UNITED STATES PATENT OFFICE.

SAMUEL P. BROWN, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO HIMSELF AND WILLIAM E. SHAW, OF PORTLAND, MAINE.

IMPROVEMENT IN PRESERVING WOOD.

Specification forming part of Letters Patent No. 115,931, dated June 13, 1871.

To all whom it may concern:

Be it known that I, SAMUEL P. BROWN, of Washington, in the District of Columbia, have invented a certain new and useful Improvement in Preserving Wood, to be termed the "Ironizing Process;" and I do hereby declare the following to be a full, clear, and exact description of the same.

The invention consists in the process, hereinafter set forth, of permanently hardening and preserving wood by clearing its pores and filling them with the specific composition described, in the manner substantially as specified.

My process is as follows: I load the timber or wood upon iron cars and run it into a kiln suitably constructed for the purpose, where, without removing it from the cars, I subject it for about twelve hours continuously to the action of superheated steam not under pressure, and at a temperature of about 250° Fahrenheit. This part of the process should be particularly attended to, as the details are of the utmost importance, the value of the result depending not upon the application of superheated steam to the wood, but upon its continuous application for a long time without pressure.

I have experimented very thoroughly and for many years with the application of superheated steam to wood for the purpose of drying it and cleansing its pores, and have observed that the operation of the steam is as follows: When applied under pressure it drives the sap and other liquids of the wood to the center of each stick and holds them there, preventing their vaporization, and thus defeating the very purpose for which it is applied. If applied for a short time with pressure, as in the Samuels process, the center of the timber is not dried at all, neither the watery particles nor any other being able to escape; while if applied for a longer time the watery particles may indeed evaporate; but the coagulable matters are driven to the center and held there till solidified, completely obstructing the pores and preventing the access of the substances intended to preserve the wood. The result of applying superheated steam under pressure for a short time is, therefore, to dry only the circumferential portions of the stick, leaving its center still more heavily charged with moisture than before, while the result of a longer application under pressure is to drive all the coagulable matters to the center and fix them there, to the complete exclusion of everything else. Now, the result of my process is exactly the reverse. It does not act toward the center at all, but from the center. It first slowly and thoroughly heats the wood and vaporizes the water in it without obstructing the escape of such vapors. The expanding vapors move from the center of the stick, and, so far as they act upon the coagulable or coagulated matters at all, tend to expel them from the wood. The center of the stick first becomes dry, as I have demonstrated practically over and over again, and the drying extends gradually toward the surface, which it reaches, in an average-sized stick, in from ten to twelve hours. The coagulable matters contained in the pores are not forced to the center of the stick, but are deposited on the walls of the pores, so far as they are not expelled from the wood altogether. And let it be observed that the superheated steam tends to force said matters neither toward nor from the center of the stick. The only force exerted upon them is that of the escaping vapors of the wood, as above described. When the wood is thoroughly dried and the albuminous matters completely coagulated or expelled, at the end of the ten or twelve hours referred to, it is in an expanded pulpy condition, with its pores wide open and receptive from center to circumference; but if the air is allowed to act upon it for a very few minutes it shrinks, the pores contract, the substance of the wood hardens, and it loses, to a material extent, its power of absorbing preservatives.

The next step of my process is, therefore, to run the cars out of the kilns and dump the wood quickly into tanks constructed for the purpose, where it is subjected to the action of my hardening and preserving composition, as hereinafter described.

The tanks referred to are constructed of wood, ordinarily about twenty-five feet long by ten wide, and of sufficient depth—say, eight feet or more—to enable me to sink the wood about six feet under the surface of the liquid in the tanks, in order to get a hydrostatic pressure of about twenty pounds to the

inch, which, as the tanks are open, must be obtained from the weight of the liquid itself.

The liquid is a composition consisting of ninety parts water; five parts sulphate of iron; two parts chloride of zinc; two parts carbolic acid; and one part common salt, or their equivalents, thoroughly mixed, and raised to a boiling temperature by means of steam-pipes extending through it near the bottom or sides of the tank; the same apparatus, if preferred, supplying the superheated steam for the kilns and the steam to heat the liquid in the tanks. The wood is boiled in this liquid from fifteen minutes to one hour, according to the size of the sticks and the variety of the wood. In the course of this treatment the composition enters into every pore and is, by the hydrostatic pressure above described, driven to the center of the sticks. The chemicals having been conveyed to every fiber and deposited in contact with every cell from center to circumference, the timber is removed from the tank and dried, when it hardens rapidly, the pores closing and permanently retaining the substances with which they have been charged, so that it is virtually indestructible.

Wood prepared in this way is much harder and firmer than in the natural state, and has a dark iron-like appearance, from which qualities, together with its increased strength and durability, I have denominated my process the ironizing process, as above referred to.

Besides these qualities the prepared wood has others, resulting from the carbolic acid, salt, and other chemicals with which it is impregnated, that render it valuable for specific purposes; for example, the antiseptic qualities of the carbolic acid render it valuable for pavements, especially where animal or vegetable filth abounds, and in hot climates where putrefaction readily takes place. The healthfulness of a city would be materially promoted by the use of such a pavement, particularly in the vicinity of markets and other crowded places abounding in putrescible matter.

I do not claim as my invention the treating of wood either under pressure or without pressure, or *in vacuo*, by steam or superheated steam, wet or dry; nor the filling of the pores by vapor and then condensing the vapor by the preservatives, or removing the vapor by mechanical means; nor the forcing of preservatives into the wood; nor the subjection of the wood first to steam and then to preserving liquids; but

What I do claim, and desire to secure by Letters Patent, is—

The process of ironizing wood, substantially as described.

S. P. BROWN.

Witnesses:
L. HILL,
J. S. FOWLER.