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COMPOSITE WOOD PRODUCT

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COMPOSITE WOOD PRODUCT

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The present invention has a two-fold object. The first is to provide an artificial wood shape of such characteristics as to yield a much more artistic and pleasing article than has heretofore been available from waste material and the other is to make it possible to usefully employ a material which has heretofore represented a very great economic waste.

The importance and advantages of the invention will be best appreciated by an understanding of the conditions which prevail at lumber mills and especially at the mills of the Pacific Northwest. In these areas great logs of red wood, spruce, fir, ponderosa pine and other varieties are converted into vast quantities of lumber in day by day operations which leave enormous quantities of waste wood to be disposed of. This comprises the slabs from the log with the adhering bark, pieces of small limbs, twigs, leaves, etc. The mills dispose of as much of this waste material as possible by using it for fuel but there still remain hundreds of thousands of tons for which no susbtantial use has heretofore been devised. In the use of this waste wood for fuel it is usually broken into relatively small pieces by being passed through a hog-mill and the resultant product is commonly known throughout the industry as hog fuel.

In carrying out the present invention I subject this hog fuel to a hammer-like comminuting action, which not only reduces the particles as to size but which flattens the chips of appreciable size and squeezes them to harden their flat surfaces and to cause whisker-like fibres to protrude along their edges. These fibres interlock in a way hereinafter set forth.

The product of the hammer mill consisting of particles ranging from granular wood meal to good sized chips is then molded into an artificial wood shape by the use of a binder and the application of pressure in the presence of either heat or cold.

Both hog mills and hammer mills are well known to the industry. The hog mill differs from the hammer mill in that its striking elements have chisel-like edges which act to break the pieces of wood against a breaking plate. The striking elements are pivoted to a revolving carrier and they move over a grate like bottom through which the comminuted particles fall when they have been sufficiently reduced in size. The hammer mill, upon the other hand, has its like pivoted striking elements rounded upon their ends so that they do cut but trap the particles between themselves and a fixed serrated wall with

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a pounding and rubbing action which is continued as the particles pass over an arcuate grate like bottom, and through which the particles fall when sufficiently reduced in size.

The mill constitutes no part of the invention. I employ conventional mills which have been available in the open market for years. In all of these mills the ultimate nature and fineness of their product is largely determined by the coarseness or fineness of the grate through which the material is finally discharged. In the case of the present invention the nature of the mill is such that the final product ranges from relatively small granular particles of wood meal to good sized chips. These chips are pounded or hammered, as described, in the action of the mill. The particles are made up of pieces of wood, twigs, bark and the like. In other words, no attempt is made to sort the hog wood content. The most economical, and consequently the preferred way, is to take the waste product as it comes and subject it to the action of a hammer mill or its equivalent. However, it so happens that this way which is the most economical is also the way which yields the most beautiful effects in the finished product. This is due to the fact that when the entire waste is used many different colors and shades are present which give an attractive and artistic effect in the finished product. For example, the pieces of bark are usually much darker than the other particles as well as being more absorbent of paints, stains, etc. Thus, mottled and mosaic effects appear in the finished product, as presently set forth.

This product from the hammer mill comprising, as stated, particles ranging from wood meal up to good sized chips is mixed with an adhesive, waterproof binder in a heterogeneous mass and to the consistency of merely a damp and not a slushy mass. It is agitated well to effect thorough mixing of the whole and is then subjected to molding pressure in any desired type of press or machine. In this heterogeneous mass the small sticks, chips, etc., extend at a great multiplicity of angles, both longitudinally and laterally of the mass, with the result that a structure of great strength is provided. While I have used the term "shape" in describing this artificial wood product to indicate that it is of use in forming any shape of artificial wood article, such as columns, beams, molding and the like, one of its greatest fields of usefulness is in the manufacture of artificial board. In this field it yields marked features of superiority over known products from the standpoint of economy, strength, artistic ap-

pearance and sound-proofing capability. It is cheap because it is made of a waste product already existent in large quantities and a drug on the market; it is strong in that it is not made by felting after the manner of many wall boards. Its fibres do not all extend in the same direction as in the case of felted products. Upon the contrary, they extend in every conceivable direction and internally brace the board against lateral bending, so that it will not easily break. Every little stick and chip is an internal brace, adding strength to the whole. Further, the whisker like fibers produced along the edges of the chips of considerable size interlock with the fibres of other particles to tie the whole firmly together. It has superior sound-profing qualities because the heterogeneous disposition of the particles, together with their size leaves interstices and voids which, while individually very small, complementally provide a mass of sound-proofing or entrapping cavities to absorb sound waves. Finally, the artistic surface appearance of the finished product is much superior to products made from particles of uniform size and color. Much of the wall board on the market is flat and drab in appearance and some of it is much like blotting paper in its capacity to absorb paint and other covering compositions. My product differs from products of the nature described in that it provides a hard waterproof surface of a distinctly ornamental nature.

One form of product which I have manufactured by the method of this invention has its particles ranging from the granular wood meal up to chips of about three-quarters of an inch in length to about three-eighths of an inch in width. Thus, the finished surface presents a number of flat hard surfaces represented by the pounded faces of these chips and disposed at varying angles, while the intervening spaces are made of spots of darker bark, smaller and narrower chips running down to those of little more than line width, and disposed at many angles and filled between with spots of granular wood material. When a surface of this nature is stained and varnished the hard flat surfaces of the larger pounded chips absorb less stain than the bark or the open grain of other pieces and provide high lights which in the resultant pattern present a very attractive mosaic. The small voids at the surface also show up and produce a product which in a beam, for example, rivals in attractive appearance the so called "pecky-cypress" beams valued for their decorative effect in tropical homes. Upon the other hand, if we paint over a board of this sort with, for example, a light blue paint and wipe the surface with a rag while the paint is still wet, the paint wipes off of the hard flat surfaces of the larger chips and most of those surfaces flush therewith, but clings in the open grain surfaces of the other particles and in the interstices between particles, outlining a pattern distinctive of the particular disposition of the particles in that piece. The pattern produced would differ with every piece produced. No two would ever be alike. However, in order to give as good an idea as possible of the nature of the surface produced, I have photographically illustrated in the accompanying drawing, made a part hereof, a representation of a block made as above described, enlarged to about double size.

With a board having such a surface it is possible to secure a multitude of polychrome effects of the nature of those which a painter has heretofore secured in the finishing of rough cast plaster

walls. And even when no pigment is employed and only a transparent coating, such as varnish, is applied to the natural, multi-shaded surface of the product, the result is of such beauty as to render it possible to use such a board in the direct finishing of libraries, dens, restaurants and other places where ordinarily high priced, beautifully grained woods would find a place.

I do not limit myself to any particular binder. However I have found urea formaldehyde to be valuable in this relation. For example, I may take of the comminuted hammered wood waste two pounds and mix with this a binder consisting of two to four ounces (preferably three ounces), of urea formaldehyde plastic glue and one-fourth to one-half pound of rye or wheat flour as an extender. To this I add one to two pounds (preferably about 1 and three-quarters pounds) of water. The whole is mixed to a damp mass and then molded to the desired form. This molding may take place as a simple step by step pressing operation or in a continuous operation in any suitable machine, either with or without the application of heat. If the urea formaldehyde glue be increased in content the hardness and waterproof qualities of the product will be increased.

I contemplate employing this basic product (to wit, the product secured by passing hog fuel through a hammer mill to secure a heterogeneous product of hard wood, bark, twigs, etc. ranging from wood meal to fairly large flat sided chips), in conjunction with other types of binders, such as plaster of Paris, gypsum, etc., and in connection with any type of binder I contemplate the employment of any desired chemicals. For example, para-formaldehyde makes a good preservative resistant to the ravages of insects. I may add animal glue, where deemed desirable, and small amounts of acids, such as oxalic acid. I wish to cover the use of urea formaldehyde and grain flour in any proportions.

It will be observed that the base product which I employ differs very radically from the base products employed in most wall boards in that it is composed, in the main, of particles so large, so hard and so heterogeneous as to size and shape as to be wholly unsuited for the felting commonly resorted to in the manufacture of wall board and which results in the production of products very weak in one direction, to wit, laterally. That is to say, pressure applied through the thicknesses of many of these boards easily breaks them.

However, I wish to emphasize the fact that this invention amounts to radically more than merely varying the size of comminuted wood. For example, in my co-pending application, Ser. No. 491,546, filed June 19, 1943, now Patent No. 2,441,169, May 11, 1948, I disclose a wall board formed by compressing relatively coarse woody particles (shavings) and a binder. However, there is no comparison between the ultimate products. The compressed shavings product is very characterless in appearance as compared with the product of this invention. This is due to the fact that it is of such uniform color as to yield no contrasts and very little design. The product of the present invention, upon the other hand, yields a terrazzo like effect, because of the presence of woods of many different kinds, woods from many different parts of the log, particles of bark and the hardening and burnishing effect upon the chips of larger size, arising from the pounding and rubbing action of the hammer mill, thereon. In the drawing some of the large flat faced chips are indicated at 5, their whis-

kered edges at 6 and the dark splotches of bark at 7.

It is to be understood that the invention is not limited to the precise construction set forth, but that it includes within its purview whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. A wood product composed of a binder and a mass of comminuted wood resulting when hog fuel is subjected to the action of a hammer mill, to produce a multiplicity of relatively large flattened chips having their faces burnished by the rubbing action of a hammer mill togther with a mass of smaller wood particles including those from the bark and leaves of the hog fuel.

2. The hereindescribed method of making artificial wood shapes which consists of subjecting hog fuel with its contained bark, twigs and leaves to a comminuting and pounding and rubbing action to reduce it to a mass containing particles ranging from the granular to chips of considerable length and width, the pounding and rubbing action flattening and burnishing said chips and compressing their fibres to leave protruding whisker-like edges therealong, mixing said particles in a heterogeneous mass with a water repellent, adhesive binder, and pressing the whole into the desired shape.

3. An artificial wood shape composed of an adhesive binder and a mass of wood particles ranging in size from wood meal to chip-like particles, said particles being those produced when hog fuel including the bark and twigs, is comminuted in a hammer mill to yield a product in which

at least some of the chips range to three quarters of an inch in length and three eighths of an inch in width and wherein said chips have been flattened and hardened by the hammering action of said mill and, wherein some of said chips have whisker-like fibres along their edges, wherein the said binder is composed of the following ingredients mixed with each other and with the wood particles in the following proportions, to wit:

Comminuted wood products	pounds	2
Urea formaldehyde	ounces	2 to 4
Flour	pounds	¼ to ½

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