April 4, 1944. E. A. LEHMAN 2,345,940

WOOD FINISHING

Filed Dec. 17, 1941 2 Sheets-Sheet 1

Fig. 1

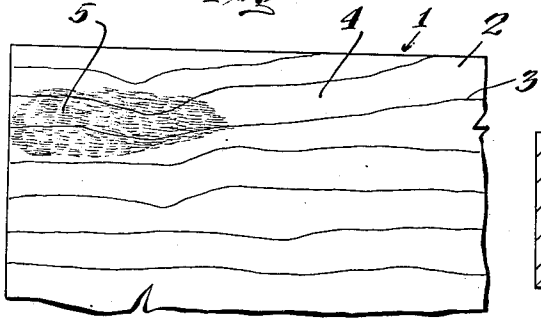


Fig. 2

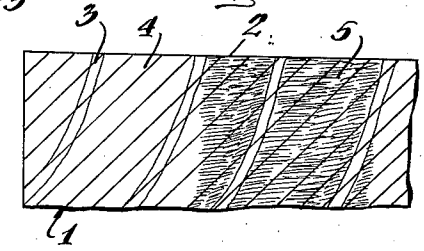


Fig. 3

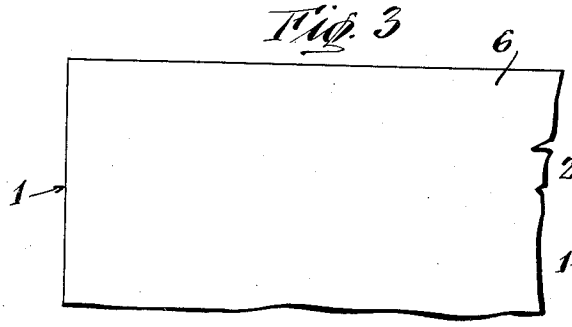


Fig. 4

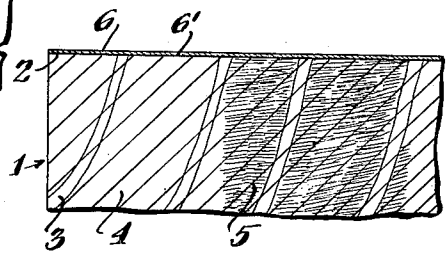


Fig. 6

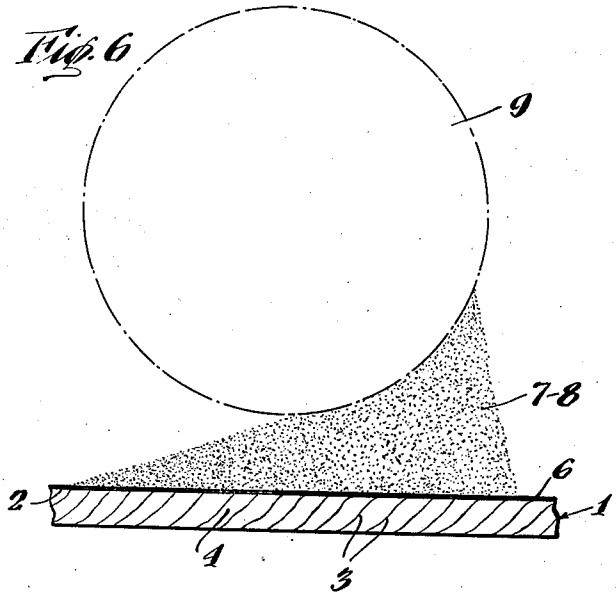
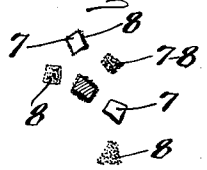


Fig. 5



INVENTOR.
Edgar A. Lehman
BY
Albert M. Austin
ATTORNEY

April 4, 1944. E. A. LEHMAN 2,345,940

WOOD FINISHING

Filed Dec. 17, 1941 2 Sheets-Sheet 2

Fig. 7

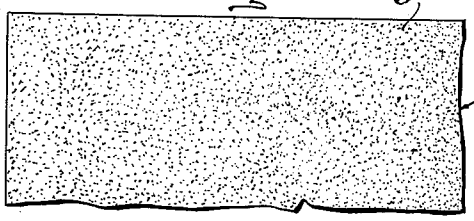


Fig. 8

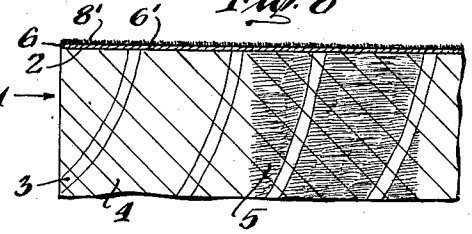


Fig. 9



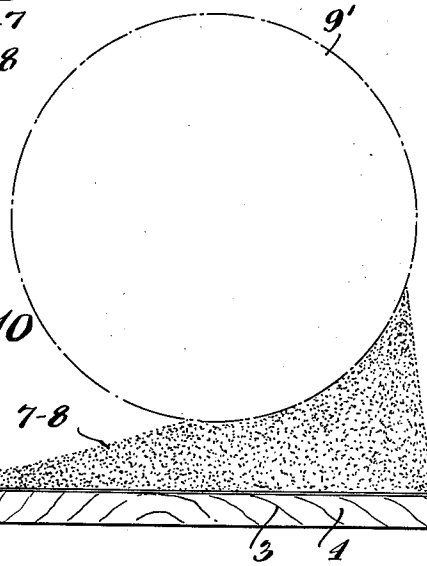


Fig. 10

Fig. 11

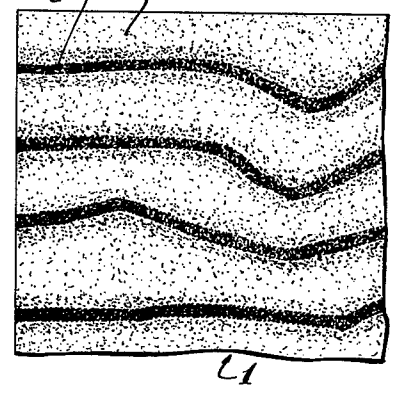


Fig. 12

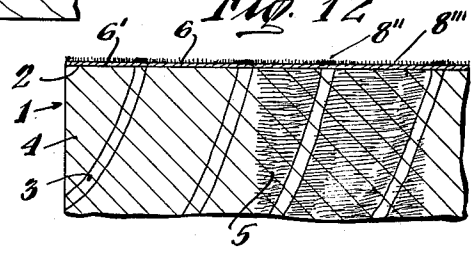


Fig. 13

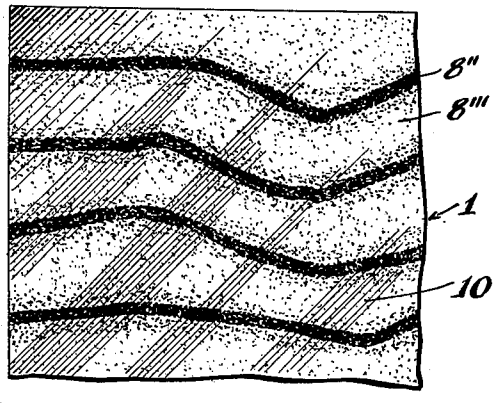
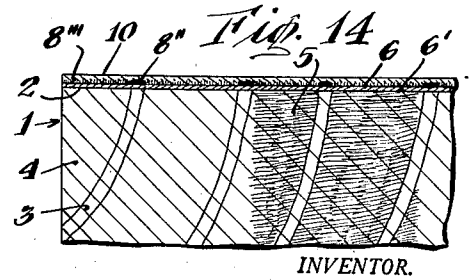


Fig. 14



INVENTOR.

Edgar A. Lehman

BY

Albert M. Austin

ATTORNEY

Patented Apr. 4, 1944

2,345,940

UNITED STATES PATENT OFFICE

2,345,940

WOOD FINISHING

Edgar A. Lehman, Mishawaka, Ind., assignor to The American Foundry Equipment Company, Mishawaka, Ind., a corporation of Delaware

Application December 17, 1941, Serial No. 423,322

28 Claims. (Cl. 117—29)

This invention relates to wood finishing, and more particularly to the finishing of wood surfaces to bring out and highlight the true grain structure and conceal unsightly discolorations and mineral stains which occur in the natural wood.

The present application in a continuation-in-part of my application Serial No. 298,071, filed October 5, 1939, and entitled "Process of forming ornamented wood surfaces."

A considerable percentage of the wood used for wood trim, wood panelling, furniture, and other wood objects contain unsightly discolorations which are present in the natural wood, such as the darker or discolored heart wood or discoloration due to mineral stains in the wood. While such woods are equally as serviceable for wood trim, wood panelling, furniture, and other wood objects, from the standpoint of strength and durability, no method has heretofore been known for concealing the undesirable discolorations of the wood surface to be finished without at the same time obliterating or concealing the wood grain which is to be emphasized.

For this reason, only prime woods are used for wood trim, wood panelling, furniture and like objects where the wood is to be stained to reveal the grain, and the discolored sections of the trunk or log are either discarded or used for other less valuable purposes. Due to the gradual depletion of prime forests, prime boards which are free from spot discoloration and mineral stains are becoming more difficult to obtain, and more costly in price.

An object of this invention is to provide a method of finishing wood surfaces whereby undesirable discolorations of the natural wood are concealed and the desirable grain lines are emphasized and enhanced.

Another object of this invention is to provide an improved method of finishing wood which makes use of the physical characteristics of the wood itself to obtain grain emphasis.

Another object of this invention is to provide an improved process for finishing wood which can be carried out mechanically at high production speeds and low cost and whereby undesirable discolorations are concealed and the natural grain lines of the wood revealed and enhanced.

Another object of this invention is to provide an improved finished wood surface in which the undesirable discolorations in the natural wood are concealed and the natural grain lines thereof are distinctly brought out and emphasized.

Other objects of this invention will become apparent as the disclosure proceeds.

Various other features and advantages of the invention will be apparent from the following particular description and from an inspection of the accompanying drawings.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part hereof, in which:

Fig. 1 is a plan view of a short section of planed wood before treatment, showing the natural grain lines which are to be brought out and a discolored area which is to be concealed;

Fig. 2 is a magnified cross-section of the planed wood showing the gain lines and the discolored portions emerging into the planed surface of the wood to be finished;

Fig. 3 is a plan view of the wood section shown in Fig. 1 after the planed surface has been coated with an opaque paint which conceals both the grain lines and the discolored areas;

Fig. 4 is a magnified cross-section of the wood as shown in Fig. 2 after the opaque paint has been applied to the surface thereof as shown in Fig. 3;

Fig. 5 illustrates a number of particles of hard carrier granules greatly magnified, some of which are shown as coated with the selected coloring pigment;

Fig. 6 is a diagrammatic illustration of a centrifugal blasting wheel showing the manner in which the hard pigment-coated carrier particles are thrown from the periphery of the wheel to bombard the painted surface of the wood under treatment;

Fig. 7 is a fragmentary section of the painted wood surface showing the generally even distribution of the pigment powder over the painted surface applied by the centrifugal blasting wheel as illustrated in Fig. 6;

Fig. 8 is a magnified cross-section of the planed wood showing the even distribution of the pigment powder over the painted surface thereof as illustrated in Fig. 7;

Fig. 9 illustrates a number of particles of hard carrier granules greatly magnified, some of which are shown coated with coloring pigment, which are fed into a centrifugal blasting wheel illustrated in Fig. 10, at a second blasting step;

Fig. 10 is a diagrammatic illustration of a centrifugal blasting wheel showing the manner in which the hard pigment-coated particles, illustrated greatly magnified in Fig. 9, are thrown from the wheel to further bombard the wood surface on which pigment powder has previously been deposited as shown in Figs. 6, 7 and 8;

Fig. 11 is a magnified plan view of the wood section showing the arrangement of the pigment on the bombarded surface thereof and wherein the pigment is deposited with greater density along the grain lines than between the grain lines, which results from the second blasting step as illustrated in Fig. 10;

Fig. 12 is a magnified cross-section of the wood surface shown in Fig. 11 after the second bombardment, this view further showing the manner in which the pigment has arranged itself with greater density along the grain lines than between the grain lines;

Fig. 13 is a magnified plan view of the surface of the wood as shown in Fig. 11 after the transparent lacquer coating has been applied to the dry stained wood surface; and

Fig. 14 is a magnified cross-section through the finished wood product shown in Fig. 13 after application of the transparent lacquer to the dry stained wood surface.

Similar reference characters refer to similar parts throughout the several views of the drawings and the specification.

The summer growth of wood, which is generally characterized by darker grain lines, is harder than the spring wood growth, usually identified in most woods with a lighter colored marking than the summer growth. I have discovered that the spring growth responds to particle bombardment to a different degree or measure than the summer wood even though the bombarded wood surface has been covered by a relatively thin but dense and opaque paint or enamel coat. This characteristic of the wood growth is taken advantage of and made use of in my improved process of wood staining.

To illustrate more clearly my improved method, there is shown in Fig. 1 a short section of wood 1 whose top surface 2 has been planed or ready for finishing. The natural grain line portions which are characteristic of the summer growth have been designated by the numeral 3, while the spring growth portions have been designated by the numeral 4. The discolored portion of the wood which is usually darker than the undiscolored wood is indicated by the portion or area marked 5. The discolored areas may either result from the inclusion of heart wood in the wood or board as prepared or may result from tree injuries, foreign matters or chemical reactions due to injuries or foreign matter drawn into the growing wood by capillary action or other forces.

A substantial percentage of sawed lumber contains heart wood or chemical discolorations. Discolored woods have heretofore not been used for first class furniture, wood trim and panelling and numerous other finished wood objects, since the discolorations are clearly visible through the stained surface finish. For this reason a considerable part of the fine lumber or board is discarded for furniture and similar uses, which results in a great waste of ordinarily fine lumber since most of the heart wood and chemical discolorations in no sense weaken the wood or make it less serviceable.

By following out my improved process, discolored woods can be used for fine furniture, wood panelling, wood trim, and other wood objects where a fine grain finish is desired, with no discolorations in the wood appearing through the finish.

In carrying out my process, the porous types of wood are first preferably filled with a suitable wood filler, as is common practice. The planed surface of the wood is then coated with a dense, opaque enamel 6, as illustrated in Figs. 3 and 4, which may be applied by brushing or spraying. While an enamel coating 6 of any desired color may be applied, a white or light colored coating is preferably used where it is desired that the grain lines of the wood be brought out with maximum emphasis. White enamels commercially on the market having a base of titanium oxide have been found satisfactory. The enamel should contain a maximum amount of pigment such as titanium oxide and a minimum amount of vehicle in order that the enameled surface when dry will be as dense and opaque as possible to fully conceal all discolorations in the wood. The enamel coat should further be relatively thin but sufficiently tough to become thoroughly bonded to the wood and free from brittleness or chipping characteristics.

To obtain a firm bond between the enamel coat and the wood surface, a primer coat 6' may first be applied to the wood surface. A primer coating material which I have found satisfactory for the purpose is known commercially as Duco Lacquer No. 1366. A primer coat 6' of this material is first applied to the wood surface and permitted to dry before the covering enamel coat 6 is applied. The enamel coating which I have found satisfactory is known as Du Pont 238 Series 4385. The enamel coat 6 is also permitted to thoroughly dry before the next step in the operation is performed. It will be noted by referring to Figs. 3 and 4 that the covering or enamel coat 6 not only conceals all surface discolorations 5 but also conceals the natural grain line portions 3 and spring growth portions 4 and the surface has the appearance of a dense enamel coating. In many cases the primer coat has been found to be unnecessary. Where no primer coat is used, the enamel coat known as Duco Lacquer No. 1540 applied directly to the wood has been found satisfactory.

After the dense enamel coat 6 has been applied and dried, operations are then carried out to bring out the true wood grain of the wood underlying the ground coat 6 clearly and with emphasis. In the first step of this operation the coated surface 6 of the wood is bombarded by clean and hard but relatively fine carrier particles 7 coated with a selected color pigment 8 as shown in Fig. 5, by a centrifugal blasting wheel 9 as shown in Fig. 6, rotated at a relatively low speed to deposit the pigment uniformly on the coated surface 6, as shown in Figs. 7 and 8. This is followed by surface bombardment by the pigment coated carrier particles 7—8 thrown by a centrifugal throwing wheel 9' as illustrated in Fig. 10 rotated at a substantially greater speed than the pigment depositing wheel 9.

The bombardment action of the pigment-coated particles 7—8 against the relatively thin but opaque coating 6 in the manner hereinafter more particularly described, has the remarkable and unexpected effect of visibly revealing the wood grain on the coating 6 without blasting off or removing the coating 6. This astounding phenomenon is believed to be due to the fact that the summer growth grain line portions 3 underlying the enamel coating 6 are harder or otherwise possess different characteristics than the intermediate spring growth portions 4 of the wood and respond in different degrees to particle bombardment even though the entire surface is covered by the opaque enamel coating 6. By taking full advantage of this natural characteristic, I am able to sharply develop and emphasize the grain characteristics of the wood underlying the enamel coating 6, even though the planed untreated wood surface will reveal the grain structure to the human eye only faintly.

In practising the invention, a very fine granular material 7 is selected which is clean and hard and of such a nature that it will not discolor the ground coating 6. Metal abrasive can be used for the purpose but it must be free from rust, surface dust, or other foreign matter which has a tendency to become deposited on the ground coat 6 during bombardment action. Since the granular bombardment particles 7, as shown in Fig. 5, can be recovered and re-used time and again, granular particles can be economically selected which are clean and hard and do not discolor the wood even though they are higher in cost than inferior abrasive particles. I have found that aluminum oxide or silicon carbide particles (carborundum) are especially adapted for the purpose, since they are clean and hard and do not impart any other color to the wood surface.

The granular carrier particles 7, such as aluminum oxide, silicon carbide (carborundum), or clean and hard metal abrasive, should be relatively fine and preferably should have a fineness of 120 mesh or finer.

The powdered pigment 8 of selected color is mixed with the granular carrier particles by stirring the carrier particles 7 and the pigment powder 8 together. The pigment powder 8 will adhere to the surface and the granular carrier particles 7 and coat the same, as indicated in Fig. 5, where some of the pigment-coated carrier particles are shown in cross-section to more clearly reveal the pigment coating. The pigment selected may be the ordinary paint or stain pigment possessing the desired color, such as brown, amber, gray, red, orange, yellow, blue, violet, black, or shades thereof. It will be appreciated that the color of pigment selected will determine the color of the stained and treated wood. For example, if a yellow pigment is used, a finished wood surface resembling grained maple is produced; if brown or amber is employed, the finished wood surface will resemble oak; and if purplish or reddish pigment is employed, the finished surface will resemble mahogany. Thus by a proper selection of the pigment color the base wood, irrespective of its type or kind, may be finished to closely resemble other woods having the same grained lines as the base wood treated.

The amount of pigment powder which is mixed with the granular carrier particles determines the color denseness or tone of the finished product. To obtain a relatively light tone, for example, approximately one pound of pigment powder is mixed with approximately 150 pounds of granular carrier particles, such as aluminum oxide particles. Where a relatively solid, opaque finish is desired, the pigment powder can be greatly increased, up to one pound of pigment powder to approximately fifteen pounds of granular carrier particles, such as aluminum oxide particles. Thus the color depth or tone of the finished product can be varied within wide limits by properly proportioning the pigment powder and granular carrier mixture. For example, I have found that approximately 25 pounds of granular carrier material, such as aluminum oxide particles, mixed with one pound of brown or amber pigment powder will impart a highly acceptable brown or amber oaklike tone or quality to the finished surface with full grain emphasis. Where a lighter or pastel shade of pigment is employed, a greater percentage of such pigment may be added to the granular carrier material to emphasize the color tone.

In carrying out the first step of the bombardment operation, the pigment-coated carrier particles 7—8 are fed into a bladed centrifugal throwing wheel, indicated generally by the numeral 9 in Fig. 6, and are thrown from the periphery of the wheel 9 under controlled conditions against the base coat 6 of the wood to be treated. A centrifugal blasting wheel which I have successfully used for this purpose is illustrated in Unger Patent No. 2,162,139. The bombardment wheel 9 may be made in almost any desired size. A wheel of convenient size which I have successfully employed has a diameter of approximately fifteen inches and a blade width of 1½ inches, equipped with an apertured control cage to direct the fired material uniformly onto the wood surface. The lower periphery of a wheel of such size is spaced from five to twelve inches from the applied ground coating 6. The pigment-coated granular material 7—8 is fed into the central impeller which rotates with the blades of the wheel and within the normally stationary control cage. The impeller operates to throw the granular material out through the discharge opening in the control cage and into the path of rotation of the throwing blades.

In the first bombardment step, illustrated in Fig. 6, the bombardment wheel 9 is rotated at a relatively low peripheral velocity of approximately 5,000 to 6,000 lineal feet per minute. For example, in the treatment of most woods, I have found that a wheel of fifteen inch diameter rotated at approximately 1800 R. P. M. in the initial blasting operation has proved satisfactory.

The pigment material 8 is jarred from the carrier particles 7 as they strike the ground coat 6 by the impact and are uniformly deposited upon the surface of the ground coat 6. The ground coated wood is kept constantly moving under the bombarding wheel so that approximately one-half to one pound of pigment-coated granular material is thrown against approximately one square foot of the ground coat 6. This initial blasting operation serves to uniformly distribute pigment powder over the ground coat 6 in a thin uniformly distributed dusty layer 8', as illustrated in Figs. 7 and 8. The ground coat 6 remains tenaciously bonded to the planed surface 2 of the wood being treated and is in no way visibly disturbed by this blasting operation. Both the wood discolorations 5 and the grain lines 4 remain concealed after this initial pigmenting operation by the overlying ground coat 6 and the ground coat appears to be merely uniformly dusted by the pigment powder 8.

In the next succeeding blasting operation the

grain lines are brought out and revealed on the ground coat 6 without revealing the undesirable discolorations in the wood underlying the ground coat. In this second and highly important blasting operation the same carrier particles 7 coated with the same pigment powder 8 are employed. No change in the particle-pigment mix employed in the second blasting operation is made from the particle-pigment mix employed in the first blasting operation. The same centrifugal blasting wheel 9 or a different centrifugal blasting wheel 9', as is found most convenient, may be employed. The only substantial difference between the first blasting operation, illustrated in Fig. 6, and the second blasting operation, illustrated in Fig. 10, is the speed of rotation of the blasting wheel and the consequent change in lineal velocity at which the pigment-coated carrier particles 7—8 are fired against the ground coat 6.

In the second blasting operation, illustrated in Fig. 10, the centrifugal wheel 9' is rotated so as to fire the pigment-coated carrier particles at a substantially higher velocity of from 9,000 to 14,000 lineal feet per minute. This second blasting operation can be performed by the same blasting wheel as is employed in the first blasting operation, diagrammatically illustrated in Fig. 6, and with the same particle-pigment mixture flowing into the wheel in substantially the same volume. Where an abrasive throwing wheel of the type shown in the Unger Patent No. 2,162,139 is employed, having a diameter of fifteen inches, the wheel should be rotated from 2,500 to 3,600 revolutions per minute, a fair average being approximately 3,000 revolutions per minute. For convenience in operation, it may be desirable to provide another blasting wheel 9' or another set of blasting wheels to perform the second blasting operation, which would permit the surface under treatment to be advanced continuously from the blasting wheel 9 or set of blasting wheels performing the first blasting operation but rotating at lower speed continuously directly under the blasting wheel 9' or set of blasting wheels performing the second blasting operation so that continuous production can be assured.

In the second higher speed blasting operation the pigment material 8 is jarred from the carrier particles 7 by the impact against the enamel coating 6 and is deposited upon the enamel coating. This higher speed of impact, however, causes the pigment layer 8' deposited on the enamel coating 6 during the initial low speed blasting operation to shift position so as to become more densely arranged over the grain lines 3 underlying the coating 6 and less densely arranged over the spring growth 4 underlying the coating 6. The pigment deposited on the coating surface 6 during the higher speed second blasting operation also becomes more densely deposited over the grain lines 3 underlying the surface coating 6 and less densely deposited over the spring growth 4 under the coating 6.

The wood is kept constantly moving under the second high speed bombardment blast so that approximately one-half to one pound of pigment-coated granular material is thrown against approximately one square foot of the ground coating 6. During the second blasting operation the grain lines of the wood gradually emerge and become visibly apparent by the graduations in density of the pigment deposited on the coating 6 which is in direct proportion to the grain line characteristics of the wood. As the second blasting operation continues the clearness and visibility of the grain lines demarked by the varying density of pigment deposit gradually increases to the point of optimum emphasis, with the densest pigment deposit occurring over the grain lines 3 as indicated at 8'' in Figs. 11 and 12 and the less dense deposit occurring over the spring growth areas 4 as indicated at 8'''. If the second high speed blasting operation is continued beyond this point of optimum emphasis, it appears that the pigment gradually becomes more uniformly distributed over the entire coating 6 and the grain lines become more blurred and less distinct. The point of optimum grain emphasis can be readily determined since it is visibly apparent to the operator.

The quantity of pigment-coated granular material which should be thrown against a square foot of coating 6 may be varied somewhat but usually should not be reduced below one-half pound of pigment-coated granular material per square foot of coated surface 6 to be treated and preferably should not exceed three pounds of pigment-coated granular material per square foot of surface treated. Where the pigment is very dark a lesser amount of dark pigment-coated granular material may be bombarded against the wood surface, and where the pigment is of a lighter or of a pastel shade, a relatively higher quantity of light colored pigment-coated granular material is bombarded against the coated surface 6.

It is also important that the abrasive throwing wheels 9 and 9' be so constructed that a substantial quantity of air is permitted to flow into the wheel, such as permitted by wheels constructed in accordance with Unger Pat. No. 2,162,139. This air serves the useful function of assisting in distributing the pigment powder over the wood surface so as to obtain a more pronounced grain effect, the density of the pigment deposit being in direct proportion to the grain line characteristics of the wood but unaffected by the discolored areas. It further appears that the pigment does not appreciably penetrate the coating 6, as would commonly be supposed, but appears to form a surface deposit which clings to the wood after the second bombardment operation and does not readily shake off.

Usually the optimum grain emphasis is reached after the wood surface treated has been bombarded from one to three seconds under the conditions above described. The grain emphasis or time can thus be readily controlled by the length of the bombardment to which the coating 6 is subjected, much the same as the distinctness of a picture produced by the unrelated art of photography is determined by the period of time the film is exposed.

Air blast projection of the pigment-coated carrier particles is not recommended if the most distinct grain emphasis is to be produced. The usual air blast nozzles appear to throw the pigment-coated carrier particles with less uniformity and the excessive amount of air employed appears to disturb the pigment deposition so that the pigment deposit does not accurately portray the grain lines. In addition to being more adaptable for the purpose, centrifugal bombardment wheels such as that shown in Unger Pat. No. 2,162,139 produce greater production output and are less expensive to operate than air blast nozzles.

It has been further found that where it is desired to emphasize the grain lines by a greater density of pigment deposit over the grain lines than over the spring growth areas, the filler compound, which is initially applied to the wood before the primer coat 6' or enamel coat 6, should be of such a nature that it is relatively hard and harder than the wood being treated. The grain lines will then emerge naturally as they appear in the wood.

It has further been found that if a relatively soft filler material is used, which is softer than the wood being treated, the bombardment blast will deposit the pigment in greater density between the grain lines or over the spring growth than over the summer growth grain lines. A reverse graining effect can thus be produced which is particularly adaptable to porous woods whose surface will absorb a substantial quantity of filler.

After the grain lines in the wood have been emphasized and developed by the second bombardment blast, the pigmented surface is coated with a transparent lacquer 10, as illustrated in Figs. 13 and 14. The transparent lacquer coating 10 bonds the pigment powder 8'' and 8''' deposited on the coating 6 firmly in place and gives the surface a final glossy finish. The lacquer coating 10 may be applied by spraying. No especial care ned be taken in spraying the transparent lacquer coating on the pigmented surface since the pigment would not normally be blown or shaken off during the lacquering operation and is in no way disturbed by the application of the lacquer. The pigment deposit on the wood surface will clearly and distinctly reflect the wood grain demarcations through the transparent lacquer.

By following out this process, woods which present heart wood or chemical discolorations 5 can be advantageously used for the finest wood trim, panelling, and furniture, or other wood articles requiring revelation of the grain lines through the finished surface, since discolored areas are effectively concealed by the enamel coating 6. The grain structure is effectively brought out and emphasized without removing the enamel coating 6 which conceals the discolorations. The grain can be emphasized, reduced or toned down by subjecting the surface treated to the proper period of bombardment. Any desired wood coloring, grain emphasis and tone can be produced by the simple expedient of selecting a hard or a soft filler, by selection of the desired coloring pigment, by mixing the pigment in proper proportions with the granular carrier material, and by regulating the bombardment period.

My improved process for staining wood not only makes possible the use of discolored woods but produces a product of greater uniformity and much more pronounced grain line emphasis than can be produced by any method heretofore known. Various different woods, such as maple, oak, mahogany, and the like, may be closely simulated on other woods, by a selection of the proper coloring pigment. By my process the coloring pigment is applied dry and the entire cost of the expensive vehicles and driers employed in liquid stains is saved. Almost any desired production speed may be attained by employing the desired number of centrifugal bombarding wheels. For example, by the use of one bombarding applicator wheel 9 and a second grain emphasizing bombarding wheel 9', each having a diameter of fifteen inches and throwing approximately six pounds of pigment-coated granular particles a minute, from six to eight feet of wood surface may be stained per minute. By increasing the wheel feed, or by employing a larger capacity wheel, or by employing a plurality of wheels, it is apparent that production can be correspondingly increased. The transparent lacquer coating can be applied immediately following the second bombardment blast without delay in production.

While certain novel features of the invention have been disclosed and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, and bombarding the coated surface with fine hard granular particles coated with dry pigment powder.

2. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, and bombarding the coated surface with fine hard granular abrasive particles coated with dry pigment powder so as to deposit the pigment powder on said surface in densities which vary with the wood grain.

3. The process of treating wood surfaces which includes, applying to the surface a filler harder than the wood, then coating the wood surface with an opaque paint to conceal undesirable surface discolorations, coating clean, fine, hard, granular particles with a dry pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain pattern becomes revealed by the pigment deposition forming a reproduction of the wood grain lines on the coat of paint.

4. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, coating clean, fine, hard, irregular particles with a dry pigment powder, bombarding the coated surface with the pigment-coated particles until the wood grain lines are revealed by the pigment deposition, and coating said pigmented surface with a transparent lacquer to bond the deposited pigment to the paint.

5. The process of treating wood surfaces which includes, applying to the surface a filler softer than the wood, then coating the wood surface with an opaque paint to conceal undesirable surface discolorations, coating clean, fine, hard granular particles with a dry pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain pattern becomes revealed by the pigment deposition, the pigment pattern being a reverse or negative of the original wood grain pattern.

6. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, coating clean and hard particles of 120 mesh or finer with dry pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain lines are revealed by the pigment deposition.

7. The process of treating wood surfaces which includes, coating the wood surface with an

opaque paint to conceal undesirable surface discolorations, coating clean, fine, and hard aluminum oxide particles with dry pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain lines are revealed by the pigment deposition.

8. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, coating clean, fine, and hard silicon carbide particles with dry pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain lines are revealed by the pigment deposition.

9. The process of treating wood surfaces to emphasize the grain growth which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, centrifugally projecting relatively fine and hard granular particles coated with dry pigment powder against the coated surface so as to deposit the pigment powder on said surface in densities which vary with the wood grain.

10. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, mixing clean fine and hard particles with a dry pigment powder in the proportion of one pound of pigment powder to from fifteen pounds to 150 pounds of said particles so as to coat said particles with the pigment powder, and bombarding the coated surface with the pigment-coated particles until the wood grain lines are revealed by the pigment deposition.

11. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, mixing clean and hard particles of 120 mesh or finer with a dry pigment powder in the proportion of one pound of pigment powder to from fifteen pounds to 150 pounds of said particles so as to coat said particles with the pigment powder, and bombarding the coated surface with the pigment-coated particles at velocities ranging from 5,000 to 14,000 lineal feet per minute until the wood grain lines are revealed by the pigment deposition.

12. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, centrifugally projecting relatively fine granular particles coated with dry pigment powder against the coated surface at velocities of from 5,000 to 14,000 lineal feet per minute, and continuing said bombardment until the wood grain lines are revealed with optimum emphasis.

13. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, and centrifugally projecting from one-half pound to three pounds of relatively hard and fine granular particles coated with dry pigment powder against each square foot of coated surface so as to deposit the pigment powder on said surface in densities which vary with the wood grain.

14. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, mixing clean and hard particles of 120 mesh or finer with a dry pigment powder in the proportion of one pound of pigment powder to from fifteen pounds to 150 pounds of said particles so as to coat said particles with the pigment powder, and centrifugally projecting from one-half pound to three pounds of the pigment-coated particles against each square foot of coated surface so as to deposit the pigment powder on said surface in densities which vary with the wood grain.

15. The process of treating wood surfaces which includes, coating the wood surface with an opaque paint to conceal undesirable surface discolorations, mixing clean and hard particles of 120 mesh or finer with a dry pigment powder in the proportion of one pound of pigment powder to from fifteen pounds to 150 pounds of said particles so as to coat said particles with the pigment powder, centrifugally projecting from one-half pound to three pounds of the pigment-coated particles against each square foot of coated surface so as to deposit the pigment powder on said surface in densities which vary with the wood grain, and coating said pigmented surface with a transparent lacquer to bond the deposited pigment to the wood.

16. A wood product having the surface thereof coated with a dense and opaque coat of paint concealing the wood grain pattern and undesirable surface discolorations therein and having on the coat of paint a deposit of a pigment, the density of the pigment deposit varying in accordance with the wood grain pattern concealed by the paint so as to reproduce the wood grain pattern on said coat of paint.

17. A wood product having the surface thereof coated with a dense and opaque coat of paint concealing the wood grain pattern and undesirable surface discolorations therein and having the natural grain pattern reproduced by a dry pigment deposit on said coated surface.

18. A finished wood product having the surface thereof coated with an opaque coat of paint concealing the wood grain pattern and undesirable surface discolorations therein and having the natural grain thereof reproduced by a dry pigment deposit on the coated surface, so that the harder growth has a denser deposit of dry pigment than the relatively softer growth, the density of such pigment deposit varying in accordance with the characteristics of the growth bands, and having further a transparent coating covering the pigmented surface and bonding the pigment deposit to the opaque paint.

19. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding the wood surface with a relatively dry mixture of abrasive and pigment and thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment.

20. The process of coloring and enhancing the appearance and durability of grained wood which includes centrifugally projecting against the wood surface a relatively dry mixture of abrasive and pigment and thereafter again centrifugally projecting against the surface a relatively dry mixture of abrasive and pigment.

21. The process of coloring and enhancing the appearance and durability of grained wood which includes air blasting the wood surface with a relatively dry mixture of abrasive and pigment and thereafter again air blasting the wood surface with a relatively dry mixture of abrasive and pigment.

22. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding the wood surface with a relatively dry mixture of abrasive and pigment

of one color and thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment of the same color.

23. The process of coloring and enhancing the appearance and durability of grained wood which includes centrifugally projecting against the wood surface a relatively dry mixture of abrasive and pigment of one color and thereafter again centrifugally projecting against the surface a relatively dry mixture of abrasive and pigment of the same color.

24. The process of coloring and enhancing the appearance and durability of grained wood which includes air blasting the wood surface with a relatively dry mixture of abrasive and pigment of one color and thereafter again air blasting the wood surface with a relatively dry mixture of abrasive and pigment of the same color.

25. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding at a predetermined rate of projection the wood surface with a relatively dry mixture of abrasive and pigment and thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment at a different rate of projection.

26. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding the wood surface with a relatively dry mixture of abrasive and pigment, thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment, and coating the bombarded surface following the final bombardment thereof with a transparent coating material.

27. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding the wood surface with a relatively dry mixture of abrasive and pigment of one color, thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment of the same color, and coating the bombarded surface following the final bombardment thereof with a transparent coating material.

28. The process of coloring and enhancing the appearance and durability of grained wood which includes bombarding the wood surface with a relatively dry mixture of abrasive and pigment at a rate of projection sufficiently low as to deposit on said surface a coat of pigment of substantially even density, thereafter again bombarding the surface with a relatively dry mixture of abrasive and pigment at an increased rate of projection sufficiently high as to deposit on said surface a coat of pigment of a density varying with the pattern of the wood grain, and coating the bombarded surface following the final bombardment thereof with a transparent coating material.

EDGAR A. LEHMAN.