APPARATUS FOR HEATING MOVING SHEET MATERIALS

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5 Claims

ABSTRACT OF THE DISCLOSURE

An improved apparatus for heating moving sheet materials of varying thickness such as wood veneer which includes a lower fixed heated platen and an upper floating heated platen between which the veneer travels. The upper platen is usually mounted above and parallel to the lower platen to move vertically and longitudinally. Pins mounted in the edges of the upper platen adjacent the entry and exit ends ride in shallow V-shaped blocks attached to the supporting frame of the apparatus. As sheet materials of varying thickness are fed between the upper and lower platens the upper platen is free to rise and move slightly forward to accommodate the varying thickness. Uniform pressure and direct contact of the platens with the veneer is maintained at all times regardless of thickness. The apparatus is effective in eliminating problems of jamming and nonuniform heating usually associated with apparatus of this kind.

CROSS REFERENCE TO RELATED APPLICATIONS

This application, although not directly related, is advantageously used in conjunction with the continuous press disclosed in Ser. No. 741,755, filed July 1, 1968, and entitled, Improved Continuous Press for Laminating Materials, assigned to the assignee of the present application.

BACKGROUND OF THE INVENTION

Field of the invention

An improved apparatus for heating sheet materials of varying thickness by direct conduction from platens in direct contact with the materials to be heated.

Prior art relating to the disclosure

Preheating of sheet materials, such as wood veneer, is necessary in many operations, particularly those involving continuous wood laminating. Preheating is often done to activate a thermo-reactive adhesive which is subsequently applied to the surfaces of the preheated veneer. Such preheating has normally been done by radiant means from an infrared source or by high frequency heating. For example, see U.S. Patents Nos. 2,988,120, 2,490,819; and Canadian Patent 648,428. The use of radiant heating on thin pliable wood veneer (1/4-1/8” in thickness, for example) has the disadvantage of requiring a system of guides and guards to keep the material from contacting the heat source, to eliminate end lapping, and to maintain separate laminate in edge alignment.

It is advantageous to heat sheet materials such as wood veneer by hot platens which are in direct contact with the wood surface as opposed to radiant heating. However, difficulty is experienced when moving wood or wood veneer is continuously forced between heated platens. One difficulty, in there is the thickness variation of the veneer. If, for example, the thickness of the veneer traveling between the heated platens is less than the reference thickness, the materials will not be adequately heated due to poor contact. Materials which are greater in thickness than the reference thickness often cause jamming and stoppage when forced through the heated platens, due to increased friction.

The improved apparatus of this invention alleviates the above mentioned problems while still maintaining the advantages of preheating wood or wood veneer by direct contact of the platens with the wood surfaces.

SUMMARY OF THE INVENTION

This invention relates to an improved apparatus for heating moving sheets of wood veneer, the wood products having thickness variations. The apparatus comprises a supporting frame to which is attached a lower heated platen in direct and continuous contact with one side of a sheet of veneer. Opposite this lower platen is an upper floating, vertically and longitudinally movable heated platen substantially parallel to the lower platen. The upper heated platen has means provided for maintaining the platen in continuous direct contact with the opposite side of the moving veneer.

More specifically, the improved apparatus comprises a lower, fixed heated platen and an upper, floating, vertically and longitudinally movable heated platen substantially parallel to the lower platen, between which a sheet of wood or wood veneer passes. Both platens are maintained in substantially direct contact with the respective lower and upper surfaces of the wood veneer. To maintain uniform pressure on the veneer moving through the heated platen while allowing for variations in thickness of the material, the upper platen has pins mounted in the edges thereof adjacent the entry and exit ends. Blocks are attached to each side of the frame of the apparatus having inclined cam surfaces on which the pins travel. The low position of the upper platen in relation to the lower platen is determined by the thinnest anticipated piece of sheet material or veneer. As thinner materials enter the space between the platens, the upper platen rises and moves slightly forward along the inclined planes of the blocks to accommodate the changes in thickness. Uniform pressure and direct contact of the platen with the material is maintained at all times regardless of thickness, alleviating problems of jamming and nonuniform heating.

A further advantage of the invention is the fact that the platen heat source can be operated at relatively low temperatures (300°F to 350°F) as compared to the high temperatures (in excess of 500°F) required for radiant heat sources.

This invention has its greatest use in conjunction with a continuous press for laminating wood veneer wherein a plurality of veneer sheets are preheated, spread with adhesives on the surfaces to be bonded, and gradually brought into pressing contact to bond the laminates into a composite wood product having advantageous strength properties.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a side elevation of a heating section for heating veneer employing heating systems herein disclosed.

FIGURE 2 is a partial perspective view of one of the heating systems of FIGURE 1 with parts broken away for better illustration.

FIGURE 3 is an expanded partial side elevation of one of the platen systems showing the manner in which the upper platen moves in response to varying thicknesses of material fed therebetween.

DETAIL DESCRIPTION OF THE DRAWINGS

FIGURE 1 illustrates a complete heating section for heating moving sheet materials such as wood veneer and shows sets of upper and lower platens through which four sheets of wood veneer are fed. The upper veneer need
not be heated on its outer surface and therefore, an upper platen is not necessary. The heating section includes frame 1 on which lower platens 2 are permanently attached. The lower platens, as shown in FIGURE 2, have edge guides 3 to guide the veneer through the platens. Directly above lower platens 2 are mounted upper platens 3. The upper platens 3 are not permanently fixed to frame 1 but are both longitudinally and vertically movable. Referring to FIGURE 2, upper platens 3 have pins 4 mounted in the edges thereof adjacent the entry and exit ends which ride on inclined cam surfaces 5a of blocks 5, the blocks mounted on frame 1. In order to decrease friction, small rollers 6 may be mounted on the ends of pins 4. Upper platen 3 is thus free to move both vertically and longitudinally by travel along the inclined surfaces 5a of blocks 5. Drive rolls 7, adjacent each of the pairs of heated platens, function to drive the veneer between the heated platens. As will be noted, the upper platens are shaped at their entry end so that veneer moving through the driving rolls will not jam against the butt end thereof. The weight of the upper platens is such that material can be easily fed through the upper and lower platens with good heat transfer from the platens to the material. The upper platens should be heavy enough to eliminate any tendency of the material to curl, usually associated with wood veneer and other thin materials.

As pointed out previously, the apparatus of this invention has its widest use in preheating moving veneer (usually 1/8" to 1/4" in thickness) prior to application of a thermo-reactive adhesive such as phenol formaldehyde, urea-formaldehyde during a continuous laminating operation. More than one such unit, shown in FIGURE 1, can be provided in a continuous line to heat moving veneer to the proper temperature. Also, it is obvious that more or less units of the heating units can be stacked to provide heating for the required number of veneer plies entering the press.

The apparatus of this invention has a number of distinct advantages over other means of preheating moving lumber or wood veneer. Normally, radiant heat sources are operated at a temperature in excess of 500°F, which, in the case of wood, is above the char point of the material. If at any time the wood passing under the radiant heat should come in contact with the heat source, a fire could result. This is also the case when the line must be stopped for a period and the wood remains exposed to the heat source, any flammable scraps falling from the material such as chips or loose knots are subject to catching fire. The platen heat sources, as described herein, can be operated at temperatures below the char point of wood, i.e., at temperatures ranging from 300°F to 350°F. This greatly reduces the fire hazard associated with preheating systems for moving laminate.

The platen heating apparatus of this invention also has the advantage of requiring less space than that required for radiant heating systems. When a large number of laminae are to be preheated prior to the application of adhesives and prior to consolidation in a continuous manner, the space requirement becomes critical. It is essential that the laminae be maintained as close together as possible in the preheating operation so that when they are brought together after application of the adhesive it is not necessary to bend the material more than a minimum amount. Thin plies of wood veneer, for example, cannot be bent in excessive amounts without failure.

As a specific example, end crowned wood veneer strips (approximately 1/8" thick) were fed through four heating units such as shown in FIGURE 1, which were arranged in a continuous line. The upper and lower platens 2 and 3 of each heating unit were preheated to a temperature of approximately 350°F. The rate of veneer travel through the heating units was adjusted to provide enough energy in the veneer to cure the thermo-reactive adhesive applied just subsequent to exit of the veneer from the heating unit. At an average platen temperature of 325°F and a veneer speed of 15 feet per minute the surface temperature of exiting veneer ranged between 175°F and 240°F, depending on veneer roughness. After the veneer traveled through the heating unit a thermo-reactive adhesive was applied to the surfaces of the veneer to be bonded and the plies of veneer brought together under pressure in a continuous press to produce a laminated product.

Most direct contact heating units for veneer have lacked the flexibility to accept materials varying in thickness. This apparatus is unique in that the veneer passing through each of the heating units is maintained substantially in contact with the heating units at all times. This is made possible by the upper loading platen. As described previously, the upper platen 2 has pins mounted in the edges of the platen adjacent the entry and exit ends which ride on the inclined cam surfaces 5a of blocks 5 attached to the frame of the unit. The low position of the platen, i.e., when it is resting at the low point on the blocks is determined by the thinnest anticipated piece of sheet material to be accepted. As materials of greater thickness are fed between the upper and lower platens, the upper platen will rise and move slightly forward to accommodate them. This is shown clearly by FIGURE 3. At the same time a uniform pressure is maintained on the material. The angle of the inclined plane of the blocks is made such that the forces exerted on the platen parallel to the faced plane surface will be in equilibrium at a point where the force normal to the platen surface is at a predetermined level. This normal force is dependent on platen weight, inclined plane angle, coefficient of friction between the veneer and the heater platen, and the coefficient of friction between the roller bearings and the inclined plane track. For example, with platens mounted at 5 degrees from the horizontal (as shown in FIG. 1), an upper platen weight of 50 pounds, a coefficient of friction between the moving veneer and the upper platen of 0.4 negligible friction between rollers 6 and inclined planes 5a, and a normal force on the platen of 20 pounds over an area of approximately 1' x 6', the inclined plane angle equals 17.5 degrees from the horizontal or 22.5 degrees from the platen surface.

The preheating unit described provides a constant force on sheet materials such as wood veneer regardless of their thickness, the thickness of the materials being limited only by the height of the inclined plane. The weight of the upper platen and the angle of the inclined plane determine the force applied to the veneer, assuming a constant coefficient of friction. The thickness of the material has no effect on this system unless the support pins are raised off of the inclined planes.

What is claimed is:

1. An apparatus for heating moving sheets of veneer which comprises
   a supporting frame,
   a fixed, lower heated platen in substantially continuous contact with the lower surface of the veneer, a floating, vertically and longitudinally movable, upper heated platen substantially parallel to the fixed lower platen,
   means for feeding veneer along a path between the lower platen and the upper platen, and
   means for maintaining the upper platen in substantially continuous direct contact with the top surface of the moving veneer.

2. Apparatus according to claim 1 wherein the lower platen includes guide means for the veneer.

Apparatus according to claim 1 wherein the means for maintaining the upper heated platen in direct, continuous contact with the moving veneer includes

(a) pins protruding from the edges of the upper heated platen adjacent the entry and exit portions thereof and normal to the direction of travel of the veneer,
(b) blocks mounted on the supporting frame adjacent each pin, the blocks having inclined surfaces provid-
Apparatus according to claim 3 including roller bearings attached to the ends of the pins in contact with the cam surfaces.

In an apparatus for producing a laminated wood product comprising
means for feeding laminations along a path,
means for heating the laminations along the path,
means for applying a thermosetting glue to a surface of at least one of the laminations, and
means for juxtaposing and pressing the laminations together to bond them,
the improvement which comprises feeding each of the laminations to be preheated between a fixed, heated platen in substantially continuous contact with the lower surface of the veneer and an upper floating, vertically and longitudinally movable heated platen substantially parallel to the lower platen, the upper platen including means for maintaining the platen in substantially continuous direct contact with the upper surface of the moving veneer.

6. Apparatus according to claim 5 wherein the means for maintaining the platen in continuous direct contact includes
(a) pins protruding from the edges thereof adjacent the entry and exit portions of the heated platen and normal to the direction of travel of the veneer, and
(b) blocks mounted adjacent each pin having inclined surfaces providing cam surfaces on which the pins mounted in said heated platen may travel, the cam surfaces being of sufficient length to allow travel of the upper heated platen to accommodate varying thicknesses of moving veneer.

References Cited

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