A New Wood Preservative

By Arthur Arent

The world owes much to the pioneers who blazed the way against many obstacles in teaching wood preservation and conservation, and to the Forestry schools that have been established and to there students who carried on and are still carrying on. Not so many years ago the general opinion held that "there was plenty of wood standing for all time." Today, conservation of wood is a reality and the world is conserving wood. While much has been done and much is yet being done we find the two old enemies of wood, Fire and Decay, taking an enormous annual toll.

The chemical world has tried to keep pace with the requirements needed for wood preservation and all the preservatives used have accomplished much good. True their defects are many and the various water soluble salts that have been used and are being used possess a serious objection in that moisture dissolves the salts and therefore the treatment is removed from wood. Another vital objection to water soluble salt solutions is the difficult in obtaining satisfactory penetration of wood, owing to the grain of some woods and to the waxes, resins, gums and the like which many woods contain and which water will not penetrate. The chief water soluble salt now in use is Zinc Chloride. This salt is also used with creosota-oil.

"Creosote Oil," obtained from coal tar is also used in large quantities. It usually contains phenol, (carbolic acid) cresol, (cresylic acid) pyridine, naphthalene, and other substances. It must be remembered that these poisonous agents, carbolic acid and cresylic acids are soluble in water and will be removed by moisture. The pyridine is also miscible with water. It is possible that some of the other substances contained in creosote oil may have some toxic lasting effects. The fact that the heavier oil base of creosote oil is insoluble in water and that it eliminates moisture from wood to a certain extent, has brought this product into general use. It was with great interest that the writer read a recent article on "Saving Westminister Hall from ravages of the wood-boring beetle (Anobium domesticum)." Here all the wood, both the new and old was treated with a solution of creosote and an exceedingly poisonous salt. In this case it was evident that England's wood treating experts did not wish to guess at the final result but used a poisonous salt in connection with creosote. Some disadvantages in connection with creosote oil are viz: It requires heat to obtain a successful penetration

of wood, the operation is quite lengthy and filthy, it is caustic on the hands of workmen, treated wood is disagreeable to handle, treated wood burns freely, and its color and ordor are objectionable in many places, it cannot be painted successfully and in instances certain penetration cannot be had.

United States Department of Agriculture, Farmers' Bulletin, No. 744, states in part as follows: "Decay is not due to the chemcial action of the soil or to the fermentation of the sap, but is the result of the action of certain low forms of plant life called fungi. In general, therefore, the most effective method of preventing decay is to poison the food supply."

It was with this thought that the writer started investigations and after years of constant research chose poisonous, insoluble, compounds of Antimony to meet the necessary requirements which were lacking in wood preservatives being used.

What is Antimony? Antimony is a metal. It is not sensibly affected on exposure to the air at the ordinary temperature; its surface becomes slightly tarnished, but does not rust. It is one of the oldest metals known and an account of this metal is found in the writings of Basil Valentine in the year 1460. Antimony is mentioned in the Old Testament. Antimony is used as an ingredient in the construction of alloys such as type metal, Brittania-metal, and pewter plate. It is found generally throughout the world but China probably furnishes the bulk of the world's supply of the ore.

Briefly, these are the properties of Antimony and its compounds. In its chemical properties and its compounds Antimony resembles Arsenic with which the reader is familiar. In the year 1566 the French parliament found it necessary to prohibit the use of Antimony compounds in medicine, which prohibition was not removed until a century later. The Encyclodedia-Brittannica, 11th Edition, Vol. 2, page 129 states: "Antimony is one of the Protoplasmic Poisons, directly lethal to all living matter." On this point all authorities are agreed. Webster's dictionary defines Protoplasm as "the essential substance of the cell body and nucleus of cells of animals and plants, regarded as the only form of matter in which life is manifested." All authorities state that all compounds of Antimony are poisonous, and with the exceptions of the compounds of Antimony with some organic acids, as tartaric and citric, (which are not used) all salts of Antimony are decomposed by pure water, and the basic permanent salt of Antimony remains. In reality, a regular "setting process" takes place in wood.

So through the years the writer sought to find and fin-

ally did succeed in obtaining an exceedingly active poisonous Antimony compound which was not soluble in pure water, which would dissolve in creosote oil and insure the same with a permanent poison in practically any desired amount, and so produce a toxic and fire-resisting treatment for wood.

Later we succeeded in obtaining commercial solvents for this Antimony compound, solvents that would dissolve waxes, resins, gums and the like that many woods contain, which prevented water solutions and tarry oils from penetrating wood thoroughly. Here then we had an exceedingly active poisonous, insoluble compound of the Protoplasmic Poison Antimony in actual solution that would penetrate wood far beyond that of other regular preservatives and in much less time. Some of these solvents are volatile and can be recovered in large treating operations. This of course reduces the cost of treatment. No heat is required to secure penetration. Antimony-treated wood is nice to handle and can be painted successfully. Here also, is a much needed treatment for salt-water piling which is destroyed by the teredo and marine borers.

Heartwood of most woods can be impregnated with insoluble Antimony compounds as thoroughly as sapwoods can be penetrated by other treatments. This, however, in most cases must be done by the vacuum and pressure methods now in general use. Sapwood penetration of most woods can be accomplished by the tank method, in which case the tank is kept covered to prevent undue loss of the carrier liquids. It if be desired, an Oil Dye, (insoluble in water) can be used in the treating liquid and the Oil Dye (which is in actual solution—no stirring required) will color the wood the entire depth of the penetration or clear through the wood where vacuum and pressure is used. The expense of dyeing wood in this way is very small and is accomplished without extra work. The dyes will color only new posts or lumber. The colors run chiefly in the reds.

The approximate cost of treating ordinary woods per cubic foot for sapwood penetration from one half inch to one inch, which is a sufficient treatment for all ordinary purposes, will vary from $.062 for merely a toxic preservative treatment (and where it is possible to recover the volatile carrier liquids) to $.137 for both the toxic preservative and fire-resistant treatment. Without recovery of the solvents this will cost from $.17 to $.245. Cost, of course, is always governed by quantities, location, equipment and the like and only cost of material has been figured. In order to obtain the best absorption and penetration of the Antimony compound pre-

servative, posts and timber must be seasoned and lumber should be dry. Owing to the time saved with the Antimony treatment as compared with other treatments, the cost of treatment is very small. It must be remembered that the last price named also produces a real fire-fighting wood. If it be desired, wood can be treated with Antimony compounds to the extent that wood will not flame or carry, merely charring and becoming red hot at the point of contact with fire, like an iron in a forge.

To fortify creosote oil with poisonous insoluble compounds of Antimony would cost approximately $.05 to the gallon of creosote oil.

The record of Antimony and its compounds date back hundreds of years. The poisonous insoluble properties of same were known then and still are known. In obtaining new solvents of record for some of these Antimony compounds it has now been made possible to thoroughly impregnate timbers and woods with these permanent poisonous compounds of Antimony.