

Aug. 26, 1969

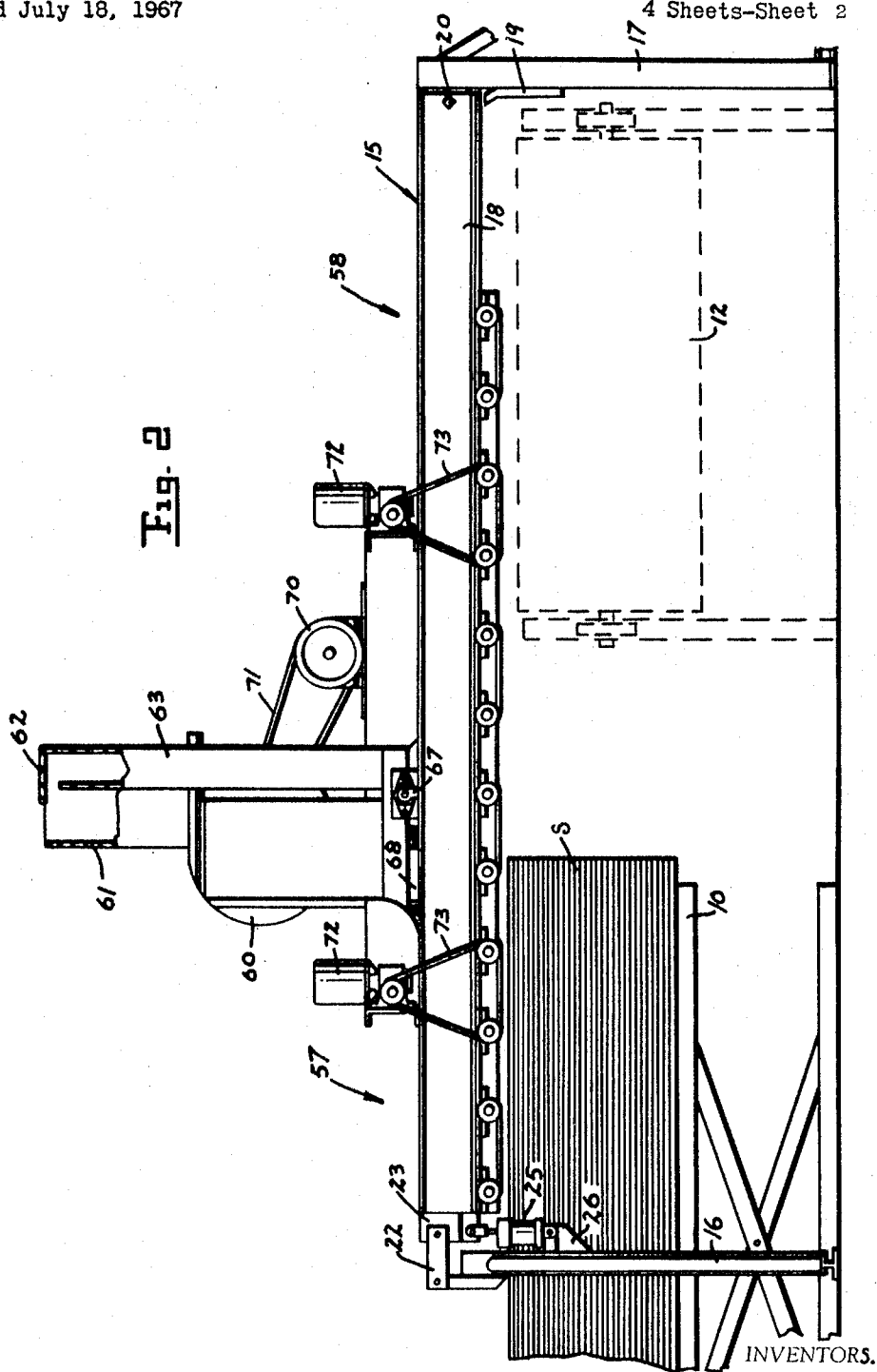
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3,463,483

VACUUM PROCESS AND APPARATUS FOR TRANSFERRING SHEETS

Filed July 18, 1967

4 Sheets-Sheet 2



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4 Sheets-Sheet 3

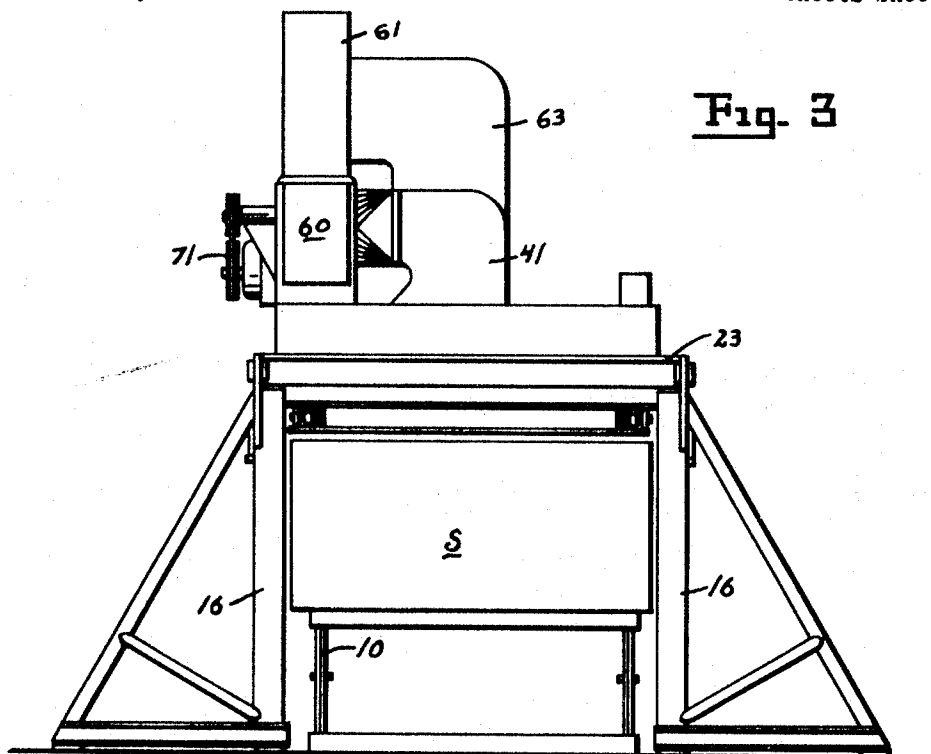


Fig. 3

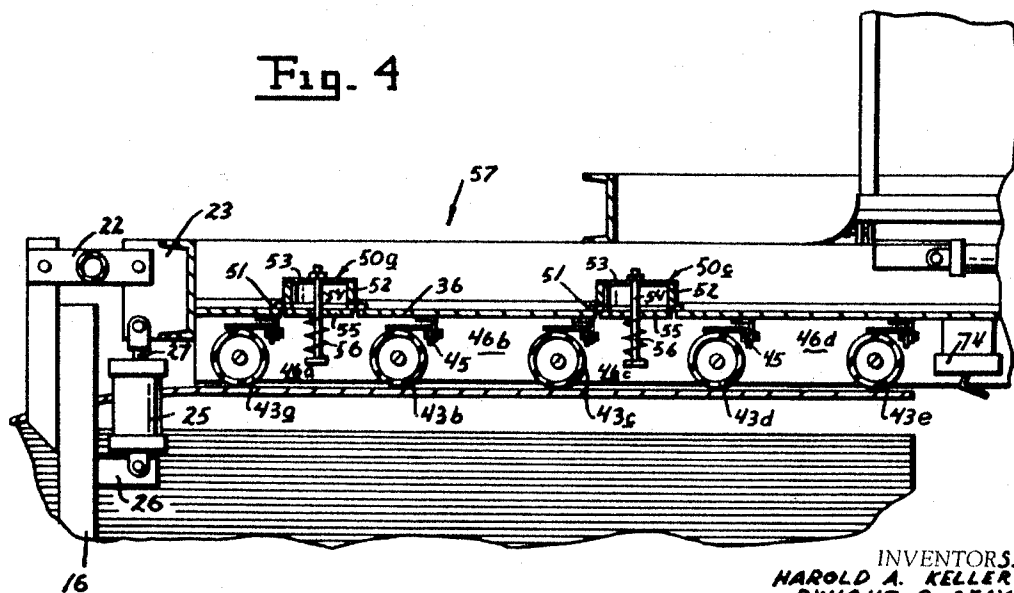


Fig. 4

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Fig. 5

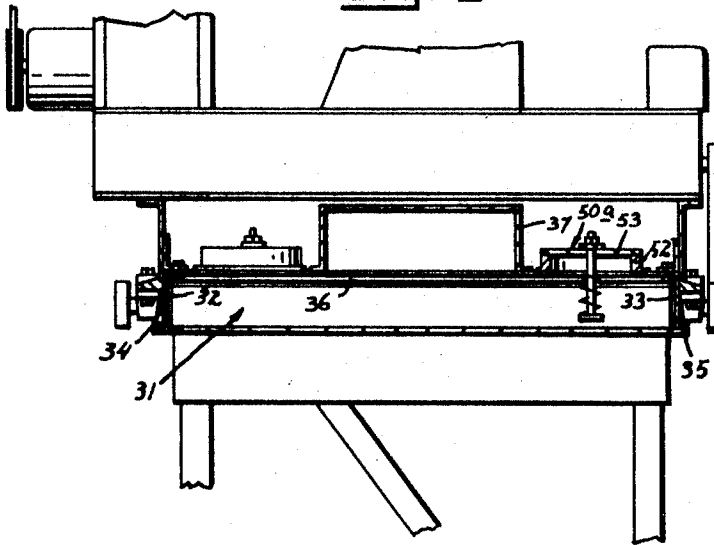
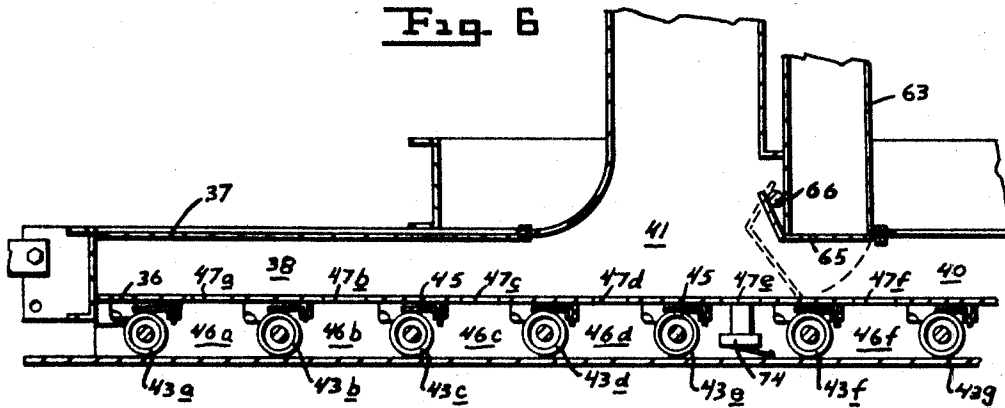


Fig. 6



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VACUUM PROCESS AND APPARATUS FOR TRANSFERRING SHEETS

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22 Claims

ABSTRACT OF THE DISCLOSURE

The disclosure describes a process for removing low grade veneer sheets one at a time from a stack and successively conveying the sheets to a receiving station. The apparatus includes a longitudinally stationary hood 30 that is above the stack and extends to the receiving station. A plurality of rollers 43 are mounted beneath the hood coextensive with the bottom edges of the hood for engaging the sheets and conveying the sheets beneath the hood to the receiving station. The rollers 43 and seals 45 form partitions to divide the hood into individual chambers 46. Relief valves 50 are formed in the hood for maintaining the vacuum pressure in the chambers immediately above the stack at a preset low vacuum level to prevent the pickup of more than one sheet at a time.

BACKGROUND OF THE INVENTION

This invention relates to processes and apparatus for successively removing sheets from a stack at a pickup station and for conveying the sheets to a receiving station and more particularly for removing sheets having random perforations therethrough.

In the customary process of manufacturing plywood, an uneven number of plies or veneer sheets are alternately placed on one another and glued together with the grain of the odd number sheets running the length of the plywood and the grain of the even number of plies running the width of the plywood.

The veneer sheets are quite difficult to handle because they are very thin and exhibit strength properties that are substantially directional in nature. In one direction, veneer is quite brittle and will readily break when forces are exerted tending to bend the veneer parallel to the grain. In the other direction, the veneer is quite flexible and exhibits substantial resistance to bending forces tending to bend the veneer transverse to the grain. Because of these physical structural characteristics of veneer special care must be used in handling the veneer sheets and transporting the sheets from one position to another.

Veneer sheets, particularly low grade veneer sheets, have surface defects such as knotholes or cracks that are randomly oriented. This presents another difficult problem in attempting to transfer the sheets from one place to another in the manufacture of plywood.

Numerous types of vacuum pickup devices have been tested in attempting to remove one sheet at a time from a stack and transport the sheet to a receiving station at the beginning of the plywood manufacturing process. As is often the case, when a vacuum pickup device is applied to the upper surface of the first sheet, it also picks up the second and maybe the third sheet. The reason for this is that the vacuum pressure applied to the first sheet communicates with the second sheet through the holes and cracks. When this happens the second or third sheet may fall while being transported to the receiving station, damaging the sheets and interrupting the automatic process. Furthermore, the plywood manufacturing process is pre-

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icated upon the successive feeding of sheets one at a time and the unintentional feeding of two or more sheets jams the system.

Most of the vacuum devices are arranged so that the entire vacuum header is moved from the pickup position to the receiving station where the sheet is ejected onto the receiving station platform. This requires expensive and complicated moving structures and mechanisms for accomplishing this operation. Most of these devices cannot consistently or adequately perform the task in the manner required. To be able to move the header from the pickup station to the receiving station at a speed required to make the process efficient and economical requires equipment and drive mechanisms that are prohibitive.

One of the principal objects of this invention is to provide a process utilizing high volume and low vacuum pressure for picking up only the first sheet from a stack of sheets each having perforations or holes therethrough.

An additional principal object of this invention is to provide a vacuum apparatus for removing sheets such as plywood veneer from a stack one at a time and successively conveying the sheets to a receiving station in which this apparatus is economical to manufacture, simple to construct and above all efficient and reliable in operation.

An additional object of this invention is to provide a vacuum apparatus for removing only the uppermost sheet from a stack in which the sheets have random surface defects such as perforations, holes or cracks.

A further object of this invention is to provide a vacuum apparatus in which the vacuum device is longitudinally stationary and does not move between the pickup station and the receiving station.

An additional object of this invention is to provide a vacuum apparatus that has a novel driving mechanism for conveying the sheets from the pickup station to the receiving station.

A further object of this invention is to provide a vacuum apparatus having a plurality of individual vacuum compartments spaced between the pickup station and the receiving station for supporting the sheets as the sheets are conveyed therebetween.

An additional object of this invention is to provide a vacuum apparatus having a unique pressure regulating system for maintaining the vacuum pressure in the individual chambers at a low level so that only one sheet at a time will be removed from the stack.

An additional feature of this invention is to provide an economical and efficient mechanism for ejecting the sheets from the apparatus when the sheets reach the receiving station.

SUMMARY OF THE INVENTION

This invention concerns a process and apparatus utilizing high volume, low vacuum pressure for removing the sheets one at a time from a stack and conveying the sheets to a receiving station. The process includes the steps of lowering a vacuum hood onto the first sheet and supplying a high volume, low vacuum pressure to the hood of sufficient magnitude to hold the first sheet to the hood but insufficient when applied through the sheet defects to hold the second sheet against the first sheet. The hood is then raised to remove the first sheet from the stack while the vacuum pressure is supplied to the header. The apparatus includes a vacuum hood mounted on a base frame in which the hood has a pickup section above the stack and a conveying section extending from the stack to the receiving station. A plurality of conveyor rollers are mounted to the underside of the hood for engaging the upper surfaces of the sheets. A source of vacuum pressure such as a fan is mounted on the hood for generating

a high volume, low vacuum pressure for holding the sheets against the rollers. An actuator is connected to the hood for lowering the pickup section of the vacuum hood into proximity with the first sheet of the stack to render the vacuum pressure effective to hold the first sheet against the rollers. The actuator then raises the vacuum hood to remove the uppermost sheet from the stack. Pressure sensitive relief valves are mounted in the pickup section for maintaining the vacuum pressure at a predetermined low vacuum pressure so that the hood will not remove more than one sheet even though the sheets may have surface defects such as holes and cracks that cover up to 2% of the surface of the sheet. Motors are connected to the rollers for rotating the rollers to move the suspended sheets along the underside of the vacuum hood from the stack to the receiving stations. More particularly, the hood has a plurality of individual compartments in which the partitions between the compartments are defined by the rollers for directing the vacuum pressure to the sheets as the sheets are progressively moved beneath the individual compartments.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention is shown in the accompanying drawings, in which:

FIG. 1 is a plan view of a sheet material conveyor that is capable of performing the steps of this invention and incorporates the principal structural features of this invention;

FIG. 2 is a side elevation view of the sheet material conveyor showing a stack of sheets and a conveyor underneath a conveyor hood;

FIG. 3 is an end view of the sheet material conveyor;

FIG. 4 is a longitudinal fragmentary cross sectional view taken along line 4—4 in FIG. 1;

FIG. 5 is a transverse fragmentary cross-sectional view taken along line 5—5 in FIG. 1; and

FIG. 6 is a longitudinal fragmentary cross sectional view taken along line 6—6 in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings, there is shown in FIG. 1 a sheet material conveyor for removing sheets one at a time from a stack S of sheets and serially conveying the sheets from the pickup station to a receiving station. As shown in FIG. 2, a plurality of sheets are formed in a stack on an indexing lift platform 10. As veneer sheets are removed from the top of the stack, the platform 10 rises automatically to keep the top of the stack at a constant elevation. The sheet material conveyor removes the sheets one at a time from the stack S and conveys the sheets onto a conveyor 12 shown in phantom (FIG. 2).

The particular embodiment shown in the drawings is designed for application for conveying wood veneer sheets having a thickness of approximately one sixth of an inch. Generally, each veneer sheet has a length of slightly greater than eight feet and a width slightly greater than four feet. Low grade veneer sheets generally have knot-holes and cracks formed therethrough that make the task of picking up only the first sheet by vacuum pressure particularly difficult. Cracks and holes enable the vacuum pressure to generate an upward force on the second and in some cases on the third sheet. Generally, the commercially usable low grade veneer sheets have knotholes and cracks that constitute approximately 2% or less of the total area.

The sheet material conveyor has a stationary base frame 15 with uprights 16 and 17. Spaced longitudinal channel frames 18 span between the uprights 16 and 17 above the stack of sheets S and over the conveyor 12. The uprights 16 are transversely spaced so that it is convenient to position a stack of sheets therebetween. The longitudinal

channel frames 18 are pivotally mounted to the uprights 17. A shaft 20 is connected between the longitudinal channel frames 18 and is supported by bearings 21 affixed to the uprights 17. A stop plate 19 is rigidly mounted to the upright 17 in the path of the sheets for stopping the movement of the sheets when the sheets reach the conveyor 12. At the other end of the apparatus arms 22 are pivotally mounted to the uprights 16 and are pivotally connected to a cross channel 23 mounted between the longitudinal channel frames 18 for permitting pivotal movement of the frames 18.

Pneumatic cylinders or actuators 25 are mounted on brackets 26 affixed to the uprights 16. The connecting rods 27 of the pneumatic cylinders 25 are connected to the cross channel 23 for transmitting motion thereto.

A longitudinal vacuum hood 30 is affixed between the channel frames 18 above the stack S and extending over the conveyor 12. The hood 30 does not move longitudinally as the sheets are being conveyed.

The hood 30 has a lower hood section 31 which may be particularly seen in cross section in FIG. 5. The hood section 31 extends the full length of the hood 30 from the pickup station to the receiving station. The hood section 31 has parallel side walls 32 and 33 that are spaced a distance substantially equal to the width of the sheets. The lower extremities of the side walls 32 or 33 are flared out respectively into lips 34 and 35. The lips 34 and 35 support the upper surface of the sheets near the side edges as the sheets are being conveyed beneath the hood 30. The lips 34 and 35 also function as seals with respect to the surface near the side edges of the sheets to prevent substantial movement of air therebetween. The lower section has a top wall 36 (FIG. 5).

The hood 30 has an upper hood section or plenum 37 shown in cross section in FIG. 5 that is mounted on the lower hood section and extends the full length of the vacuum hood 30. The plenum 37 is not as wide as the lower hood section 31 and overlays only the central portion of the wall 36. The plenum 37 has a horizontal section 38 (FIG. 6) that is positioned above the stack S and a horizontal section 40 that extends from the pickup station to the receiving station. Intermediate between the horizontal sections 38 and 40 is a vertical section 41 that extends upwardly for communication with a vacuum source.

A plurality of transverse rollers 43, identified individually by letters a-l, are mounted at spaced intervals in a flat plane to the underside of the vacuum hood 30 for engaging the upper surface of the sheets at spaced locations to transfer the sheets underneath the vacuum hood 30 from the pickup station to the receiving station. Large rectangular openings are formed between adjacent rollers to provide maximum vacuum pressure exposure to the veneer sheets with minimum physical contact between the hood and the veneer sheets. Each of the rollers 43 has a shaft 44 that extends outwardly through the side walls 32 and 33. The lower surfaces of the rollers 43 are in the same plane as the lips 34 and 35. Transverse seals 45 (FIGS. 4 and 6) are fixed to the underside of the top wall 36 for engaging the upper surfaces of the rollers 43 to prevent the flow of air past the rollers when a sheet is engaged. The spaced rollers 43 and the seals 45 define wall partitions for subdividing the space in the lower hood section 31 into individual compartments or chambers 46 individually identified by letters a-k. Each of the compartments 46 directs the vacuum pressure through the corresponding large opening to the upper surface of the sheet as the sheet is positioned below the chamber.

Orifices 47 (FIG. 6) individually identified by letter a-k are formed in the top wall 36 for providing a flow regulating means between associated individual chambers 46 and the common vacuum plenum 37. The sizes of orifices 47 are designed for the particular application of the sheet transferring conveyor.

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Pressure sensitive relief valves 50 (FIG. 4) individually identified by letters *a-d* are mounted in the wall 36 for regulating the vacuum pressure in the chambers 46 above the stack, which in this case are identified 46*a-d*. Each relief valve 50 is designed to open when the static vacuum pressure exceeds a preset value so that the vacuum pressure in the chambers 46 over the stack (46*a-d*) will not increase above the preset value. To receive the relief valves 50, apertures 51 are formed in the wall 36 spaced from the plenum 37. Each of the relief valves 50 has a housing 52. Cross members 53 are mounted across the upper opening of the housing 52 for supporting downwardly projecting rods 54. A plunger disc 55 is mounted about each rod 54 below the top wall 36. The plunger disc 55 has a diameter greater than the aperture 51 so that when the vacuum pressure in the chamber is below the preset value the discs 55 will seal against the wall 36. A spring 56 is mounted to each rod 54 for biasing the disc plate upwardly into engagement with the sealing wall 36 to close the valve 50. The biasing pressure of the spring 56 is preset so that when the vacuum pressure in the respective chambers increases above the preset value, the disc will move downwardly to enable atmospheric air to pass into the chamber to maintain the vacuum pressure in the chamber at the preset value. In this manner the vacuum pressure in the chambers immediately above the stack will not increase above the predetermined value so that the hood 30 will not pick up more than one sheet at a time from the stack.

The chambers 46*a-d* and the horizontal section 38 of the plenum 37 may be generally described as a pickup section 57 of the hood. The chambers 46*e-k* and the horizontal section 40 of the plenum 37 may be considered a conveying section 58 of the hood 30.

A fan or vacuum pump 60 is mounted on the hood 30 as a source of high volume, low vacuum pressure. The fan 60 is in direct communication with the vertical section 41 of the plenum 37. An outlet or discharge duct 61 is attached to the positive pressure side of the fan 60 and extends upwardly to the atmosphere. The opening of the discharge ducts 61 to the atmosphere is somewhat reduced by a cover 62 (FIG. 2) to create a positive back pressure in the discharge ducts 61. A bypass duct 63 extends from the discharge duct 61 into the horizontal section 40 of the plenum 37 for providing a source of air for ejecting sheets from the hood when the sheets reach the receiving station.

The flow of air (positive pressure) from the bypass duct 63 is controlled by a damper 65 (FIG. 6) mounted on a shaft 66. One end of the shaft 66 extends through the plenum 37 to a pivot arm 67 (FIG. 2). An actuator 68 is connected to one end of the pivot arm 67 for moving the damper from a position closing the bypass duct to a position opening the ducts (shown in phantom in FIG. 6).

The fan 60 is driven by a motor 70 through a belt and pulley drive train 71. Drive means is also provided on the apparatus for rotating the rollers 43 to move the sheets along the underside of the vacuum hood 30. Specifically, the drive means includes two electric motors 72 that are connected to the roller shafts 44 through belt and drive trains 73.

The apparatus has a control system for operating the actuators 25 and 68 in an automatic manner to sequentially remove the sheets one at a time from the stack and convey the sheets to the conveyor 12. Specifically, the control system includes a limit switch 74 (FIGS. 4 and 6) that is mounted in the chamber 46*e* that senses the presence of a sheet.

During the operation of the sheet material conveyor the motors 70 and 72 run continuously to provide a continuous high volume, low vacuum pressure and to continuously rotate the rollers 43. Initially the actuators 25 are depressurized to lower the pick up section 57 of the hood to move the rollers 43*a-e* into engagement with the first sheet on the stack. When the rollers engage the upper surface of the uppermost sheet the vacuum pressure in the

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chambers 46*a-d* draws the first sheet firmly against the rollers 43*a-e* with the sides of the sheet sealing against the hood lips 34 and 35 respectively. With the first sheet covering the chambers 46*a-d*, the vacuum pressure in said chambers begins to increase. The relief valves 50 open to maintain the vacuum pressure in the chambers 43*a-d* at the preset value that is sufficient to prevent the pickup of the second sheet through the knotholes and cracks in the first sheet.

It should be noted that the vacuum pressure is applied to almost the total upper surface of the portion of the sheet that is immediately below the hood. Immediately after the rollers 46*a-d* engage the first sheet the actuators 25 are pressurized to lift the pickup section 57 to remove the first sheet from the stack S. As the rollers 43 begin to move the sheet along the underside of the vacuum hood 30 progressively past the individual compartments or chambers 46, the leading edge of the sheet engages the limit switch 74. Switch 74 initiates the actuation of the actuator 68 to pivot the damper 65 upwardly to close the bypass duct 63 as is shown in FIG. 6. When the damper is in the up position the vacuum pressure in the plenum 37 is presented to the conveying section 58 of the hood to hold the sheet against the rollers as it moves from the pickup station to the conveying station.

As the sheet approaches the receiving station over the conveyor 12, the trailing edge of the sheet moves past the limit switch 74 to open the switch. This causes the actuator 68 to move the damper to the down position opening the bypass duct 63. When the duct 63 is open, a stream of positive pressure air is presented to the horizontal section 40 of the plenum 37 to eject the sheet from the vacuum head 30 onto the conveyor 12.

A timed remote circuit activates the actuators 25 periodically to move the pickup section 57 of the hood down to pickup the second sheet on the stack S. After the rollers engage the second sheet on the stack, the actuators are immediately pressurized to lift the pickup section 57 of the hood upward to remove the second sheet from the stack. The rollers move the second sheet along the underside of the vacuum hood 30 with the leading edge engaging limit switch 74 to close the damper 65 so that vacuum pressure is applied to the horizontal section 40 of the plenum 37.

The sequence of operation is repeated until the desired number of sheets are transferred from the stack successively to the receiving station.

When picking up and conveying low grade veneer sheets having substantial surface defects that cover 2% or less of the total surface of each sheet, it has been found that a static vacuum pressure of between 0.5 and 3.0 inches of H₂O in the individual compartments 46 is particularly effective. Under these conditions the relief valves are set to begin opening at 0.55 inch H₂O static vacuum pressure.

In order to make sure that a sufficient air flow is sucked through the pickup section of the hood, the orifices 47*a-d* have larger diameters than the orifices 47*e-k* in the conveying section. For the particular application in picking up and conveying low grade veneer sheet utilizing a fan drawing 3300 cubic feet a minute, the orifices 47*e-k* are approximately 3.0 inches in diameter and the orifices 47*a-d* are approximately 4.5 inches in diameter.

From the foregoing it should be appreciated that the steps of the process performed by the apparatus described includes the lowering of a vacuum hood onto the uppermost sheet of the stack. A vacuum pressure of a magnitude sufficient to hold the uppermost sheet against the hood but insufficient to hold the second sheet against the uppermost sheet is supplied to the hood. The hood is then raised to remove the uppermost sheet without picking up the second sheet. For low grade plywood veneer sheets it has been found that a static vacuum pressure of between 0.5 and 3.0 inches of H₂O is sufficient to pick up the first sheet but not the second sheet. A translational force created by the rollers moves the sheets

beneath the hood from the pickup station to a receiving station.

What we claim is:

1. A method of separating a first plywood veneer sheet from the other plywood veneer sheets in a stack in which each veneer sheet in the stack has random perforations formed therethrough, said method comprising the steps of:

- (a) positioning a downward opening vacuum hood onto the first sheet to enclose a substantial area of the upper surface of the first sheet;
- (b) applying a low vacuum pressure to the upper surface of the first sheet of a magnitude which when transmitted through the perforations of the first sheet will create a lifting force that is insufficient to hold the second sheet to the first sheet but will create a lifting force that is sufficient to hold and seat the first sheet against the hood; and
- (c) separating the vacuum hood from the stack to remove the first sheet from the stack while the vacuum pressure is supplied to the hood.

2. The method as defined in claim 1 wherein the sheets are low grade wood veneer sheets having random surface defects such as knotholes and cracks that constitute less than 2% of the total area of the sheets and wherein the magnitude of the static vacuum pressure applied to the top sheet is between 0.5 and 3.0 inches of H₂O.

3. The method as defined in claim 1 wherein the method further includes the conveying of the removed veneer sheets along the bottom of the hood by applying a translational force to the removed sheet to move the sheet lengthwise along the hood while the vacuum pressure is applied to the sheet.

4. In a vacuum apparatus for conveying plywood veneer sheets along a selected path;

- (a) a plurality of separated transverse rollers spaced in a flat plane along the selected path forming large openings therebetween for engaging the upper surfaces of the sheets;
- (b) an elongated longitudinally stationary vacuum hood mounted above the spaced rollers overlying the selected path;
- (c) a source of vacuum pressure connected to the hood directing vacuum pressure through the large openings between the spaced roller for biasing the sheets upwardly against the spaced rollers; and
- (d) drive means connected to the rollers for rotating the rollers to move the sheets along the selected path past the large openings.

5. In an apparatus as defined in claim 4 wherein the vacuum hood has a series of individual vacuum chambers that are downwardly directed to apply the vacuum pressure to the sheets through corresponding large openings and wherein the source of vacuum pressure is connected with each chamber and wherein further the drive means rotates the rollers to present the sheet progressively to the openings as the sheets move along the selected path beneath the hood.

6. In the vacuum apparatus as defined in claim 5 wherein the rollers are mounted between the chambers for facilitating the movement of the sheets along the selected path.

7. In the vacuum apparatus as defined in claim 5 wherein the rollers define the partitions between the chambers and wherein seals are mounted to the hood engaging the rollers to prevent communication between the chambers.

8. In the apparatus as defined in claim 5 wherein the vacuum source produces a large flow volume at a low vacuum pressure.

9. In the apparatus as defined in claim 5 wherein air flow control means regulate the flow of air through the chambers.

10. In the apparatus as defined in claim 9 wherein the air flow control means comprises orifices formed in the

chambers in communication with the vacuum source for regulating the flow of air through the chambers.

11. In the apparatus as defined in claim 4 further including pressure reversing means for selectively applying a positive pressure to the sheets to eject the sheets from the rollers.

12. In the apparatus as defined in claim 11 wherein the pressure reversing means includes a damper positioned to open and close a positive pressure duct that communicates with the hood.

13. A vacuum apparatus for successively removing sheets having random defects such as holes or cracks from a stack and conveying the sheets to a receiving station, and apparatus comprising:

- (a) a stationary base frame;
- (b) a hood mounted on the base frame having a vertically movable pickup section overlying the stack and a conveying section extending to the receiving station;
- (c) a plurality of rollers mounted along the underside of the hood for engaging the upper surfaces of the sheets;
- (d) a high volume source of low vacuum pressure connected to the hood for supporting the sheets against the rollers;
- (e) an actuator connected to the hood for lowering the pickup section into engagement with the uppermost sheet of the stack to render the vacuum pressure effective to hold the uppermost sheet against the rollers and for raising the pickup section to remove the uppermost sheet from the stack; and
- (f) drive means connected to the rollers for rotating the rollers to convey the sheets beneath the vacuum hood from the pickup station to the receiving station.

14. The apparatus as defined in claim 13 further comprising pressure sensitive relief valves mounted in the pickup section of the hood for maintaining the vacuum pressure in the pickup section below a preset vacuum pressure to prevent the removal of more than one sheet at a time from the stack.

15. The vacuum apparatus as defined in claim 13 wherein the vacuum head includes a series of downwardly opening individual vacuum chambers for directing the vacuum pressure to the sheets, and a common vacuum plenum communicating with the chambers.

16. The vacuum apparatus as defined in claim 15 wherein the vacuum source is a large volume and low vacuum pressure fan that communicates with the common plenum.

17. The vacuum device as defined in claim 14 wherein the pressure sensitive relief valves are connected to the chambers in the pickup section of the hood for maintaining the vacuum pressure in the pickup section chambers at a preset low vacuum value.

18. A vacuum device as defined in claim 15 wherein the rollers define the partitions between the compartments and wherein further seals are mounted to the hood engaging the rollers for preventing communication directly between the chambers.

19. The apparatus as defined in claim 15 wherein air flow control means are mounted in the hood for regulating the flow of air through the chambers.

20. In the apparatus as defined in claim 19 wherein the air flow control means comprises orifices formed in the chambers communicating with the plenum for regulating the flow of air from the chambers to the plenum.

21. The vacuum device as defined in claim 20 wherein the diameter of the orifices in the chambers of the pickup section are larger than the diameter of the orifices of the chambers in the conveying section of the hood.

22. The vacuum device as defined in claim 17 further comprising an exhaust port connected to the air pump having a reduced opening for generating a positive back pressure, and a bypass duct communicating with the exhaust port and the plenum for providing a positive pres-

sure to the plenum, and a damper pivotally mounted in the plenum for opening and closing the duct, and control means operatively connected to the damper for opening the damper to permit positive pressure for air to flow into the plenum conveyor section for ejecting the sheet from the vacuum hood when the sheet reaches the receiving station.

3,081,996	3/1963	Hajos	271—26	X
3,202,302	8/1965	Insolio	271—74	X
3,272,351	9/1966	Burton	214—1	X
3,275,317	9/1966	Fromm	271—26	

5

EDWARD A. SROKA, Primary Examiner

References Cited

UNITED STATES PATENTS

U.S. Cl. X.R.

1,442,718	1/1923	Free	271—26	10
1,560,579	11/1925	Jones	226—95	

214—8.5; 271—26