UNITED STATES PATENT OFFICE.

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PROCESS OF PRESERVING WOOD.

SPECIFICATION forming part of Letters Patent No. 707,224, dated August 19, 1902.

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To all whom it may concern:

Be it known that I, TOMASO GIUSSANI, merchant, a subject of the King of Italy, residing at 10 Via Palestro, Milan, in the Kingdom of Italy, have invented an Improved Process for the Preservation of Wood, of which the following is a specification.

If a liquid which has a point of ebullition above 100°—for example, tar-oil, linseed-oil, a solution of metallic salts, or the like—is heated in an open vessel and maintained at a temperature midway between the said point and 100°, no movement of ebullition takes place; but if a piece of wood is plunged into the liquid a movement takes place upon its surface similar to that of ebullition, but which is, in fact, only the effect of the vapor produced by the wood, owing to the water which it contains and which escapes through the surrounding liquid. If the temperature is maintained constantly above 100° until all movement has ceased, all the water which the wood contained will have been expelled from it with the exception of a small quantity, which remains in the form of vapor in the pores of the wood, occupying them completely after having expelled even the air contained therein. If after this point has been reached the liquid is allowed to cool, this small quantity of vapor in condensing forms a vacuum, which necessarily becomes filled by the surrounding liquid, which is forced in by the external atmospheric pressure. The wood is therefore completely injected, whatever may be its form or dimensions or the closeness of its grain. A similar phenomenon takes place even when the wood is not allowed to remain in the same liquid to complete its cooling, but is removed rapidly and plunged into cold liquid of the same or of a different nature. This advantage is especially important, owing to the fact that it permits of impregnating the wood with a liquid of any desired density or weight even if its point of ebullition is less than 100°. The transfer of the wood from one vessel to another, although effected rapidly, may be performed with relative ease, because I have found that the period elapsing may vary without prejudicial effect upon the absorption from ten to twenty minutes for large pieces of wood—for example, railway-sleepers, telegraph-poles, or the like. The quantity of liquid absorbed by the wood may be varied as desired by means of this process, because it may be perfectly regulated by the time allowed for the cold bath, from which it may be removed as soon as the liquid has been lowered to a predetermined level. A sufficient degree of evaporation may be obtained by means of the hot bath at a temperature of from 130° to 150°, lasting from ninety to one hundred and fifty minutes, according to the nature of the wood.

I will now describe two different methods of carrying my invention into practice.

First. Using a very dense mixture for the hot bath—for example, anthracene and pitch at a density of from 18° to 26° Baumé—the evaporation of the wood is effected as above explained. When the wood is removed from the bath, it carries with it upon its entire surface a layer of some millimeters in thickness, amounting in the case of a railway-sleeper 2.60 by 0.24 by 0.14 meters to a weight of about two kilograms. This layer during the period of absorption in the cold bath is forced, owing to the internal condensation which takes place, beneath the surface of the wood, where it stays in the form of a hard and impermeable stratum and protects the wood very efficiently against external action to which it is liable to be exposed.

Second. If two liquids of absolutely different nature, density, and weight are placed in the vessel containing the cold bath—for example, a solution of chlorid of zinc or other salts at a density of 2° to 4° Baumé and tar-oil (creosote) at a density of 10° to 14° Baumé—the two liquids remain quite separate in accordance with a well-known phenomenon—that is to say, the lighter solution remains above, while the creosote remains at the bottom, while even if they are vigorously stirred the two liquids do not change their relative positions. The wood upon being removed from the hot bath is transferred to the cold vessel, in which it is forced to the bottom, where it is surrounded by the creosote, with which it becomes impregnated. It is allowed to remain in this bath until the indicator shows that the level of the liquid has become lowered by the amount previously determined upon. The wood is then raised by mechanism provided for that purpose until it enters

the solution of salts, which then surround it and in which it may remain until its complete condensation and absorption, unless it is desired to limit this to a predetermined amount. The treatment is then finished. The passage of the wood through the three different baths produces a very interesting phenomenon, the result of which is absolutely certain. The tar-oil during its absorption by the wood carries with it the pitch so much the more readily that it is perfectly soluble in the oil. When the wood is transferred to the solution of salts, these latter enter it, carried in in their turn by the internal condensation, which has not ceased, and traverse the tar-oil which entered previously, becoming intimately mixed therewith as if it had passed through an ideal filter. The two liquids cannot afterward be separated. The pitch removed from the hot bath is carried beneath the surface, where it forms an impermeable stratum, as above explained. The great difficulty of obtaining a perfect mixture of two liquids not capable of combination one with the other, and which however perfectly emulsioned beforehand would become separated during their penetration into the wood, is thus obviated. My method also permits of readily and exactly controlling not only the quality of the substances injected, but also their respective quantities.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The process for preserving wood, consisting in first immersing the wood in a mixture of anthracene and pitch, heated to a temperature over 100° centigrade whereby the water contained in the pores of the wood is vaporized and a layer of the mixture is deposited upon the surface of the wood and then in immersing the wood in a second cold bath whereby the surface layer remaining from the first bath is made to penetrate the surface of the wood and thereby form a dense protecting-layer, substantially as described.

2. The process for preserving wood, consisting in first immersing the wood in a mixture of anthracene and pitch heated to a temperature over 100° centigrade, whereby the water contained in the pores of the wood is vaporized, and then in immersing the wood in a second bath consisting of two liquids of different densities and incapable of being mixed mechanically whereby the latter liquids penetrate the wood and become mixed with the material of the first bath, within the pores of the wood and form a dense protecting-layer, substantially as described.

3. The process for preserving wood, consisting in first immersing the wood in a mixture of anthracene and pitch heated to a temperature over 100° centigrade whereby the water contained in the pores of the wood is vaporized, and then immersing the wood in a second bath consisting of layers of a solution of chlorid of zinc and creosote whereby the latter liquids penetrate the wood and become mixed with the material of the first bath within the pores of the wood and form a dense protecting-layer, substantially as described.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 13th day of June, 1901.

TOMASO GIUSSANI.

Witnesses:
MICHELEDE DRAGO,
JAS. A. SMITH.