Feb. 11, 1958 G. I. REYNOLDS ET AL 2,822,840

MACHINE FOR BONDING KRAFT PAPER TO VENEER SHEET

Filed Dec. 27, 1954 2 Sheets-Sheet 1

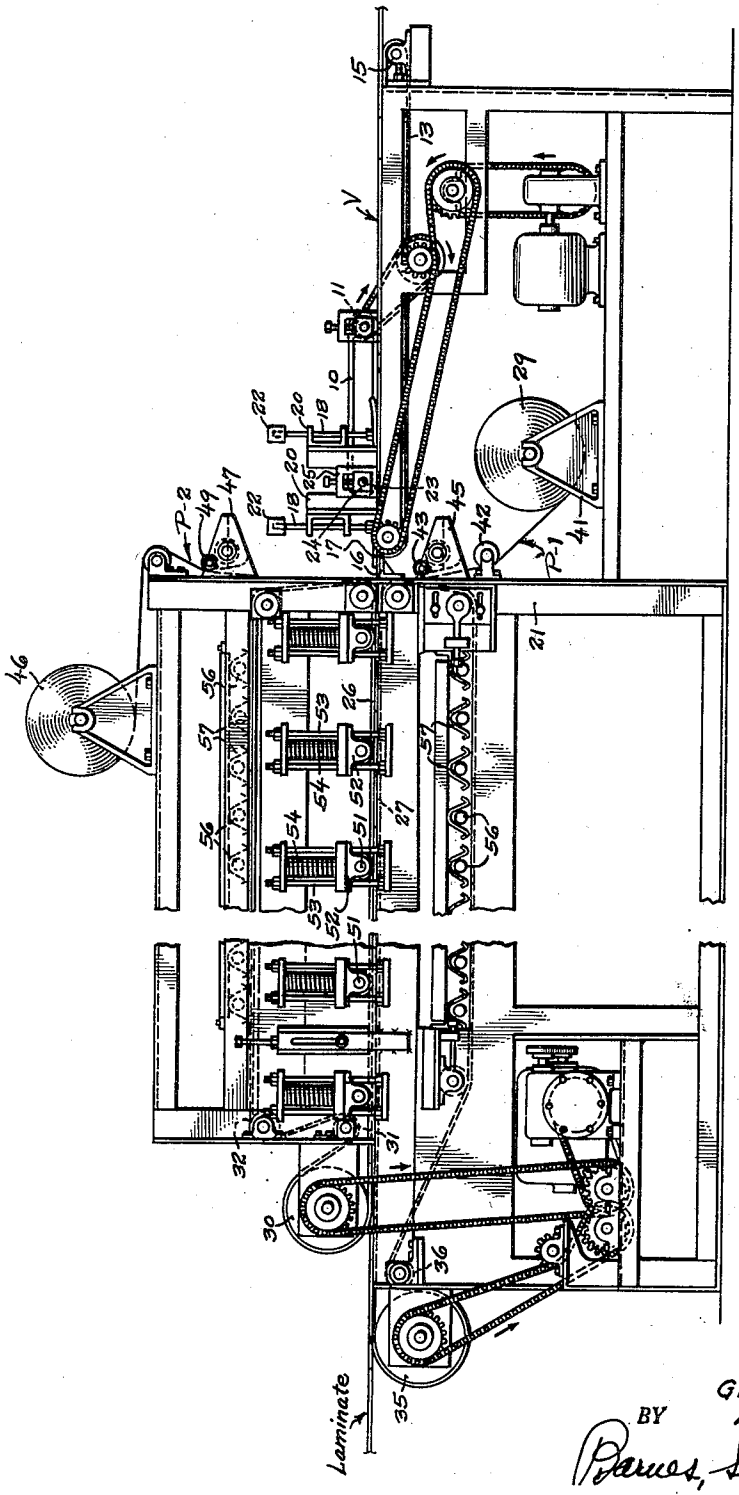


Fig. 1

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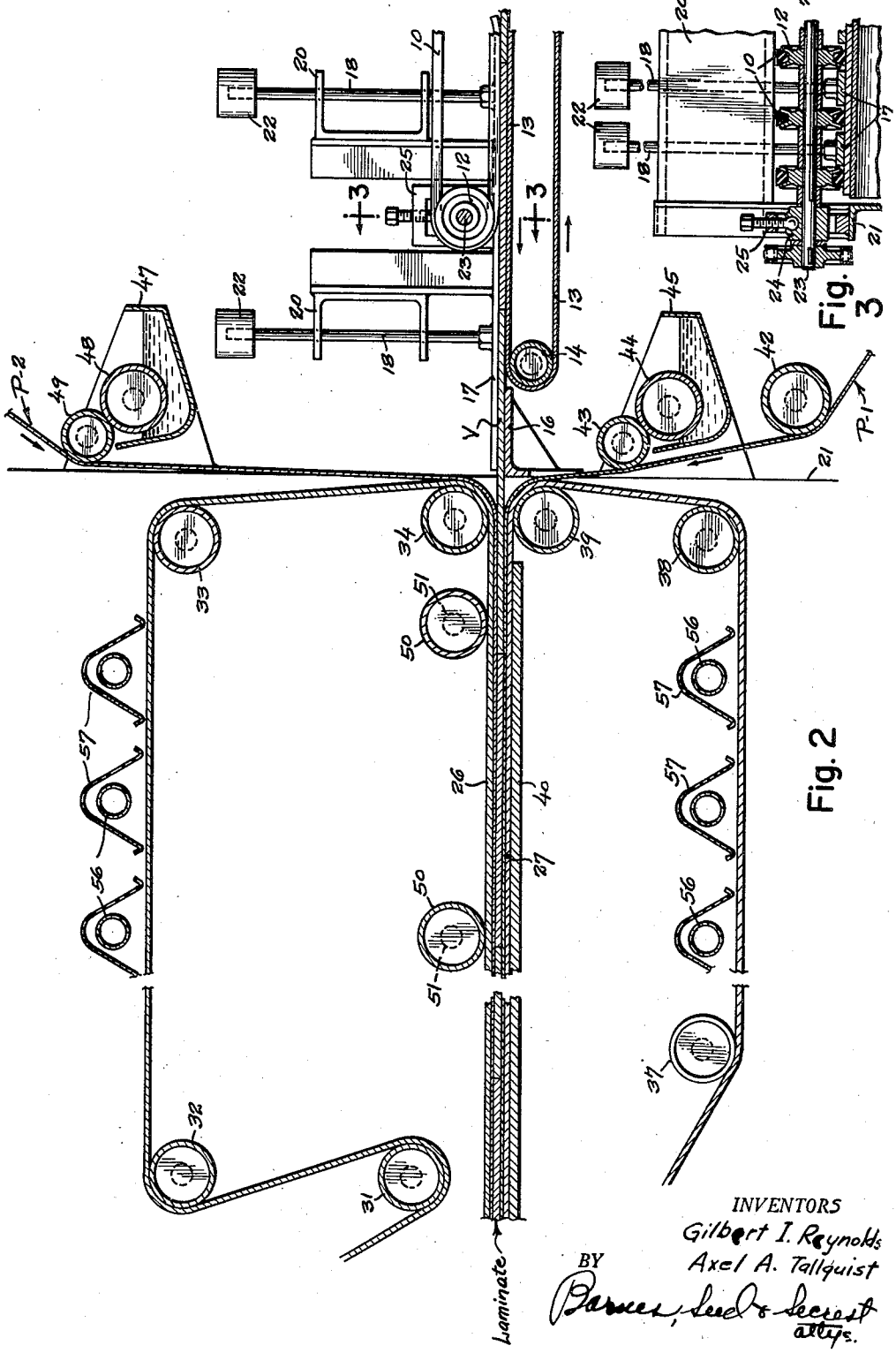


Fig. 2

Fig. 3

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MACHINE FOR BONDING KRAFT PAPER TO VENEER SHEET

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4 Claims. (Cl. 144—279)

This invention relates to a machine and method of producing, from veneer wood and kraft paper, a product hereinafter termed "kraft veneer laminate," the said product being one in which the veneer sheet is sandwiched between sheets of the kraft paper so as to combine the stiffening quality of the veneer with the toughness of the paper.

The general object of the invention is to provide a machine and method by which said operation of bonding paper to veneer may be performed expeditiously and at nominal expense.

This and other more particular objects and advantages will appear and be understood in the course of the following description and claims, the invention consisting in the new method and in the novel construction, adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

Figure 1 is a fragmentary side elevational view illustrating a machine constructed to embody the preferred teachings of the present invention, and incorporating a showing of kraft paper and wood veneer as these components pass through the machine.

Fig. 2 is a fragmentary enlarged-scale longitudinal vertical sectional view thereof; and

Fig. 3 is a fragmentary transverse vertical sectional view on line 3—3 of Fig. 2.

The steps practiced in producing the kraft veneer laminate will be here cursorily traced in the belief that such will add to clarity in an understanding of the later detailed description of the machine and method.

Drawn from a respective supply reel an upper and a lower sheet of kraft paper are each given continuous travel along guided travel paths and in the course of such travel the said upper and lower paper, designated by P–1 and P–2, respectively, are each coated on one facing surface with a suitable cement or glue. For our glue we prefer to utilize a thermosetting adhesive such, for example, as urea formaldehyde, resorcin formaldehyde, phenol formaldehyde, a plasticol, starch or silicate.

Following the application of such glue the said upper and lower sheets of kraft paper are brought against the top and bottom face, respectively, of the veneer. Having moved along a separate path which merges with the paths travelled by the two sheets of kraft paper, the veneer—which is or may be composed of transversely extending strips of scrap stock—in the meantime traverses a crowder table whereat each successive strip is overtaken by the next following strip so that the leading edge of such following strips are brought against the trailing edge of the preceding strip. After such multi-strip sheet of veneer and the two sheets of paper are brought together, pressure and heat is applied to effectuate a bonding.

Referring to the drawings it will be seen that there are provided two successive horizontal conveyors of which the first-acting conveyor performs the crowding function and of which the other conveyor performs the bonding function. It is by these terms "crowding" and "bonding" that the two conveyors will be hereinafter referred to. The crowding conveyor is composed of complementing upper and lower members which each comprise a plurality of laterally spaced endless belts. The upper said

belts, designated by **10**, pass about live and idler rollers **11** and **12**, respectively, while the lower belts **13** pass about live and idler rollers **14** and **15**, respectively. Beyond the tail end of such lower belts **13** and horizontally aligned with the upper run thereof is a rigid platform **16**, and as a lapping complement of this platform there are provided a plurality of bars **17**. These bars are disposed longitudinally of the crowder conveyor in the interstice between the upper belts **10** and have their tail ends overlapping the platform **16**. Upstanding rods **18** rigid with the bars are journaled for vertical slide movement in brackets **20** carried by a frame-work **21**, and upon the upper ends of the rods there are provided weights **22**. Said idler rollers **12** lie at the tail end of the concerned belt and are mounted upon a common spindle **23** journaled at each end in a respective block **24** vertically adjustable in a cage **25**. The arrangement for driving these belts **10** and **13** is such that the upper belts have a speed accelerated by comparison with the speed of the lower belts. The upper belts **10** terminate short of the lower belts, thus operating to close gaps from between successive strips of veneer as the slower speed of strips propelled only by the lower belt **13** causes them to be overtaken by strips moving under the influence of the faster upper belt **10**.

Like the crowder conveyor, the bonding conveyor is here shown as being also comprised of complementary upper and lower endless belts **26** and **27**, respectively. These latter belts are, however, wide belts extending substantially the full width of the machine. In its endless travel the upper belt **26** is trained about a live drum **30** and idler rollers **31**, **32**, **33** and **34**. The lower belt **27** is trained about a live drum **35** and idler rollers **36**, **37**, **38** and **39**. The upper run of the lower belt, passing from roller **39** to drum **35**, is sustained upon a flat table **40**, and it is between this section of the lower belt and a paralleling lower run of the upper belt that the step of bonding kraft paper to veneer is performed, the merging of the three said separate preliminary paths travelled by the veneer sheet V and by the two paper sheets P–1 and P–2 occurring at the head end of these complementing runs.

As to the kraft sheet P–1, this being the lower sheet, the same is drawn from a reel **29** journaled for free-turning movement in a mounting box **41** and passes first around an idler roll **42** and thence is fed into touching contact with a glue-spreading roll **43** which bears in turn against a dip roller **44** having its lower portion turning in a pot **45** containing glue. For the upper sheet of kraft paper, which is drawn from a reel **46**, there is provided the counterpart of the described gluing system, the pot, dip roller, and spreading roll being in this instance denoted by **47**, **48** and **49**, respectively.

In the lower-run travel of the upper belt **26**, and namely between the idler head roll **34** and the live drum **30**, the belt passes below a succession of longitudinally spaced apart transversely extending pressure rolls **50**. Trunnion shafts **51** at each end of these rolls are journaled in boxes **52** guided for vertical slide movement by rods **53**, and pressing from above upon these boxes to exert a yielding downward thrust thereon are respective compression springs **54**.

In order to cure the thermo-setting glue applied by the spreading rolls **43** and **49** the laminated paper-veneer-paper product is caused to be heated as it moves with the bonding conveyor. We show, as the source of this heat, a plurality of infra-red tubes **56** such, for example, as the tubes illustrated and described in U. S. Patent #2,535,268. Associated with each of these tubes is a reflector, as **57**, and the tubes are arranged in two banks with the upper bank focusing its heat upon the top surface of the upper run of the upper belt **26**, and

with the lower bank focusing its heat upon the top surface of the lower run of the lower belt 27. In view of the heat-storage ability of the two cord-reinforced belts 26 and 27 and the inherent ability of infra-red heat to penetrate an object on which the heat is focused the particular surface of the belts onto which the infra-red heat is directed is immaterial. It should, however, be pointed out that the upper belt 26 can be deleted, retaining only the lower belt 27 as a conveyor, in which case the heat from the upper bank of tubes must perforce be played directly on the conveyed product. It is for this reason that the upper bank of tubes are illustrated as having their heat rays directed downwardly.

It is believed that the invention will have been clearly understood from the foregoing detailed description of our now preferred illustrated embodiment. We find that a bonding zone 25 ft. in length used in conjunction with a belt speed approximating 50 ft. per minute, and with the temperature of the belts at the ingress end of the bonding zone in the neighborhood of 300° F., provides an ideal condition. The veneer used should be fairly dry, say with a moisture content, by preference, not in excess of 15%.

One use for which the kraft veneer laminate produced by the present machine is especially suited is the bottom, sides and top of a crate such, for example, as the crates used in boxing fruit. Strips of the finished laminate are clipped to width so that the bottom, sides and top may be separate or, if desired, the veneer strips are or may be clipped to a predetermined necessary width before their lamination with the facing sheets, leaving the latter continuous through the full combined width of sides, bottom and top. It may occur, moreover, that spaces of moderate width are desired between these pre-clipped veneer strips in order to give the strips a freer hinge action after they have been joined by the facing sheets of paper. In such case the crowding action is deleted and a spacing means substituted therefor.

Minor changes in the invention will suggest themselves and may be resorted to without departing from the spirit of the invention, wherefore it is our intention that no limitations be implied and that the hereto annexed claims be given a scope fully commensurate with the broadest interpretation to which the employed language admits.

We claim:

1. A machine for producing the described kraft veneer laminate and namely a laminate composed of wood veneer sandwiched between facing sheets of kraft paper, said machine comprising a generally horizontal bonding throat defined at the bottom by the upper run of a lower endless conveyor belt and at the top by the lower run of an upper endless conveyor belt, both of said belts having high thermal capacity, a flat table underlying and giving support to said upper run of the lower conveyor belt, a series of transversely extending longitudinally spaced apart pressure rolls bearing from above upon the lower run of said upper conveyor belt, a respective means for concentrating heat upon each of said conveyor belts so located as to apply its heat to the related belt along a section of the belt's travel which is outside the bonding throat and thereby storing heat within said belt in advance of the traversal by said belt of the bonding throat, means for applying a thermo-setting glue to one surface of each of the facing sheets, and means for bringing said glued surfaces against the opposite faces of the veneer and feeding the laminate into the admission end of the bonding throat.

2. A machine for producing the described kraft veneer laminate, and namely a laminate composed of a core of veneer sandwiched between facing sheets of kraft paper, said machine comprising a generally horizontal bonding throat defined at the bottom by the upper run of an endless conveyor belt and at the top by a series of transversely extending pressure rolls bearing upon said upper run of the belt at longitudinally spaced intervals thereof, means underlying and giving support to said upper run of the belt, means for applying a thermo-setting glue to one surface of each of the facing sheets, means for bringing said glued surfaces against opposite faces of the veneer and feeding the laminate into the admission end of the bonding throat, and means for heating the laminate as it moves through the throat so as to set said glue, the belt being a cord-reinforced structure of high heat-storing capacity, said heating means performing its heating function by concentrating heat rays upon the lower run of the conveyor belt, thus storing heat to be later transferred by conduction to the laminate in the upper-run travel of the belt.

3. A machine for producing the described kraft veneer laminate and namely a laminate composed of wood veneer sandwiched between facing sheets of kraft paper, said machine comprising a generally horizontal bonding throat defined at the bottom by the upper run of a lower endless conveyor belt and at the top by the lower run of an upper endless conveyor belt, both of said belts having a high thermal capacity, a flat table underlying and giving support to said upper run of the lower conveyor belt, a series of transversely extending longitudinally spaced apart pressure rolls bearing from above upon the lower run of said upper conveyor belt, a bank of infra-red heaters positioned so as to project their heat rays upon the upper run of the upper conveyor belt so as to store heat within said belt before the belt reaches the bonding throat, a bank of infra-red heaters positioned so as to project their heat rays upon the lower run of the lower conveyor belt to store heat in the lower belt likewise before the same reaches the bonding throat, means for applying a thermo-setting glue to one surface of each of the facing sheets, and means for bringing said glued surfaces against the opposite faces of the veneer and feeding the laminate into the admission end of the bonding throat, the advance heating of the belts insuring a curing temperature of highest intensity at the very advent of the laminate's admission to the bonding throat and a progressively lowering temperature as the curing laminate, proceeding with the belts through said bonding throat, draws the stored heat from the belts.

4. A machine for producing the described kraft veneer laminate and namely a laminate composed of wood veneer sandwiched between facing sheets of kraft paper, said machine comprising an endless conveyor belt having high thermal capacity, backing means giving support to the belt along one run thereof, means complementing said backed run of the belt to define a bonding throat between said complementing means and the backed run of the belt, pressure means operatively associated with said belt, the backing means, and said complementing means so as to yieldingly press the complementing means towards the belt, a means for concentrating heat upon the belt so located as to apply its heat along a section of the belt's travel which is outside the bonding throat and thereby storing heat within said belt in advance of the traversal by said belt of the bonding throat, means for applying a thermo-setting glue to one surface of each of the facing sheets, and means for bringing said glued surfaces against the opposite faces of the veneer and feeding the laminate into the admission end of the bonding throat.

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