

UNITED STATES PATENT OFFICE.

ARTHUR M. HOWALD, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE GRASELLI CHEMICAL COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

WOOD PRESERVATION.

No Drawing.

Application filed January 23, 1924. Serial No. 688,099.

This invention relates to the preservation of wood by the impregnation or saturation thereof with preserving agents, such as fungicidal, fireproofing and waterproofing materials.

It is known that wood may be preserved by impregnating it with certain oily materials such as coal tar creosote, gas tar oil, crude petroleum, shale oil and the like or with certain inorganic water soluble materials such as zinc chloride, sodium fluoride, mercuric chloride, copper sulfate and the like, and it is also known that a better preserving effect is obtained by impregnating the wood with both types of preserving agents, that is, with both the oily materials and the water soluble materials, for instance, by the successive treatment of the wood to be preserved with the two types of preserving agents. It has also been proposed to accomplish the impregnation of the wood with the two types of preserving agents simultaneously by the use as impregnating liquids of mixtures or emulsions of the oily materials with aqueous solutions of the water soluble preserving agents. The simultaneous impregnation of wood with the two types of preserving agents as heretofore carried out has not however given satisfactory results. The impregnating emulsion in order to give satisfactory impregnation must be sufficiently stable so that it will not separate into its components during the impregnating operation. The emulsion must also have a relatively low viscosity and at the same time contain a sufficient proportion of each of the preserving agents to give the desired preserving effect. Most important of all, the components of the emulsion must be in such a fine state of subdivision that they will penetrate the wood evenly, that is, without a filtering out of or selective penetration by one of the components.

When a mixture of an oily preserving agent with an aqueous solution of a water soluble preserving agent in which the oil constitutes the internal or disperse phase and the aqueous liquid constitutes the external or continuous phase produced by ordinary mixing methods, is used for the impregnation of wood the aqueous liquid or continuous phase penetrates the wood satisfactorily, but the oily liquid or disperse phase is filtered out and does not penetrate to the same degree. On the other hand,

when an emulsion of an aqueous liquid in an oily liquid is used the oily liquid penetrates and the aqueous liquid is filtered out.

I have now found that the ready and uniform and simultaneous impregnation or co-penetration of wood with oily and aqueous preserving agents may be accomplished by the use of what may be termed super-emulsified mixtures of the two types of agents, and my invention therefore resides more particularly in the impregnation of wood with such mixtures.

Briefly, the process of my invention consists in mixing an oily preserving agent such as creosote, gas oil, crude petroleum, shale oil or other hydrocarbon complex or oily liquid having wood preserving properties or any mixture thereof, with an aqueous wood impregnating agent such as a water solution of a preserving or fireproofing material, for example, the inorganic salts, zinc chloride, sodium fluoride, copper sulfate, mercuric chloride, and the like or any compatible mixture thereof and preferably also with an emulsifying or stabilizing agent such as glue, dextrine, asphalt, stearine pitch, rosin soap, sulfite-pulp waste-liquor, sulfite-pulp waste-liquor concentrate, or the like, super-emulsifying the mixture and thereafter impregnating wood with the resulting emulsion in any suitable manner.

Impregnating emulsions of oily and aqueous preserving agents fall into two general classes, to wit: (1) emulsions of oily liquids in aqueous liquids, that is, emulsions in which the oily liquid is the disperse or internal phase and the aqueous liquid is the external or continuous phase, and (2) emulsions of aqueous liquids in oily liquids, that is, emulsions in which the aqueous liquid is the disperse phase and the oily liquid the continuous phase. Both types of emulsion are embraced by my invention.

The super-emulsification of the mixture, as is indicated above, is of prime importance. The expression "super-emulsification" is used to designate the type or degree of emulsification which I have found to give mixtures of oily and aqueous wood preserving agents capable of the ready and even penetration heretofore referred to and which is characteristic of my invention. Super-emulsification of the oily and aqueous preservative agents is accomplished in accordance with my invention by mixing the two

types of agents with each other in suitable proportions and preferably also with an emulsifying agent and passing the mixture preferably at elevated temperature, say in the neighborhood of 40 to 60° C., to increase the fluidity thereof and under heavy pressure, say from 1000 to 3000 pounds per square inch, through a well known type of emulsifying apparatus comprising a valve having a conical seat and a conical tight fitting plug held against the conical seat by means of a strong spring.

The treatment of the wood with the super-emulsified impregnating liquids prepared as described may be carried out in any of the various known ways, for instance, by simply soaking the wood in the liquids, but the impregnation preferably is accelerated by heating, steaming, evacuation or the application of pressure, or a combination of such expedients.

The invention is illustrated by the following specific examples:

I. An impregnating liquid is prepared by mixing 17.5 parts of California gas oil, 5 parts of dextrine, and 77.5 parts of a 3% solution of zinc chloride and super-emulsifying the mixture at a temperature of about 60° C. and under a pressure of from 1500 to 2500 pounds per square inch. Wood to be impregnated is placed in a steel vessel or cylinder and heated with steam at say 20 to 40 pounds pressure and the cylinder is then evacuated and a sufficient quantity of the impregnating liquid run in to immerse the wood. Pressure is then applied until the wood is impregnated to the desired extent, after which the unabsorbed liquid is removed and the cylinder again evacuated. The impregnated wood is then removed and the cylinder recharged with a fresh supply of wood.

II. An impregnating liquid is formed by mixing together 450 parts of dry zinc chloride, 2550 parts of water, 5000 parts of heavy Mexican fuel oil, and 10,000 parts of California gas oil and super-emulsifying the mixture at a temperature of about 60° C. and under a pressure of 2000 to 2500 pounds per square inch. The impregnation of wood with the resulting liquid is carried out in the same manner as that described in Example I.

The foregoing examples illustrate the use of what may be termed the oil-in-water super-emulsions and the water-in-oil super-emulsions for the impregnation of both types of different compositions applied under different impregnating conditions and to different kinds of wood show not only a thorough impregnation of the wood, indicating that the emulsions are of such a physical nature as to readily impregnate the wood

but also an even distribution of the emulsified components in the wood substantially in the proportions in which they exist in the impregnating emulsions, thus indicating that no separating or filtering action takes place during the impregnation. The fibers of the wood are coated and the pores filled with a uniform mixture of the oily and aqueous components of the impregnating emulsion and the preservative effect upon the wood is greater than that obtainable by impregnation with either the oily or the aqueous impregnating agent separately.

I claim:—

1. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing an oily preservative agent and an aqueous preservative agent.

2. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing an aqueous solution of a preserving agent, a second wood preserving agent which is insoluble in water and an emulsifying agent.

3. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing an aqueous solution of an inorganic salt, and an oily hydrocarbon complex insoluble in water.

4. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing an aqueous solution of an inorganic salt, an oily hydrocarbon complex insoluble in water, and a suitable emulsifying agent or emulsion stabilizer.

5. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing creosote, an aqueous solution of zinc chloride and sulfite-pulp waste-liquor.

6. Process for the preservation of wood which comprises impregnating the same with a super-emulsified liquid containing a dispersion of an oily wood preserving agent in an aqueous wood preserving agent.

7. As a novel product wood impregnated with a super-emulsified liquid containing a dispersion of an oily wood preserving agent in an aqueous wood preserving agent.

8. As a new product super-emulsified liquid containing an oily wood preserving agent and an aqueous wood preserving agent.

9. As a new product a super-emulsified liquid containing an oily wood preserving agent dispersed in an aqueous wood preserving agent.

In testimony whereof, I affix my signature.

ARTHUR M. HOWALD.