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G. H. OSGOOD
APPARATUS FOR MAKING PLYWOOD

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Fig. 1.

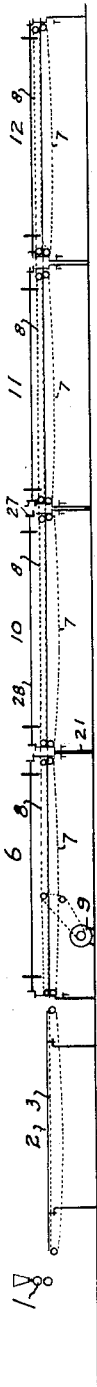


Fig. 3.

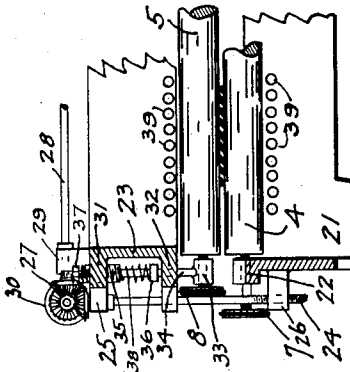
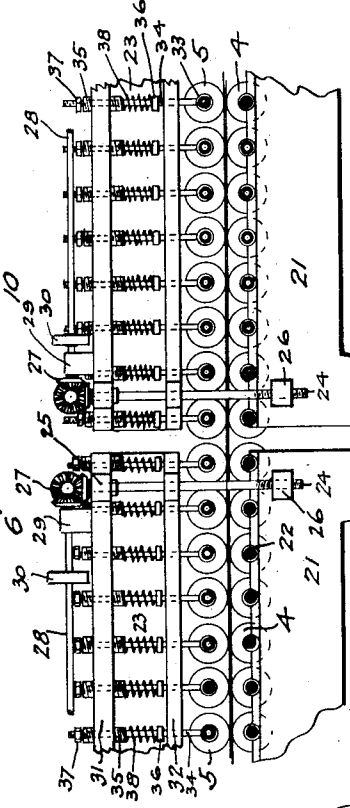


Fig. 2.



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APPARATUS FOR MAKING PLYWOOD.

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This invention relates to methods and apparatus for making plywood, and especially to the methods and apparatus used in pressing the freshly glued layers of veneer wood while the glue thereof is drying.

The objects of the invention are, first, to provide means for receiving the raw plywood, comprising the several sheets of veneer, assembled and suitably coated with glue on their inner surfaces, and feeding this raw plywood panel alone through a press whereby it is continuously moved there-through and whereby, by the time the plywood is delivered at the other end of the apparatus, the glue therein has set and the panel of plywood is completely made and may then, at once, be trimmed or otherwise worked without any further delay; second, in which the pressure applied in such a press, through which the panel being made passes, increases progressively; third, in which the pressure is applied between a fixed body, or series of bodies, and a complementary spring-pressed body, or series of bodies, thereby causing every portion of each panel to pass through identical pressure conditions, since every part thereof must pass between any and every such pair of pressure bodies; fourth, in which the initial compression of each spring may be independently adjusted whereby the pressure applied thereby, when the pressing body is raised a predetermined distance by the passing wood panel, is made uniform over a certain section of the apparatus; fifth, in which the pressure of all the springs, in any section of the apparatus, may be simultaneously adjusted, thereby permitting the pressure to be progressively increased from one section to the next, and thereby permitting quick adjustment of the apparatus to accommodate a change in the thickness of the raw plywood panel being pressed; and sixth, in which the panel is carried through the apparatus at a uniform speed without undue strain on the soft glue therein. A further object is to provide a simple, strong, and efficient apparatus which is adapted to continuously receive such raw panels and which will pass them in a stream through the pressure conditions, and will deliver them in a stream of completed panels.

I attain these and other objects by the devices, mechanisms, and arrangements illustrated in the accompanying drawings, wherein one form of the apparatus to carry out the improved method, is illustrated, in which:—

Fig. 1 is a diagrammatic side elevation of such an apparatus; Fig. 2 is a side elevation of the adjacent ends of two contiguous sections thereof, on a larger scale; and Fig. 3 is a cross-section of a portion thereof.

Similar numerals of reference refer to similar parts throughout the several views.

The art of making plywood panels has been substantially as follows:—The sheets of veneer are passed through the glue spreader and are then assembled into a raw panel of the desired arrangement. The raw panel thus formed is stacked with similar raw panels into a pile of several feet in height and, if the veneer is very thin, a sheet of paper is inserted between each such panel and the adjacent panels. Then this pile of raw panels is transferred to a hydraulic, or other powerful, press and is compressed therein. While it is in this press it is clamped between pressure plates by suitable adjustable bars. Then the hydraulic pressure thereon is released and the pile, still under the pressure from the tension in said clamping bars, is transported and stored until the glue has had time to set.

Under such conditions it is evident that the glue used cannot be of a quick-drying character, because of the time necessary to assemble the large number of panels which go to make up the said pile, and therefore it requires a considerable time, after the panels have been put under pressure of the hydraulic press, before the glue has set therein sufficiently for the clamping bars and plates to be removed. It is also evident that this process requires a large number of sets of clamping plates and bars because the time that it takes the glue to set is much longer than the time taken in assembling a pile of raw panels. Also this process requires a very large investment in storage space, in a large plant, and requires the labor of many men in the various steps of the process as above outlined. It further necessitates the gluing up of a large number of panels before any of them can have any adequate pressure applied thereto, and this results in a certain loss in quality of the gluing.

All these objects are removed by my improved process and in the apparatus whereby it is carried out. The floor space required is only that occupied by my continuous press, and substantially no labor is used between the assembling table and the finished panel. It reduces the capital tied up in panels in

which the glue is setting because each panel is ready for trimming, or otherwise being worked on, in about four minutes after it has been assembled. It improves the quality of the panels because the glue therein is at once put under pressure and there is no delay in making up a pile, as in the old process, and this fact permits the use of a special quick-drying glue, which it would be impossible to use under the old conditions. The old process is a batch process while my process is a continuous process.

My improved process therefore results in a very great saving in capital and in expense of operation, a saving amounting to at least \$1.50 per thousand feet of three-ply, $\frac{3}{8}$ inch panels, in a plant producing 50,000 feet of panels per day, thus saving its cost in a few months operation.

Referring to the drawings, in which one form of an apparatus for performing this process, is shown, the glue-spreader 1 (Fig. 1) delivers the glued sheets of veneer to the assembling table 2, where the raw plywood panels are assembled. As soon as one such raw panel is assembled, the conveyor chain 3 engages the raw panel and feeds it between the first pair of driven pressure rolls 4 and 5, hereinafter more particularly described, of the first section 6 of the apparatus. As the front edge of this raw panel is fed between the rolls 4 and 5, it raises the spring-pressed roller 5 a predetermined distance, say $\frac{1}{8}$ inch, and receives the amount of pressure developed by the springs when they are thus compressed an additional $\frac{1}{8}$ inch more than when adjusted without the panel thereunder, as hereinafter described. The front edge of the raw panel is thus compressed and fed on to the next pair of rollers, where the same degree of pressure is applied thereto by the corresponding rise in the second spring-pressed roller 5. This action continues throughout the first section 6 of the apparatus and it will be noted that every succeeding portion of the raw panel is brought successively under the pressure of each spring-pressed roller. Also it will be noted that all the upper and lower rollers turn at exactly equal peripheral speeds, say twenty feet per minute, and in opposite rotational directions, thus feeding the raw panel through the first section 6 of the apparatus at a constant speed and with substantially no strain on the glue in the panel, except that due to the compression thereof by each pair of rollers. The said rollers 4 may be driven by a suitable drive chain 7 and the rollers 5 by another drive chain 8. Both chains 7 and 8 may be driven from any suitable driving means, such as indicated at 9.

The action of the first section 6 is repeated in the second section 10 of the apparatus, except that in this section the adjustment of the carrier frame of the upper set of rollers

5 is such that the springs of the rollers will be under greater initial compression when the upper stops thereof, hereinafter described, are screwed down on the rods to bring the rollers 5 to the same level as those in the first section 6, and therefore they each apply a greater pressure on the panel when they are raised the same amount ($\frac{1}{8}$ "') thereby as it passes. All the rollers are driven at the same peripheral speed and in the same manner as those in the first section, above described. As the panel reaches this second section, therefore, the only difference in the action of the apparatus thereon is that the pressure of the rollers is greater than that in the first section.

A similar increase, with an otherwise identical action, is repeated in the third section 11, and again in the fourth section 12 of the apparatus.

By the time the panel has completed the length of the entire apparatus the glue therein will have set and the panel is ready to be worked in whatever way may be desired, and does not need to be stacked under pressure.

In order to carry out the above described process I have illustrated one form of the apparatus in the drawings. This consists of a series of units or sections, each identical with the others, except for its adjustment as above outlined, and placed end to end. Each comprises a frame 21 carrying the lower set of rollers 4 in suitable fixed bearings 22 therein, all said rollers 4 being driven by the chain 7. A carrier frame 23 is adjustably supported over the frame 21 by means of four or more vertical screw rods 24, each rotatably mounted in bearings 25 in the said upper frame 23 and screwing into lugs 26 extending out from the lower frame 21. These rods 24 are all connected together by means of suitable bevel gears 27 and by the horizontal shafts 28, which are mounted in suitable bearings 29 on the said frame 23. The shafts 28 are adapted to be turned by means of the hand wheels 30 mounted thereon. Thus by turning any of the shafts 28 all the vertical screw rods 24 of that section are rotated equally and are screwed into or out of the supporting lugs 26 to lower or to raise the said frame 23, as desired. The frame 23 is provided with an upper flange 31 and with a lower flange 32 immediately below it.

Each roller 5 is mounted in bearings 33 at each end, said bearings being formed on the ends of the vertical rods 34. A vertically adjustable sleeve 35 passes through and screws in the said upper flange 31 of the frame 23, and is positioned vertically over the center of the end of the roller 5. The sleeve 35 is provided with a smooth central vertical hole therethrough. The said vertical rod 34 passes through a guide hole in the lower flange 32 of the frame 23 and through the above mentioned central hole in the sleeve

35. A flange or collar 36 is formed on the rod 34 at a point slightly above the lower flange 32.

5 An upper stop nut 37 is adjustably screwed on the upper end of the rod 34, above the sleeve 35, and is adapted to engage the upper end of the said sleeve to limit the downward motion of the rod 34 therein, thereby forming an adjustable
10 means of controlling the position of the roller 5 when no panel is in engagement therewith. The rod 34 can move freely upward in said sleeve 35 from said lower limiting position.

15 A helical spring 38 is wound around the rod 34 and is compressed between the lower surface of the sleeve 35 and the collar 36 on the rod 34. This spring presses the rod 34, bearing 33, and roller 5, downward on the
20 panel passing between the rollers. The degree of pressure exerted by the spring 38 when the roller 5 is raised $\frac{1}{16}$ inch by the passing panel, depends on the adjustment of the frame 23 above the frame 21, on the adjustment of the sleeve 35 in the frame 23, and the adjustment of the stop nut 37 on the rod 34. When a panel of a different thickness is to be passed through the apparatus, then the height of the frame 23, above the frame 21, and therefore the height of all the apparatus supported thereby, is altered an amount corresponding to the change in such thickness so that the pressure applied by the rollers 5, when raised $\frac{1}{16}$ inch, will not be different
35 than in the other case, unless a difference therein is desired. As an example of the amount of pressure exerted by the springs on the rollers 5 I may state that in the apparatus at present in successful use, each spring
40 in the first section exerts a pressure of two pounds when raised $\frac{1}{16}$ inch by the panel; in the second section the pressure is four pounds; in the third section it is seven pounds; and in the fourth section it is ten
45 pounds.

The glues used in this process, as above stated, must be of the quick-drying variety. When a cold glue is desired I prefer to use one of the high-protein-base vegetable glues.
50 However if a blood-albumen glue is used it is necessary to apply heat to the panels as they are passing through the apparatus, to promote the coagulation thereof. This heat may be obtained from a series of steam pipes 39

which may be supported in the frames 21 55 and 23 immediately below the rollers 4 and above the rollers 5.

In the above description I have set forth the preferred type of apparatus which I use but it is evident that other types might be 60 developed, such as a progressive plate type, or a chain carrier, without departing from the scope of my invention which, in brief, comprises the continuous conveyance of the raw panel through substantially continuous 65 pressure conditions, each part of each panel experiencing successively each such pressure condition, and the speed of such conveyance and the length of such pressure apparatus and the kind of glue used are coordinated 70 such that the glue is set in the panel before the panel reaches the end of the said pressure apparatus.

Having, therefore, described my invention, what I claim is:— 75

In an apparatus for making plywood, the combination with a fixed frame; of a vertically adjustable frame mounted thereon; a series of rotating feed rollers mounted in said fixed frame and adapted to feed the raw 80 panel through the machine and to support it against the pressure therein; a series of vertical sleeves adjustably mounted in said adjustable frame; vertically guided rods mounted in and freely moving in said 85 sleeves; adjustable limiting nuts on the upper ends of said rods and adapted to engage the upper ends of said sleeves to limit the downward motion of said rods therein; compression springs mounted between the 90 lower ends of said sleeves and collars on said rods, whereby the rods are resiliently forced downward; bearings mounted on the lower ends of said rods; and a series of rotating pressure rollers mounted in said bearings, 95 each pressure roller being positioned above one of said feed rollers and adapted to press the raw panel between it and said feed roller as it passes therebetween, and whereby the initial pressure of the feed roller is governed 100 by the adjusted position of the sleeve in the frame and the limiting nut on said rod, and whereby adjustment for the thickness of the panel without changing the pressure of the roller thereon is attained by adjusting the 105 adjustable frame.

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