacture of wood pulp or are contained in the latter.

While I have described my process as applied to the bleaching of wood, it will be obvious that the same may be applied equally well to the bleaching of other fibrous

vegetable materials, such as Manila or hemp ropes.

I claim as my invention:

1. A process for treating pieces of sap containing wood which consists in subjecting such pieces to the action of a bleaching-gas liberating solution, acting to dissolve the sap whereby decoloration and sap-extraction are simultaneously effected.
2. A process for treating pieces of sap-containing wood which consists in subjecting such pieces to the action of a bleaching-gas liberating tepid solution, acting to dissolve the sap, whereby decoloration and sap-extraction are simultaneously effected.
3. A process for treating pieces of sap-containing wood which consists in subjecting such pieces to the action of a bleaching-gas liberating solution, acting to dissolve the sap, whereby decoloration and sap-extraction are simultaneously effected, the viscosity of the said solution having been increased by the addition of a suitable substance.
4. A process for treating pieces of sap-containing wood which consists in subjecting such pieces to the action of a bleaching-gas liberating solution, acting to dissolve the sap, whereby decoloration and sap-extraction are simultaneously effected, the viscosity of the said solution having been increased and said solution rendered alkaline by the addition of an alkaline silicate.
5. The process of bleaching wood consisting in subjecting wood to the action of a potential bleaching-gas liberating solution and subsequently bringing into coöperative relation with such solution, while the wood is still subject to its action, quantities of bleaching-gas liberating agent, in succession, whereby the rapidity of gas liberation and the effective influence of the gas upon the wood treated is governed.
6. The process of bleaching wood which consists in subjecting wood to the action of a potential bleaching-gas liberating solution to which a reaction-retarding agent has been added, and subsequently bringing into coöperative relation with such solution, while the wood is still subject to its action, quantities of bleaching-gas liberating agent, in succession, whereby the rapidity of gas-liberation and the effective influence of the gas upon the wood treated is governed.
7. The process of bleaching wood which

consists in subjecting wood to the action of a potential oxygen-liberating solution and subsequently bringing into coöperative relation with such solution, while the wood is still subject to its action, quantities of bleaching-gas liberating agent, in succession, whereby the rapidity of gas liberation and the effective influence of the gas upon the wood treated is governed.

8. The process of bleaching wood which consists in subjecting wood to the action of a potential oxygen-liberating solution to which a reaction-retarding agent has been added, and subsequently bringing into coöperative relation with such solution, while the wood is still subject to its action, quantities of oxygen liberating agent, in succession, whereby the rapidity of oxygen liberation and the effective influence of the oxygen upon the wood treated is governed.

9. The process of bleaching wood which consists in subjecting wood to the action of a hydrogen peroxid solution, and subsequently bringing into coöperative relation with such peroxid solution, while the wood is still subject to its action, quantities of an oxygen liberating agent, in succession, whereby the rapidity of oxygen liberation and the effective influence of the oxygen upon the wood treated is governed.

10. The process of bleaching wood consisting in subjecting wood to the action of a hydrogen peroxid solution, and, while the wood is still subject to the action of the said solution, adding to said solution quantities of a permanganate in succession, whereby the rapidity of oxygen liberation and the effective influence of the oxygen upon the wood treated is governed.

11. The process of bleaching wood consisting in bathing the wood in an oxygenated bleaching substance bearing a retarding agent to restrain the normal liberation of oxygen, and subsequently bringing into coöperative influence with said oxygenated substance an oxygen-liberating agent in predetermined quantity to govern the decomposition of said substance.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

AXEL FRANCK-PHILIPSON.

Witnesses:

M. M. BOYLE,

ALBERT SCHEIBLE.