CHEMISTRY

# Wood Substitutes for Substitutes

## New Chemical Treatments, Hardening, and Waterproofing Open New Ways To Save Metals

**See Front Cover**

WOOD is fast becoming a "substitute for substitutes" — replacing metal alloys and composition materials in our war program.

Big timbers are being substituted for steel girders in many newly constructed war plants, armories, hangars, piers and docks. The shortage of steel has compelled engineers to return to the big beam construction of former years. Perfection of salt pressure impregnation methods, using zinc chloride or other salts, makes it possible to protect these timbers from pests and decay.

As a result of new discoveries at the Forest Products Laboratory at Madison, Wis., many new uses are being found for wood and its products.

In common with all America and the forest products industry itself, emphasis at the Laboratory is on defeating the Axis powers, and wood scientists are busy devising means of adapting wood to the needs of many industries hard hit by priorities. Among the research projects primarily directed to defense needs are those involving: lamination of wood for airplane propellers; improved decking for naval craft; substitutes for cork, made scarce by the war; better construction for the pontoons necessary in emergency bridges thrown up by Army engineers to facilitate the progress of mechanized troops; containers for shipping explosives; and a new type of resin for shrapnel filling.

The concern of the Forest Products Laboratory with the war effort, however, is but a part of the Laboratory's long-time program to improve our present uses for wood and to adapt it to still more civilian and peacetime needs. For the directors of this research institution are confident that the new applications for wood developed in war will prove of equal value in a peacetime economy, particularly since wood is such an abundant national resource.

How abundant a crop it is is revealed in figures recently released on the forest reserve. Systematic and extensive tree planting plus natural regeneration is resulting in an annual growth of 32 billion board feet of timber in the United States, or enough to build 2,665,000 new homes each year, more than five times the number constructed in 1941. Further indication of the timber owners' future planning is the fact that more than 70,000,000 acres of commercial forest land is being managed on a sustained-yield production basis, so that its huge timber crop can be harvested and replenished indefinitely. In fact, the annual increment from the 461,000,000 acres of commercial forest land in the nation is now almost equal to the amount of timber we consume.

The Laboratory, founded in 1911, and the only institution in the world to be devoted exclusively to the study of wood and its derivatives, includes more than four acres of floor space and is staffed with 160 scientists.

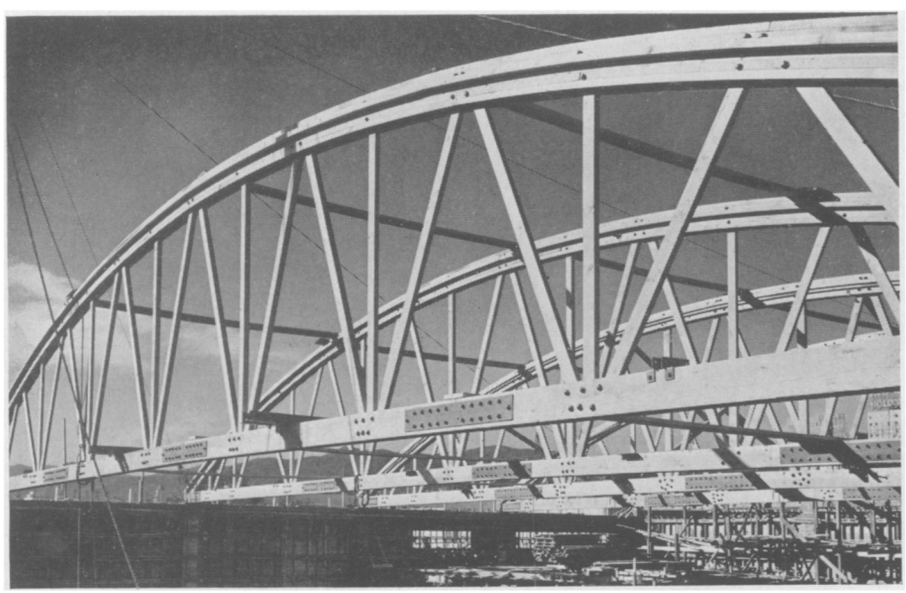
An example of a wartime product which will be of great value in peace is a sensational new plasticizing process which the Laboratory has developed. Under treatment with urea, an inexpensive chemical produced in quantity by du Pont, it is possible to twist wood like rope, bend it like lead, mold it like dough, and to give it the hardness of some types of steel.

### Process Is Simple

The process itself is a simple one. After soaking the wood in urea it is dried and heated to the boiling point of water. At this point the wood can be bent, twisted, compressed and molded, direct from its original form. In addition to the obvious wide applications such a product will have, the new process has the further advantage of making use of second-growth and other low-grade timber. This is still in the experimental stage, however; it is not commercially available, nor will it be for some time.

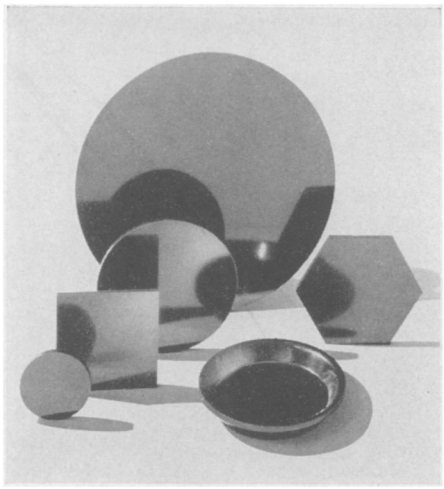
The whole new field of plastics, which produces so many of our most exciting commercial products, has benefited enormously from the work done at the Forest Products Laboratory. Wood and wood products are our largest single source for plastics. The mysterious substance lignin, whose actual chemical composition has baffled scientists for more than a hundred years, has at last proved to be valuable material for conversion into plastics.

Lignin is also used as an expander for lead in automobile storage batteries, thus increasing their life several fold. It has also been put to limited uses in tan-



*STRONG*

***Girders of wood, like the above, instead of steel are being used for many long-span roof structures both in war production plants and in peacetime buildings. New methods of chemical impregnation give the wood almost the strength of steel.***



*FROM SAWDUST*

*Lignin, waste product of paper and pulp mills, acts as the formative and binding agent for this plastic from sawdust.*

neries. Experiments are now in progress which would make lignin available as a base for fertilizer.

Lignin is the stuff that binds the cellulose together in wood. It is wood's second most abundant constituent. Chemically, it is known to be related to cellulose and, like the latter, is made up of carbon, hydrogen and oxygen. But the size of its molecule and the arrangement of the atoms in it remain unknown.

This substance has to be eliminated in pulp manufacture, but does great harm when discharged into streams as a pulping liquor. Until now it has been almost totally a waste, so that processes which tend to adapt it for use are earnestly sought.

The Laboratory has also devised more efficient and economical methods of chipping trees to obtain "naval stores"—gum resin and turpentine; the drying of timber in salt solutions which eliminate the cracking and warping so usual in the old seasoning process and which saves the industry $10,000,000 annually; fireproofing in which treated wood specimens are tested in specially designed combustion apparatus; the chemical impregnation of wood to prevent decay.

All these and many more experiments and projects are under way in Madison's House of Magic in an effort to make available to America its greatest crop—wood—a crop which is growing as fast as it is harvested and which still has thousands of possibilities for the enrichment of our lives as well as for the protection of our way of life.

*Science News Letter, March 14, 1942*



ETHNOLOGY

# Japanese In Hawaii Loyal Declares American Author

## Not Only American-Born Youth, But Their Alien-Born Parents, Have Stuck With the Colors and Served

JAPANESE in Hawaii have proved loyal to the United States since the first bombs fell on Pearl Harbor, declares Prof. Blake Clark of the University of Hawaii, whose eye-witness book, *Remember Pearl Harbor!* has just been published. (*Reviewed, SNL, this issue.*) Not only the Nisei, American-born of Japanese parentage, but their alien-born elders who cannot become citizens, have stuck with the colors of their adopted land, he states, adding:

"Of all the 425,000 people in Hawaii, only 273—and by no means all of them Japanese—have been detained as suspicious characters."

First evidence came while the bombardment was just starting. Yamato and his wife Hatsu, alien-born Japanese servants in the house where Prof. Clark lives, were first incredulous, then stricken with horror and grief, at the treachery of their fellow-countrymen. The woman actually became physically ill. Subsequently Yamato did all the digging for the air-raid shelter in the back yard.

During the raid, two Japanese workmen helped one American soldier to set up a machine gun, and then aided so eagerly in feeding ammunition into it that both suffered burns from its heated barrel.

The Japanese naval officer who escaped from one of the disabled two-man submarines found a Nisei in American uniform waiting to take him prisoner when he swam ashore. The brown-skinned soldier forgot military etiquette to the extent of giving his captive a couple of cuffs on the jaw because, he said, "you're one of those (deleteds) that's responsible for me being out here on guard duty at $21 a month!"

Japanese members of the University of Hawaii faculty immediately put themselves at the service of the F.B.I. Japanese surgeons treated the wounds of American soldiers and sailors, while Japanese bombs were still bursting about them.

Outweighing by far these individual deeds of courage and sacrifice, however, was the response of the Japanese community to the medical authorities' appeal for donors to the blood bank. People of all races and classes came crowding in together, but the Japanese who offered their blood outnumbered all other racial groups combined. The older people, alien-born, came dressed in the ceremonial black which their etiquette requires for formal occasions.

Many an American fighting man, wounded during the raid, is now able to man his gun or fly his plane against the aggressors today because he very literally has Japanese blood in his veins.

*Science News Letter, March 14, 1942*

NUTRITION—PSYCHOLOGY

## American Soldiers Receive Daily Rations of Candy

AMERICAN fighting men at Bataan as well as American troops in action everywhere rate candy and tobacco along with their regular rations, as an aid to morale, according to Army Quartermaster Corps officers.

When the soldier is in action and can't get to a post-exchange for smokes and sweets, he gets a daily ration of candy, cigarets, pipe tobacco or chewing tobacco as he prefers. The candy ration is one ounce; pipe tobacco one ounce, chewing tobacco one ounce; cigarets, 20. If he rolls his own, he gets 100 cigaret papers and two ounces of smoking tobacco. A box of matches is supplied every two days. Reasonable choice of brands is allowed on all tobacco.

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