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METHOD OF GLUING LAMINATED PANELS

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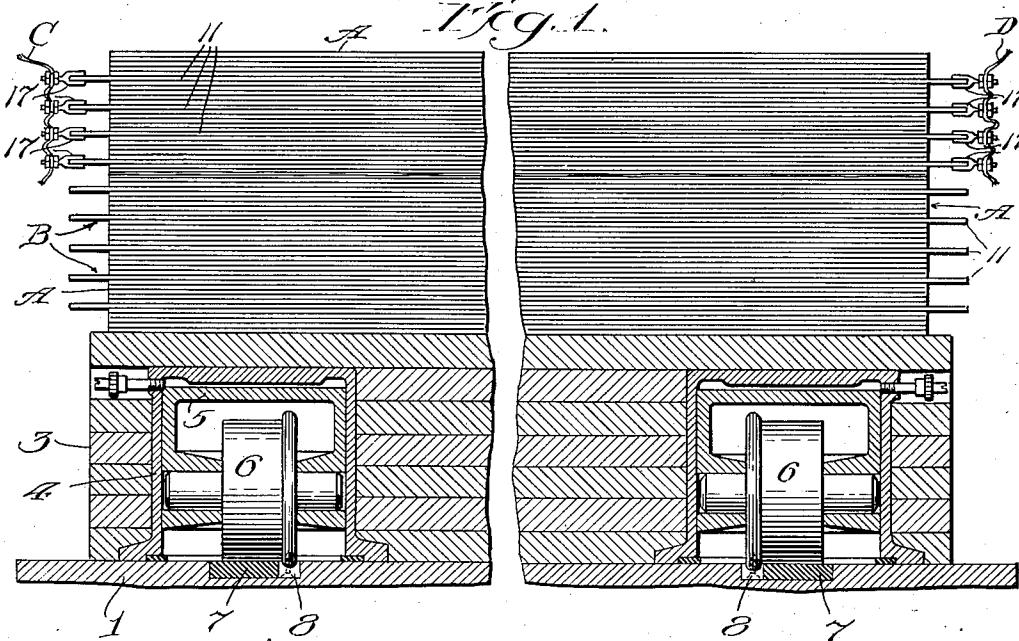
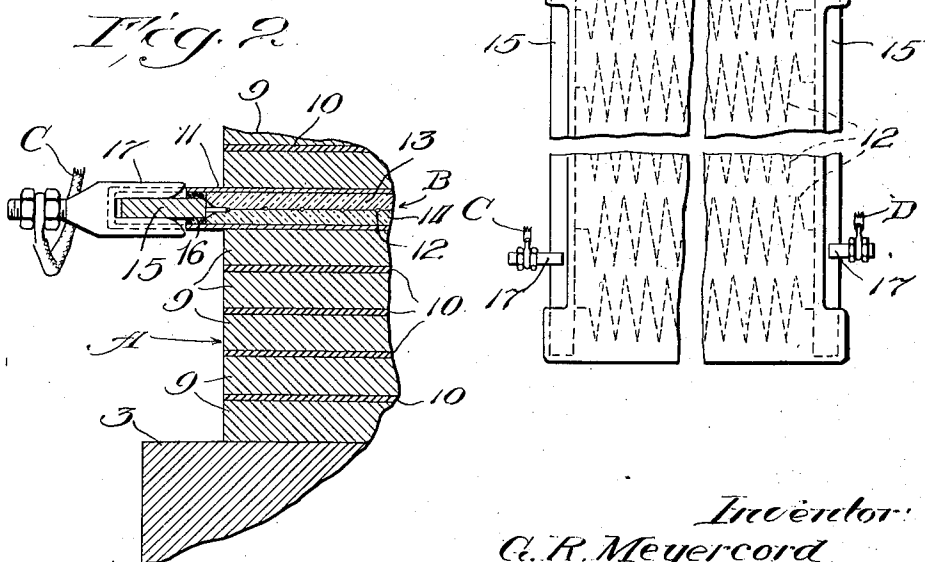


Fig. 3.



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METHOD OF GLUING LAMINATED PANELS

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3 Claims. (Cl. 144—309)

In the manufacture of laminated glued panels, such as plywood panels or panels faced with metal or other sheet material, requiring heat and pressure for their production, the panels are usually made one at a time. In some instances, presses are provided with a few flat, movable steam-heated platens between the main upper and lower platens; whereby several panels may be glued simultaneously. In any event, only one or, at most, only a few panels can be glued at one time by the old methods. Furthermore, the parts of each panel are usually assembled, one at a time, in the press, keeping the press idle while the assembling operation is going on. It takes longer to glue thick panels than it does thin panels; and while a press crew may be kept busy when working with thin panels, a single crew can take care of several presses when the panels are thick. However, since the assembling is done at the press, it has heretofore been the custom to provide each press with a full crew, thus causing much waste of workmen's time except when thin panels are being glued. Since in the old processes the presses must be kept hot, heat is applied as soon as a press is closed and, where a panel is built up in the press a layer at a time, the first layer will become heated before the other layers are in place. Also, because the various layers of a panel are usually not flat but more or less warped or wavy, the layer next to the lower hot plate will touch the plate only in spots which quickly take up heat from the plate; with the result that the glue overlying these spots or areas may become overheated and spoil the joint.

The present invention may be said to have for its objects greatly to simplify and improve the method of gluing laminated panels, whereby a large number of panels may be glued at one time; the assembly of the constituent elements of the numerous panels will be simple and easy; the actual time that the panels remain in the press will be no longer than the time required by the old methods in the case of a single panel; the application of heat may be controlled so as accurately to regulate the intensity thereof as well as the time and duration of application thereof relatively to the time of applying and the duration of the pressure; the panels the press and the heating means may be cold at the time of placing the panels in the press; and a press need remain idle only as long as it takes bodily to remove a stack of glued panels and replace it by a completed stack of panels to be glued.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a view partly in vertical section and partly in elevation, illustrating more or less diagrammatically the operation of compressing and heating a large number of panels in a press in accordance with one embodiment of my invention; Fig. 2 is a vertical section, on a larger scale, showing fragments of two adjacent panels, of an interposed heating element, and of the movable supporting base or bed shown in Fig. 1; and Fig. 3 is a plan view of one of the heating elements on a smaller scale than Fig. 2, partly broken away.

In carrying out my invention I build up a stack of panels each composed of its constituent layers having interposed between the layers a glue or other suitable material that will unite the layers under heat and pressure; placing at frequent intervals through the stack panel-like heating elements which may be energized at will so as to supply heat to the panels only while the stack is being compressed; the intensity of the heat, the length of time that it is supplied and the relation between the time that the panels are compressed and the time that they are heated being factors that may be varied according to the character of the work, including the glue. These heating elements must be comparatively thin and comparatively light in weight in order that they may be easily handled and not take up much room in the vertical direction when forming part of a stack. The heating elements should, therefore, be metal plates that may be heated by currents induced therein, or they may be thin panels containing wires or the like through which current may be passed by simply connecting terminals thereon to a suitable power line while the stack is in the press.

In order to secure the fullest advantage of my invention, each stack should contain a large number of panels, possibly from 50 to 100 or more, depending on the thickness of each panel. As it takes times to build up a stack of this kind, it should not be done in the press but at some convenient remote point, whereby the press may be in use at all times excepting during short intervals while one stack is being removed and

another stack is being placed in position in the press.

When the panels are of considerable length and width, a stack of panels and heating elements that is five or six feet high will be very heavy, and, therefore, special provision must be made to move the stack to and from the press. For this purpose I prefer to employ what may be termed a low truck but which is in effect a large solid slab; the same being provided with supporting wheels that may be retracted into chambers within the same. Thus, this heavy slab or bed will rest over its entire under surface or face on a floor or other flat surface upon which it may be lowered. While in this condition, the stack may be built up upon the same. The slab or bed with its overlying load is then raised on its wheels so as to permit it to be rolled into position in the press. Then, upon lowering the slab or bed, it will rest on the bottom platen of the press and serve as a caul between the under side of the stack and the press. The press is then closed and the heating elements are energized. In from fifteen to thirty minutes, ordinarily, the gluing of the entire lot of panels will be completed, whereupon the press is opened, the stack is raised up so as to be supported by the wheels of the underlying slab or bed, and it is then rolled out of the press. In the meantime another stack may have been built up, so that the press may again be immediately put into service.

It will be seen that the assembling of the panels to be glued and the heating elements is accomplished while the panels and the heating elements are cold and that the press is also a cold press. Consequently, the work of building a stack is simple and is performed without causing any discomfort to the workmen.

In the drawing I have shown how my invention may be carried out by employing a truck in the form of a solid slab or bed and heating elements in the form of thin panels containing wires through which current may be passed.

Referring to the drawing, 1 represents the lower platen of a powerful press. 3 is a truck body in the form of a solid slab or block having in the under side chambers into which are fitted air cylinders 4 provided with pistons 5 to which are journaled flanged wheels 6. Set into the top of the lower platen 2 are rails 7 flush with the upper surface of the platen or bed. Beside the rails are grooves 8 into which the flanges on the wheels may extend. The parts are so proportioned that, when the pistons are up, the member 3 will rest directly on the platen or bed 2 whereas, when air is admitted into the cylinders above the pistons, the member 3 will be raised so as to be supported by and capable of being rolled along on its wheels.

The member 3 may be, and preferably is, a thick board-like member composed of layers of wood glued together with the grain in one layer crossing that in adjacent layers. The plies or layers of the structure may conveniently be composed of boards from three-quarters of an inch to an inch thick; there being enough plies or layers to produce a body that is seven or eight inches thick.

A stack is built up on the member 3 of panels indicated in Fig. 1 at A, alternating with heating elements B.

In Fig. 2 I have shown fragments of two panels each composed of five plies 9 having interposed between them thin layers 10 of glue or other

material which, under heat and pressure, will firmly unite the plies; although the panels may be composed of any number of plies and be of any desired thickness. Where the panels are thick, having a thickness of, say, three-quarters of an inch, it is desirable that the heating elements alternate with the panels so that there will be as many heating elements as panels.

The heating elements are shown as consisting of flat, box-like metal members 11 in which are housed wires 12 lying between thick layers of asbestos 13 and 14. At opposite ends of the box-like structure are long copper bars 15 exposed by cutting away the metal of the box, and insulated from the box by layers of mica 16. One end of each of the wires is connected to one of the bars and the other end to the other bar so that, if the bars are connected to the opposite sides of a power circuit, current will flow through the wires.

Current may be delivered to the heating elements from wires C and D having at intervals clips 17 that may be engaged with the bars 15 on the corresponding side of the stack. It is but the work of a moment to connect the heating elements in the energizing circuit and to disconnect them therefrom.

It will, of course, be understood that what I have shown in the drawing is simply in explanation of the broad principle of my invention and is not to be regarded as limiting or confining the invention to the specific things illustrated. What I intend to cover is broadly the series of steps which will permit many panels, arranged in stack formation, to be glued simultaneously by a hot process and, viewed in another aspect, which will permit the stack to be produced at a point remote from the press, be delivered with little effort to and from the press, and which will greatly reduce the cost of manufacture of multiple-ply panels. In this connection, also, I wish it to be understood that, while the panels to be glued will ordinarily be plywood panels or composite panels of metal or wood, my invention is applicable to any product in which a layer or sheet of one material is glued to a flat body or panel of any kind. I, therefore, intend to cover all methods or processes coming within the definitions of my invention constituting the appended claims.

I claim:

1. The method of gluing laminated wood panels which consists in forming a stack of rudimentary panels each composed of its laminae with material interposed between the same to cause them to adhere under heat and pressure, separating consecutive panels at frequent intervals between the top and bottom of the stack by thin solid panel-like heating elements, placing the stack in a press, and closing the press and energizing the heating elements.

2. The method of gluing laminated wood panels which consists in forming a stack of rudimentary panels each composed of its laminae with material interposed between the same to cause them to adhere under heat and pressure, separating consecutive panels at frequent intervals between the top and bottom of the stack by thin solid panel-like electrical heating elements, the building of the stack being effected while the panels and the heating elements are in a cold state, placing the stack in a press, and closing the press and energizing the heating elements.

3. The method of gluing laminated wood panels which consists in building up upon a solid base or bed a stack of rudimentary panels each composed of its laminae with material interposed between the same to cause them to adhere under heat and pressure, spacing consecutive panels apart at frequent intervals from the top to the bottom of the stack by inserting between them a thin, solid panel-like heating element, moving the base or bed with its load into a powerful press, causing the base or bed to rest directly on the floor of the press, and then energizing the heating elements and closing the press. 80

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