

UNITED STATES PATENT OFFICE.

MAX RÜPING, OF BERLIN, GERMANY.

METHOD OF PRESERVING WOOD.

1,345,253.

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No Drawing.

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To all whom it may concern:

Be it known that I, MAX RÜPING, a subject of the German Emperor, residing at Lessingstrasse 1, in the city of Berlin, N. W., Germany, have invented certain new and useful Improvements in Methods of Preserving 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 present invention relates to an improvement in the method of preserving wood by coating or painting the walls of the cells of the wood with a preservative liquid, after the manner described in my Reissue Patent No. 12707, granted October 22, 1907, entitled "Method of impregnating wood."

According to the invention described in that patent, the wood was first subjected for some time to air under pressure, which air permeated the pores and cells of the wood. While the wood still contained the air under pressure, as before described, it was submerged in a bath of preservative material, at a still higher pressure, causing the liquid to enter the pores and cells of the wood. Due to capillary attraction, this liquid would follow the walls of the cells or pores, leaving the air in the form of globules imprisoned in the liquid, but not in contact with the walls of the cells or pores; then when the pressure was suddenly removed, the imprisoned air blew out the excess of liquid in the pores or cells, leaving the walls of the cells painted with the preservative compound.

According to my present invention I purpose to modify the first step of the process thus described, by preheating the air which is supplied to the pores of the wood, thereby securing certain advantages that will be hereinafter described.

The heated air may be either at or near atmospheric pressure, but better control of the amount of preservative liquid injected into the wood, and quicker treatment are secured by using the heated air at a pressure considerably above atmospheric pressure, for instance from 50 to 100 pounds pressure per square inch.

The air may be heated either in the chamber itself, or may be supplied to the chamber in the heated condition, and the wood should be subjected to this heated air for a period depending in a large measure upon

the nature and density of the wood, the amount of moisture contained therein, the nature of the preservative material used, and the purposes for which the finished product is desired.

In no event should the temperature be high enough to char the wood; or, when a preservative such as creosote oil is used, which gives off explosive gases when heated, the temperature should not be high enough to explode the gases generated from the presence of more or less of the preservative material either remaining in the heating chamber or admitted thereto.

Where the wood is dry and porous, the time for which it is required to be exposed to the heated air would be materially less than where the wood is dense or not well dried; and in a similar way the temperature of the heated air need not be so high where the wood has been thoroughly dried in advance. I cannot, therefore, state any fixed time during which the wood should be exposed to the action of the heated air, or the temperature of the air, except that this temperature should preferably range between 50° and 110° C, and the time between two and six hours. Of course, with a lower temperature the wood would ordinarily need to be subjected to the action of the heat longer than where the temperature was higher.

As a specially suitable liquid preservative for use in this process, creosote oil might be mentioned, and the process will now be described with special reference to the use of this preservative.

After the wood has become thoroughly impregnated with the heated air, preferably under pressure; the creosote oil is forced in, preferably also heated to a temperature of not less than 70° C., nor more than 95° C., and at a higher pressure than the air already in the retort. The heating of the creosote oil will make it more fluid, and it will flow more readily into the pores and cells of the wood; and at the same time it will imprison the air globules therein; the capillary attraction of the side walls of the pores or cells serving to draw the fluid creosote oil into the innermost recesses of the wood and effectually coating the walls of the pores or cells as above referred to.

The drying action of the preliminary heated air will serve not only to evaporate much of the moisture still remaining in the

wood, but will more especially leave the walls of the pores or cells dry, and this will facilitate the more ready flow of the creosote oil along the walls of the pores or cells of the wood, thus facilitating and expediting the coating of said walls with creosote oil.

Furthermore, the heating of the air injected into the wood will serve to melt most of the gums or resins remaining in the wood and prevent the same from clogging up the cells or pores against the entrance of the heated air.

The time during which the wood should be subjected to the action of the heated creosote oil would depend in a large measure upon the nature of the wood being treated, being, of course, greater with dense woods than with porous woods, and the time required would also be greater when the wood had not been thoroughly seasoned than where it had been well seasoned or dried.

After this treatment with the heated creosote oil has been continued for a suitable length of time, the creosote oil is drawn off from the retort, and the pressure is suddenly relieved. This will cause the imprisoned air to blow the free creosote oil out of the cells or pores of the wood, and it will settle in the bottom of the retort and may be drawn off for use over again.

In this final step of relieving the pressure, the pressure may be simply lowered to normal atmospheric pressure; or, if preferred, a partial vacuum may be created, which will expedite the escape of the imprisoned air from the cells and the consequent blowing out of the free creosote oil. The process may be stated briefly as follows:

The wood, preferably in the form of timber of the dimensions required for use, is subjected to the usual drying process either by air seasoning or by kiln drying, and is then placed in the retort, which is closed and contains more or less air, also the air imprisoned in the pores or cells of the wood, under atmospheric pressure.

I preferably increase the density of the air by forcing in additional air under pressure. This air is heated and maintained in the heated condition until it warms up the wood and penetrates the pores and cells thereof. Now the heated creosote oil is forced in under a still higher pressure, compressing the air in the pores, cells and cavities of the wood and coating the side walls of these pores, cells and cavities, as hereinbefore described; and finally the pressure is removed and the excess of creosote oil is drawn off from the retort, the retort is opened and the timber removed.

When the pressure is removed, the action may be supplemented by causing a partial

vacuum in the retort, which may be done by means of an air pump.

The air imprisoned in the cells, pores and cavities of the wood will blow out the free oil, and the degree of permanent saturation of the wood will depend upon the respective pressures of the heated air before the creosote oil is admitted, and of the pressure to which the heated creosote oil is subjected in carrying out that step of the process.

After the operation has been completed, the walls of the cells or pores of the wood will be coated or painted with a more or less thin film or layer of creosote oil, and these walls having been previously dried, this film or layer of creosote oil will oxidize and harden, and will form a thin solid shell or paint on the inner walls of the pores of the wood, which will effectually protect the same from the incursions of destructive insects, or living germs.

The oxidizing and hardening of the film or layer of creosote oil will be expedited by the use of heated air under pressure in the manner stated.

This hardening of the creosote oil on the walls of the cells or pores will also do away with any dripping or exuding of the creosote oil from the wood.

By preventing the exudation of the oil from the wood so treated, not only is much serious inconvenience in the handling of such material avoided; but one great objection to the use of such treated timber for telegraph poles, fence posts, or the like is avoided, where these are used near wells, or springs, or other reservoirs containing drinking water, which is likely to be contaminated by the exuding of the oil from the timber. It has been found in practice that a very small amount of creosote oil exuding from a telegraph or fence post will often contaminate a neighboring well or pond and render it unfit for drinking purposes for either man or beast.

Again, the wood so treated will have its interior pores or cells coated with a comparatively hard shell or paint adapted to hold spikes or nails driven therein; whereas creosote oil when used to saturate railroad ties or the like forms with the wood a greasy mass in which spikes or nails will not firmly adhere. This is especially noticeable with railway ties, treated by the old method of thoroughly saturating the tie with creosote oil, in which cases the spikes often became loose, due to the vibrations to which the rails were subjected.

While the hereinbefore described process is specially applicable to the use of creosote oil, as a preservative; it is also specially applicable to the use of asphaltic oils, crude oils of asphaltic basis, tar oil mixtures, crude oil mixtures, and the like, with or

without the addition of chemical constituents of aseptic or antiseptic qualities.

Under certain conditions the process may also be satisfactorily used with other preservative aqueous solutions such as zinc chlorid, or other well known liquid preservatives.

By having the heated air supplied to the retort at a considerably higher pressure than the atmosphere, and permitting this heated air under pressure to completely fill the pores, cells or cavities of the wood, when the heated preservative fluid is subsequently forced in under pressure, it will compress this air in the pores, cells or the like of the wood; the proportion of the space occupied by the air and the liquid varying directly as the initial pressure of the heated air and the subsequent pressure of the liquid, so that where the pressure of the air is substantially the same as the pressure of the liquid, the tendency of the liquid to enter the pores will be due entirely to capillary attraction; whereas, as the pressure of the liquid becomes greater than that of the imprisoned air, the air will occupy a less and less space in the pores or cells of the wood, so that by regulating the initial pressure of the heated air and the subsequent pressure of the liquid supplied, the proportion of the liquid injected in the wood may be predetermined; and, if desired, only a small quantity of the liquid may be forced into the pores or cells of the wood, capillary attraction causing this liquid to follow the walls of these pores or cells.

Thus it will be seen that where the initial pressure of the heated air is comparatively high, relative to that of the liquid, a far smaller quantity of liquid will be sufficient to paint the walls of the cells or pores than where the pressure of the heated air was lower compared to the pressure of the heated preservative liquid applied in the second step of the process. Moreover, the larger the proportion of space occupied by the imprisoned air, the greater will be the effect of that air in blowing the free liquid out of the pores or cells of the wood.

This feature of decreasing the amount of preservative fluid left in the timber is especially important where extremely porous woods are used, such as young pine trees, or other woods of like nature.

Thus it will be practicable to thoroughly

coat the walls of the pores or cells of any porous wood with a thin layer of protective material which will thoroughly preserve this wood without any waste of preservative and also to obviate the disadvantage as to exuding of the preservative, as previously referred to.

It will thus be possible to vary the amount of preservative left in the timber by varying the relative pressures of the preliminary treatment with heated air, and the following treatment with heated preservative liquid, so that within limits the desired amount of liquid may be left in the timber, and at the same time the walls of the pores, cells or cavities of the wood would be thoroughly protected against the incursions of those insects or living germs which tend to destroy the wood.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is:—

1. A method of preserving wood which consists in placing the wood in a closed retort, subjecting the same to the action of heated air under pressure, then injecting heated creosote oil into said retort at a higher pressure until the wood is submerged therein, maintaining the wood in said heated oil bath under high pressure until the walls of the pores and cells of the wood are coated with creosote oil, then drawing off the excess oil, and finally relieving the pressure, thus allowing the air imprisoned in the wood to escape.

2. A method of preserving wood, which consists in placing the wood in a closed retort, subjecting the same to the action of heated air under pressure, then injecting heated creosote oil into said retort at a higher pressure until the wood is submerged therein, maintaining the wood in said heated oil bath under high pressure until the walls of the pores and cells of the wood are coated with the creosote oil, then drawing off the excess of oil, and finally relieving the pressure and creating a partial vacuum in the retort, thus allowing the air imprisoned in the wood to escape.

In testimony whereof, I affix my signature.

MAX RÜPING.

Witnesses:

HENRY HASPER,

ALLEN J. JENNINGS.