Jan. 20, 1970 R. W. WILSON ET AL 3,490,614

TRANSFERRING SHEET MATERIAL

Filed Nov. 17, 1967

2 Sheets-Sheet 1

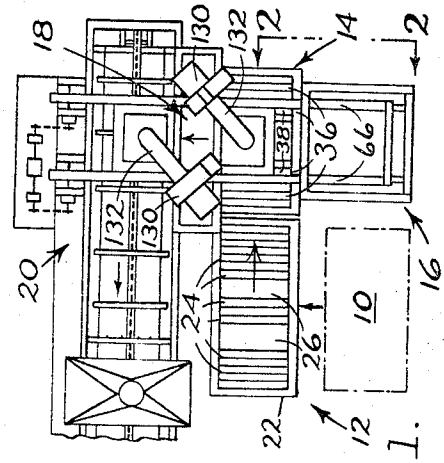


Fig. 1.

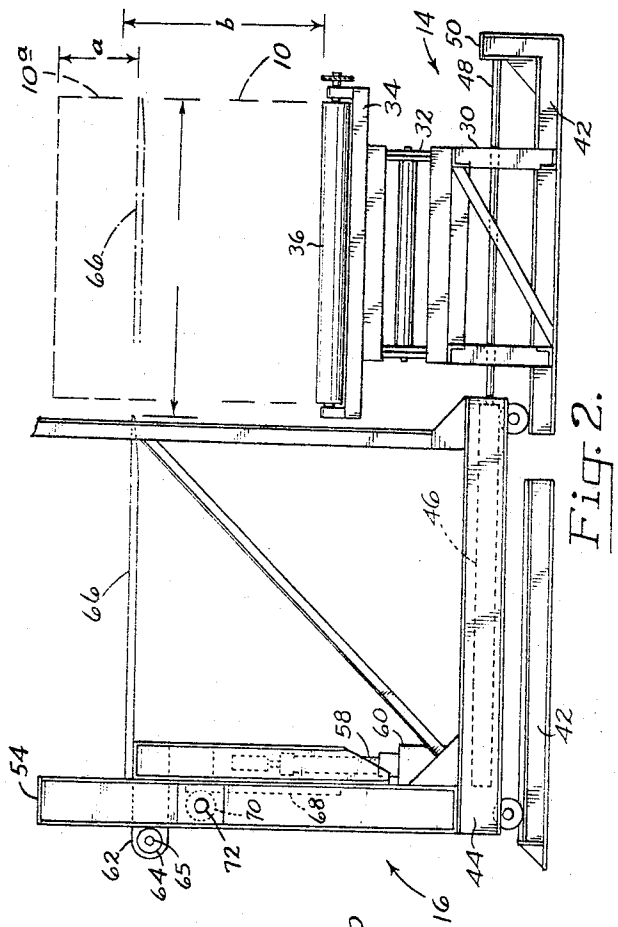


Fig. 2.

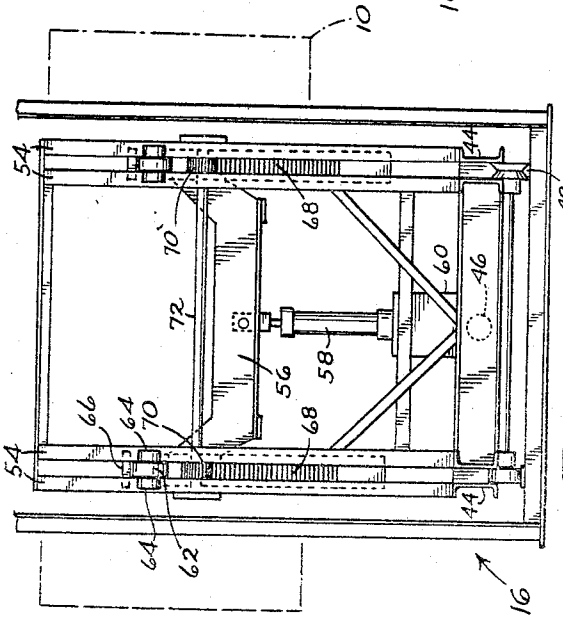


Fig. 3.

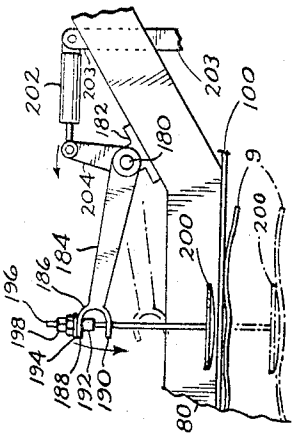


Fig. 8.

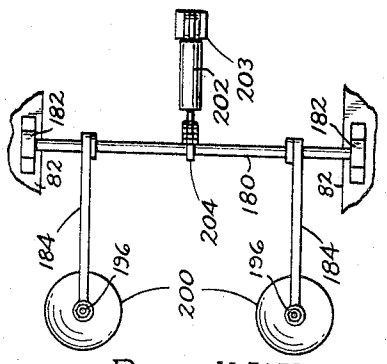


Fig. 7.

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TRANSFERRING SHEET MATERIAL

Filed Nov. 17, 1967 2 Sheets-Sheet 2

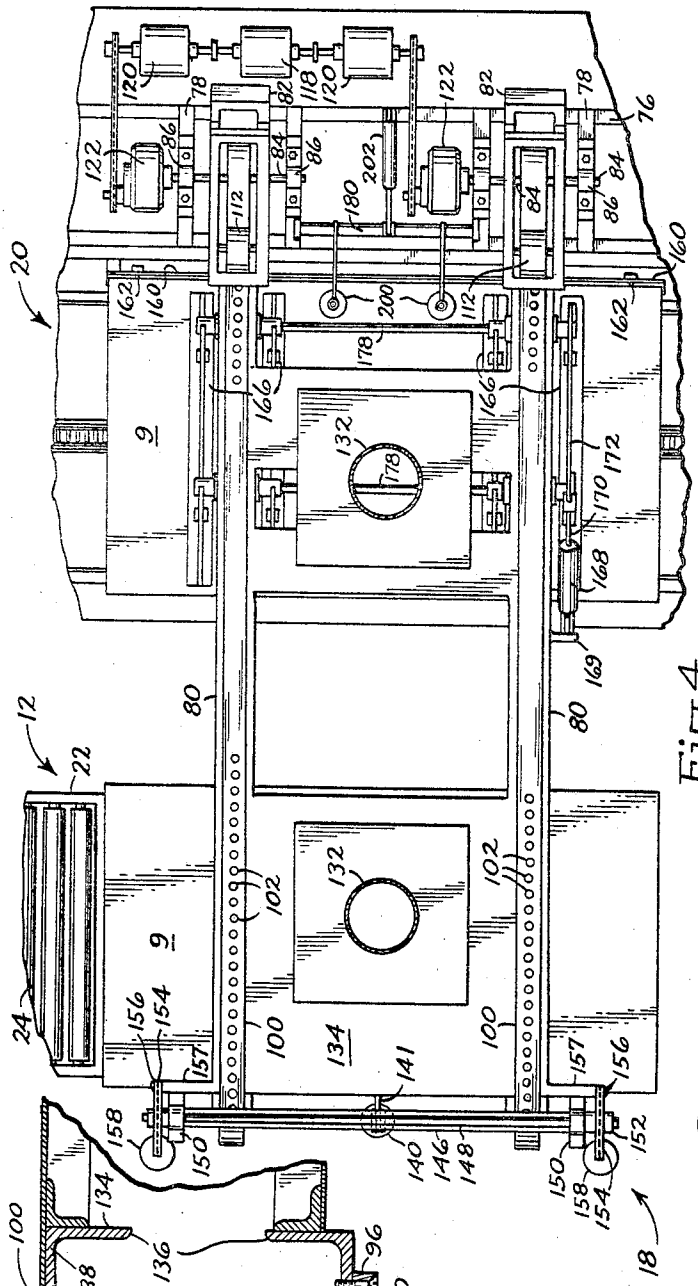


Fig. 4.

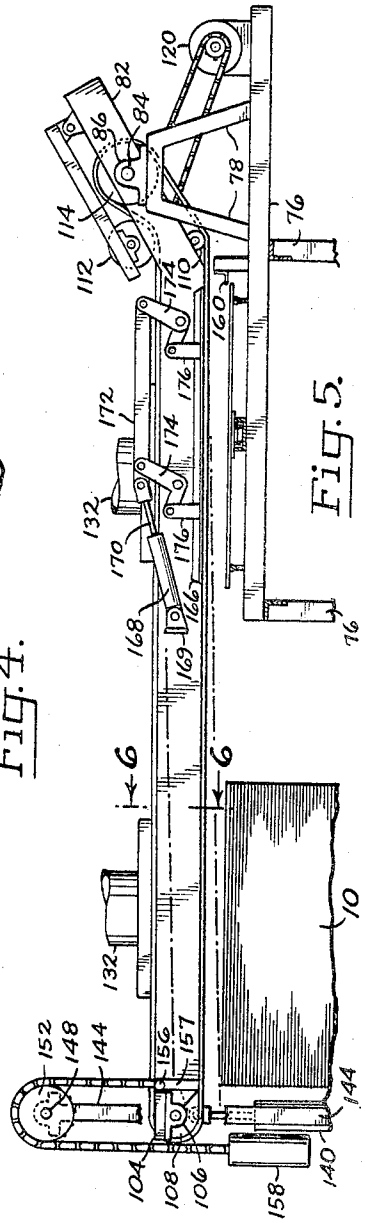


Fig. 5.

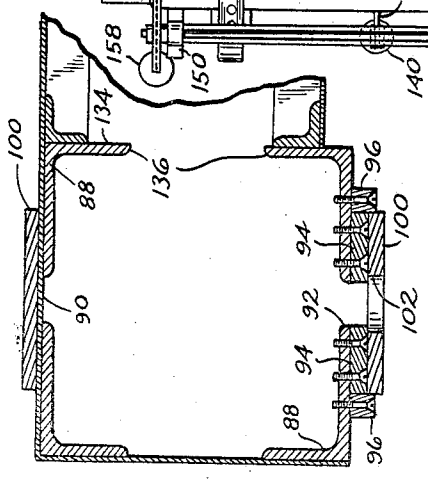


Fig. 6.

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United States Patent Office 3,490,614
Patented Jan. 20, 1970

3,490,614

TRANSFERRING SHEET MATERIAL

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Filed Nov. 17, 1967, Ser. No. 683,871
Int. Cl. B65g 60/00, 61/00, 57/04
U.S. Cl. 214—8.5 20 Claims

ABSTRACT OF THE DISCLOSURE

Method and apparatus are provided for transferring wood veneers and other stiff structural sheets from a first to a second station by vacuum lifting the uppermost sheet of a stack, transferring the vacuum lifted sheet from the first station into substantial registration with a support at the second station, the support being not substantially removed from the effective pick-up range of the vacuum. While maintaining the vacuum lift, a releasing force is applied to the sheet in the direction opposite to that in which the vacuum is supplied and in the direction of the support. The releasing force is greater than the force exerted by the vacuum lift. It is sufficient to separate the sheet from the vacuum lift and to pass it in controlled floating motion into precise position on the support. Additionally a floating weight of predetermined magnitude may be applied to the sheet as it passes from the vacuum lift to the support, further to guide its descent.

This invention relates to method and apparatus for transferring sheet material. It pertains particularly to method and apparatus for transferring plywood veneers and like stiff, structural sheets which are subject to breakage, from a loading station to a conveyer as an integral step in the process of laying up plywood assemblies preliminary to introducing the assemblies into a plywood press. The invention is described herein with particular reference to this application, although it is to be understood that it may be applied also to the transferring of sheet material of other categories and to other processing operations.

Although many systems and type of apparatus heretofore have been devised for moving plywood veneers and other stiff, structural sheets from one place to another, none is satisfactorily adaptable to such problems as the automatic assembly of overlaid plywood veneers in a rapid, automatic and continuous process. The present invention provides such method and apparatus and is characterized by the following attributes and advantages:

It moves the sheets rapidly, efficiently and on the large commercial scale.

It is adaptable for automatic operation.

It transfers the sheets without damaging them even when the sheets are plywood veneers, which are easily split.

Where the sheets are split or torn in the first instance, it still transfers them effectively, making it possible to use such damaged material in an automated operation.

After transferring the sheets, it positions them precisely on the selected support, thus making it possible to register the transferred sheets precisely with underlying sheets already present on the support. Where the resulting assembly is to be used in plywood manufacture, this reduces the amount of trim and correspondingly improves utilization of the wood.

It makes possible a high production rate with minimum plant personnel. For example, when applied to laying up plywood veneers, but two or three men are required for the entire assembly line.

It is continuous in its operation and does not require shut-down for intermittent operation when introducing feed stock and off-bearing the transferred units.

Where the sheets are askew or misaligned, it aligns them automatically.

The manner in which the foregoing and other objects of this invention are accomplished will be apparent from the accompanying specification and claims considered together with the drawings, wherein:

FIG. 1 is a schematic plan view of the herein described sheet transferring apparatus;

FIG. 2 is a view in side elevation of a feed unit employed in conjunction with the sheet handling apparatus, looking in the direction of the arrows **2—2** of FIG. 1;

FIG. 3 is a view in back elevation of the feed unit of FIG. 2;

FIGS. 4 and 5 are views in plan and side elevation, respectively, of the sheet transfer apparatus;

FIG. 6 is a detail sectional view taken along line **6—6** of FIG. 5 and illustrating the construction of a vacuum belt transfer employed in the apparatus; and

FIGS. 7 and 8 are detail views in plan and side elevation, respectively, illustrating the construction and mode of operation of floating weight means employed in conjunction with the operation of the apparatus.

In essence, the presently described method of transferring a stiff, structural sheet comprises vacuum-lifting the sheet at a first station and, while supporting the sheet by the vacuum, transferring it into substantial registration with a support arranged at a second station. The support is substantially within, or immediately adjacent, the effective range of the vacuum.

While maintaining the vacuum, a releasing force is applied to the sheet in the direction opposite to that in which the vacuum lift is applied, in the direction of the support. This separates the sheet from the lift and passes it in controlled, floating condition into precise position on the support. A floating weight of predetermined magnitude may be pressed against the sheet as it passes from the vacuum lift to the support.

The apparatus comprising the herein described sheet transfer apparatus in its broad aspect comprises means for effectuating the foregoing sequence of method steps. In addition, means are provided for feeding stacked sheet material continuously to the unit during its cycle of operation.

Considering the foregoing in greater detail and with reference to the drawings:

The sheet transfer apparatus of the invention, as shown in FIG. 1, is oriented in a production unit arranged for transferring individual sheets **9** of wood veneer, or similar stiff, structural sheets, from a stack **10** to a support which may comprise an endless conveyer which is to convey the sheets through a sequence of processing operations. Such operations might comprise, for example, those involved in laying up superimposed veneer assemblies to be pressed into plywood.

The sheet transfer unit employed in this sequence comprises a live roll assembly **12** which feeds stacks of veneers to an indexing hoist **14** serviced by a fork arm lift **16**. Indexing lift **14** supplies veneers at constant level to the transfer unit, indicated generally at **18**. The latter in turn transfers the veneer sheets one at a time to the support which, as indicated above, comprises endless conveyer **20**.

Live roll unit **12** may be of substantially conventional construction. It comprises a base **22** on which are mounted a plurality of live rolls **24**. The live rolls are driven in unison, but their sequence is interrupted to afford access openings **26**. These are spaced sufficiently to afford access for the forks of a lift truck so that stack **10**

of the sheets to be processed may be transferred from the lift truck to the live rolls.

Live roll assembly **12** delivers a stack **10** of sheets whenever required by the transfer unit. It delivers them to indexing lift **14**, the construction of which is shown in FIG. 2.

The indexing lift includes a base **30** on which is mounted a scissors lift **32**. The construction of the scissors lift is conventional and not illustrated in detail.

The scissors lift, in turn, mounts a live roll assembly including a base **34** and a plurality of live rolls **36**. The latter are driven in unison with rolls **24** of live roll assembly **12**. As in the case of live roll assembly **12**, the rolls of the companion live roll assembly **34** are arranged in interrupted sequence to afford access openings **38**. These accommodate the forks of fork lift unit **16**, employed during the introduction of a fresh stack **10** of sheets to the apparatus.

It will be apparent that if the transfer apparatus is to run continuously it must be recharged with stacks of sheets at timed intervals occurring before depletion of the stack upon which the unit is working at a given time. Fork lift unit **16**, cooperating with the live roll assemblies previously described, makes it possible to introduce a fresh stack beneath a partially depleted stack without interrupting continuity of the transfer operation. The construction of the fork lift unit is illustrated particularly in FIGS. 2 and 3.

Spaced tracks **42** underlie indexing lift **14** and extend laterally outwardly therefrom. The tracks support a wheeled carriage **44**, the wheels of which are guided by the tracks. The carriage mounts a longitudinally arranged, double-acting, fluid operated cylinder **46** having a piston rod **48** pivotally coupled to a standard **50** extending upwardly from tracks **42**. Operation of the cylinder reciprocates the carriage between an advanced station in which it underlies indexing lift **14** and the sheets stacked thereon, and a retracted station in which it is removed laterally therefrom.

Carriage **44** mounts an indexing fork lift. The lift operates on a pair of vertically arranged, spaced, parallel guides **54**, each of which may comprise, for example, a pair of spaced channel irons arranged back to back. The tracks are suitably braced and mount fork arm support means such as the U-shaped hoist beam **56**. The latter spans the interval between the tracks. It is indexed between raised and lowered positions by means of a double acting, fluid operated cylinder **58** mounted on a pedestal **60**.

Fixed to the ends of the hoist beam are a pair of rearwardly extending supports **62**. These are of substantial construction and mount roller pairs **64** which are rotatably mounted on shafts **65**, and track on the back faces of the channel irons comprising guides **54**. Also fixed to the ends of the hoist beam are a pair of spaced, parallel, horizontally arranged fork arms **66**. These extend forwardly a sufficient distance to underlie the stack of sheets which they are to support.

To insure that fork arms **66** move in unison with each other and remain exactly level, their reciprocation between elevated and lowered pistons is synchronized by suitably mounted rack and pinion gear means.

This control comprises a pair of racks **68** vertically mounted on guides **54**. A pair of pinion gears **70** rotatably mounted on shafts **72** carried on hoist beam **56** mesh with the racks. The racks are fixed, exactly aligned with each other, having teeth of the same size, and are arranged for traversal by the pinion gears. Accordingly as the pinion gears traverse the racks, they insure that the fork arms will be at exactly the same level at all times.

Indexing fork lift **16** thus provides a means for introducing a fresh stack of sheets to the transfer unit without interrupting its operation.

This is accomplished by advancing carriage **44** until fork arms **66** assume the dotted line position of FIG. 2. In this position they are inserted in spaces **38** of the live rolls on live roll assembly **34** of indexing hoist **14**, FIG. 1, and underlie depleted stack **10***a*, FIG. 2. During continued operation of the transfer unit, cylinder **58** indexes the fork arms upwardly to a maximum interval indicated by interval *a* of FIG. 2.

In the meantime hoist **14** is lowered until live rolls **36** on the hoist are aligned with rolls **24** on live roll assembly **12**. A fresh stack of sheets in ready position on the latter is advanced onto the hoist.

As depleted stack **10***a* is consumed, fresh stack **10** is lifted on hoist **14** which normally operates over the vertical interval *b* of FIG. 2, until the two stacks are consolidated. Fork arms **66** then are withdrawn. Since hoist intervals *a* and *b* overlap, the transfer sequence thus may be continued uninterruptedly.

The construction and mode of operation of the vacuum transfer unit is shown in FIGS. 4, 5 and 6. It spans the distance between a first station, at which it overlies indexing hoist **14** and a second station, in which it overlies the support to which the sheets are to be transferred, i.e. conveyor **20**.

The vacuum transfer unit is mounted on a frame **76** of suitable construction having short, vertical standards **78** at the outfeed end.

The frame supports a vacuum belt member including a pair of spaced, horizontal arms **80** which extend the entire length of the unit. The arms are of substantial box beam construction.

As shown in FIG. 6, they may be fabricated from angle irons **88** clad with sheet metal plates **90**. They are connected at their outfeed ends with upwardly-angled extensions **82** and are mounted for oscillation in a vertical plane by means of shafts **84**, mounted in bearings **86**, supported on standards **78**.

At each of stations **1** and **2**, the undersides of the arms are provided with longitudinal slots **92**. The outer margins of each slot mount bearing strips **94** and guide strips **96**. These define a guideway dimensioned to receive an endless belt **100** provided with a plurality of spaced apertures **102** arranged longitudinally the entire length of the belt.

The outer ends of arms **80** mount brackets **104** which, in turn, mount bearings **106** journaling the shafts of rollers **108**. The latter mount one end of the belts. The other end of the belts is reeved about idler pulleys **110**, tensioning rolls **112**, and drive rolls **114**. The latter are keyed to shafts **84**, the same shafts which pivotally mount the arms.

Belts **100** thus may be driven independently of each other, longitudinally along arms **80**, by a drive which includes motor **118**, combination clutch and brake units **120** and gear reducers **122**, the latter being operative on the respective drive shafts **84**.

As the belts move along the arms, perforations **102** in the belts register with slots **92** in the underside of the arms at both stations. Vacuum developed within the arms thus may be transferred through the belt apertures to the sheet materials to provide a vacuum lift.

The necessary vacuum is developed by vacuum fans **130** communicating with conduits **132** leading to the respective stations. Conduits **132** communicate with vacuum plenums **134** which, in turn, communicate with arms **80** through slots **136** provided in the side walls of the latter for that purpose.

The vacuum lift arrangement thus is such that two sheets may be lifted and maintained suspended on the vacuum lift arms at the same time. As will appear hereinafter, this is necessary to effectuate the desired sequence of transfer operations.

Drive means are connected to the oscillating belt assembly for oscillating it between a retracted position, i.e. the full line position of FIG. 5, in which it is removed from the stack **10** of sheets, and an advanced position,

indicated by the dotted outline of FIG. 5, in which it is coupled to the uppermost sheet of the stack.

Although various reciprocating drive means may be employed, a preferred and illustrated means comprises a fluid operated cylinder, preferably an air cylinder **140**. The cylinder has its base connected to a suitable structural member and its piston rod connected to a bracket **141** which extends outwardly from plenum **134**.

Counterweight means are associated with the oscillating drive means. They serve two purposes: First, to facilitate the oscillatory movement of the arms, making possible use of a smaller drive unit; and second, to return the arms automatically to their elevated, retracted position in the event of failure of the drive. This feature provides a safety factor to personnel and also prevents damage to the work and fouling of the apparatus with fragments resulting from sheet disintegration.

As seen in FIGS. 4 and 5, the counterweight assembly is mounted on a frame consisting of vertical standards **144** interconnected by cross piece **146**. A shaft **148** journaled in bearings **150** mounts sprockets **152** at both ends. Chains **154** mesh with sprockets **152**. One of the ends of each chain is fastened to a pivot pin **156** extending outwardly from a bracket extending outwardly from the end of arm **157**. The other end of each chain is fastened to a counterweight **158** of sufficient size to counterbalance the weight of the arms and to elevate them.

Each time the vacuum belt assembled oscillates to its lowered position, it vacuum couples to an individual sheet **9** on top of stack **10**. Belt **100** are driven counterclockwise as viewed in FIG. 5. Hence the sheet may be transferred to station **2**, where it first is aligned and then is released from the vacuum belts.

The alignment means comprises an abutment wall **160**, FIG. 5, at the far side of the support on which the sheet is to be placed, i.e. of conveyer **20**. The abutment wall extends the entire length of the sheet. Accordingly, if the sheet is askew, one end will contact the abutment wall before the other.

Limit switches **162** are interposed between the edge of the sheet and the abutment wall. Each limit switch is in an independent circuit with one of the clutch-brake assemblies **120**, **122** associated with the respective drive shafts **84** for the independently driven belts.

Accordingly, when the leading edge of the sheet contacts one of the switches, the corresponding clutch-brake assembly is energized, stopping the forward drive of the associated belt. The other belt continues its forward drive. This skews the sheet around until the formerly trailing portion contacts the other limit switch. This in turn actuates the other clutch-brake assembly and stops the motion of the second belt with the sheet precisely aligned against the abutment wall.

The means employed for detaching the aligned sheet from the vacuum belt is shown in FIGS. 4 and 5. Two pairs of push plates **166** are arranged parallel to the belts, one pair straddling each of the belts. The plates are substantially as long as the sheet is wide. The four plates are distributed longitudinally of the sheet substantially its entire length. Thus, even though the sheet may be fragile, as in the case of plywood veneer, the release force is applied over a widely distributed area so that the sheet is released all at once. Consequently it is not bent, nor is it fractured by the application of the releasing force.

A suitable drive is associated with push plates **166** to actuate them synchronously.

A fluid-operated cylinder, preferably an air cylinder **168**, has its case pivoted to a bracket **169** fixed to the outer surface of one of arms **80**. The piston rod **170** of the cylinder pivotally is connected to one end of a first connecting rod **172**. The latter is connected to one of the ends of a pair of bellcrank levers **174**. The other of the ends of the levers pivotally is connected to release bars **166** by means of a link **176**.

A parallelogram linkage including cross shafts **178** and the corresponding bellcranks and links connects all of push bars **166** so that they operate in unison in pushing sheet **9** off the vacuum belt.

It is to be noted that this operation, i.e. the removal of sheet **9** from the vacuum belt, is effectuated without releasing or cutting off the vacuum applied to the sheet. Furthermore, support **20** is arranged so that its supporting surface is spaced from the vacuum belt by a distance which is not substantially removed from the effective working area of the vacuum.

As a consequence, when push bars **166** push the sheet off the belt, they do so against the force exerted by the vacuum. Although the sheet moves to the support surface freely in floating condition it nevertheless is restrained by the opposing forces from wobbling and moving erratically. As a consequence, it may be positioned precisely in the desired position on the support surface.

For example, if the support surface already carries a first sheet and it is desired by operation of the transfer unit to superimpose a second sheet, the second sheet may be thus superimposed by the transfer unit in precise registration with the first sheet. This makes it possible to lay up plywood veneer assemblies in a highly efficient, economical manner.

To assist in the precision placement of the sheet on the support, there is provided an auxiliary floating weight assembly shown in FIGS. 7 and 8. This has for its function the superimposition of a floating weight of predetermined magnitude on the upper surface of the sheet as it drops from the vacuum belt to the support, further stabilizing the sheet.

As shown in the drawings, the floating weight assembly is mounted between extensions **82** of the vacuum belt assembly. A rock shaft **180** is journaled in bearings **182** mounted one on each of the arm extensions. One of the ends of lever **184** is keyed to the shaft. The other of its ends mounts a yoke **186** positioned in a vertical plane. The upper arm of the yoke member is provided with a guide **188**; the lower arm, with a guide **190**.

A sleeve **192** having an exterior annular retaining flange **194** seats in guide **188**. A rod **196** having a threaded upper end is mounted for loose sliding movement in both sleeve **192** and guide **190**. The upper end of the rod is retained by means of lock nuts **198**. The lower end of the rod mounts a transverse shoe **200** of predetermined weight.

The drive for the unit comprises a fluid operated cylinder **202**. The case of the cylinder is pivoted to a post **203**. Its piston rod pivotally is coupled to one end of a lever **204**. The other end of the lever is fixed to rock shaft **180**.

Accordingly the unit may be oscillated between the full and dotted line positions of FIG. 8. In the full line position of that figure, the weight unit including shoe **200** is fully supported. In the dotted line position, however, the shoe member rests in freely floating condition on the adjacent upper surface of sheet **9**. This action may be used to advantage in locating the sheet on the support.

Shoes **200** are placed in operative position against the upper surface of the sheet while the sheet still is retained in its transport position against vacuum belt arms **80**. Just prior to the operation of release bars **166** the floating weight assembly is adjusted to its working position with shoes **200**, pressing with their own weight only against the sheet. As the sheet moves downwardly against the underlying support the shoes, like stabilizing hands, follow it and assist in locating it precisely in the desired position.

OPERATION

All of the elements of the herein described sheet transfer apparatus may be integrated into an automatic system by the use of such means as appropriately located limit

switches. The operation then becomes fully automatic, the sequence being as follows:

A stack **10** of plywood veneers or other sheet material is placed on live roll assembly **12**, FIG. 1. From there it is transferred to the cooperating live roll unit **34** of indexing lift **14**, FIG. 2. The lift maintains the uppermost sheet of the stack always in operative relation to vacuum belt transfer unit **18**, FIGS. 4–6.

Reciprocating drive cylinder **140** of the latter oscillates arms **80** between the full and dotted line positions of FIG. 5. In the dotted line position, the uppermost sheet **9** of stack **10** is vacuum-coupled to endless belts **100**. The belts carry the sheet from its original location, station **1**, to a location overlying a suitable support, for example conveyor **20** of station **2**.

If the sheet is misaligned on the vacuum belts, its leading edge strikes abutment wall **160** at an angle, actuating in sequence limit switches **162** located thereon. The first limit switch is in an electric circuit with one of clutch-brake units **120**. By actuating the latter, it arrests an independent drive for the vacuum belt on that side of the apparatus.

The companion belt continues its forward drive. It skews the sheet around until it uniformly is in contact with the abutment wall. There the formerly trailing portion of the leading edge of the sheet energizes the second limit switch. This in turn actuates the clutch and brake units of the associated drive, stopping this belt also.

With the sheet thus poised over conveyer **20**, arms **80** again oscillate to pick up a second sheet from stack **10**, holding it in ready position.

On demand from conveyor **20**, first sheet **9** is positioned precisely on the conveyer. This is accomplished by first placing floating, weighted shoes **200** on the upper surface of the sheet, FIGS. 7 and 8 by operation of cylinder **202**. Next cylinder **168** is energized. This forces press bars **166** downwardly, forcing the sheet off the vacuum belt and onto the surface immediately below. The movement of the sheet occurs against the restraining force exerted by the vacuum. As a result of this, and also as a result of the application of the weighted shoes, the sheet may be precisely located on the underlying support.

The foregoing sequence is repeated until stack **10** has been partially depleted. To avoid intermittent operation of the transfer unit, a second fresh stack is introduced beneath the partially depleted first stack while the transfer unit still is running.

This is accomplished by moving carriage **44** and associated fork lift arms into the working, dotted line position of FIG. 2. Fork lift arms **66** thereupon support the partially depleted stack **10** and by the operating of indexing cylinder **168** continue to feed the transfer unit.

Indexing hoist **14** then is retracted. A fresh stack **10** of sheet material next is passed to the surfaces of live rolls **36** by means of associated live roll assembly **12**. The indexing hoist then is elevated until the top of the fresh stack engages and supports the lower portion of the upper stack, whereupon the fork arms may be withdrawn.

The system thus continually and automatically transfers sheets one at a time from a stack to a conveyer or other support, making them available in timed sequence for further processing.

It is to be understood that the form of our invention herein shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention.

Having thus described our invention, we claim:

1. The method of transferring stiff sheets from a first to a second station, the method comprising:

(a) vacuum-lifting a sheet at the first station,

(b) while supporting the sheet with the vacuum, transferring it into substantial registration with a support arranged at the second station not substantially removed from the effective range of the vacuum lift,

(c) while maintaining the vacuum, applying to the sheet, in a direction opposite to that in which the vacuum lift is applied and in the direction of the support, a releasing force greater than the force exerted by the vacuum lift, the releasing force being sufficient to separate the sheet from the vacuum lift and to pass it in controlled, floating motion into precise position on the support, and

(d) applying a floating weight of predetermined magnitude to the sheet as it passes from the vacuum lift to the support.

2. Sheet transfer apparatus comprising:

(a) elongated vacuum belt means extending between a first station at which it overlies a stack of stiff sheets and a second station at which it overlies a support,

(b) mounting means mounting the vacuum belt means for reciprocation in a vertical plane,

(c) vacuum belt reciprocating means connected to the vacuum belt means for reciprocating it between a first position in which it contacts the uppermost sheet of the stack and a second position spaced upwardly apart from the stack,

(d) vacuum belt drive means connected to the vacuum belt means for driving it and a sheet vacuum-coupled thereto from the first station to the second station, and

(e) sheet release means mounted at the second station for separating the sheet from the vacuum belt means and forcing it downwardly into a predetermined position on the support.

3. In sheet transfer apparatus wherein a pair of spaced, parallel, perforated, vacuum-applying endless belts are movable independently of each other by vacuum belt drive means for transferring stiff sheets from a first station to a support at a second station, the combination therewith of a pair of spaced belt control means one associated with each belt means and positioned at the second station for contact by a sheet when properly positioned with reference to the support, each belt control means being operable independently of the other to control movement of the associated belt means to skew the sheet into said proper position in the event of sheet misalignment.

4. Apparatus for transferring stiff sheets from a first station to a second station, the apparatus comprising:

(a) vacuum lift means positioned at the first station for lifting the sheet,

(b) transfer means mounting the vacuum lift means for transferring it and the sheet which it lifts into substantial registration with a support arranged at the second station not substantially removed from the effective range of the vacuum lift means,

(c) sheet release means mounted at the second station and operative to apply to the sheet, in a direction opposite to that in which the vacuum lift is applied and in the direction of the support, a releasing force greater than the force exerted by the vacuum lift, thereby separating the sheet from the vacuum lift against the oppositely directed force of the vacuum, and passing it in controlled floating motion into precise position on the support, and

(d) floating weight means of predetermined magnitude positioned for application to the sheet as it passes from the vacuum lift to the support.

5. Sheet transfer apparatus comprising:

(a) elongated vacuum belt means extending between a first station at which it overlies a stack of stiff sheets and a second station at which it overlies a support,

(b) at the second station pivotal mounting means mounting the vacuum belt means for oscillation in a vertical plane,

(c) vacuum belt oscillating means connected to the vacuum belt means for oscillating it between a first position in which it contacts the uppermost sheet of

the stack and a second position spaced upwardly apart from the stack,

(d) vacuum belt drive means connected to the vacuum belt means for driving it, and a sheet vacuum-coupled thereto, from the first to the second stations, and

(e) sheet release means mounted at the second station for separating the sheet from the vacuum belt means and forcing it downwardly into a predetermined position on the support.

6. The sheet transfer apparatus of claim **5** wherein the vacuum belt means comprises a pair of spaced, parallel, vacuum conduits extending between the two stations and having their under portions at each station provided with a longitudinal slot communicating with the exterior, a pair of apertured endless belts mounted one on each vacuum conduit overlying the slots therethrough and connected to the vacuum belt drive means, a pair of vacuum plenums positioned one over the first station and one over the second station and communicating with the vacuum conduits, thereby permitting coupling to the vacuum belts of two sheets simultaneously, one at the first station and the other at the second station, and evacuating means communicating with the vacuum plenums.

7. The sheet transfer apparatus of claim **6** including combination bearing and guide means for the endless belts, the combination bearing and guide means comprising bearing plates arranged along the outer margins of the slots in the vacuum conduits, guide strips arranged outside the bearing strips and proportioned to retain the endless belt between them, and securing means for securing the bearing plates and guide strips to the vacuum conduits.

8. The sheet transfer apparatus of claim **5** wherein the vacuum belt oscillating means comprises a vertically acting reciprocating drive maens connected to the vacuum belt means at the end overlying the first station.

9. The sheet transfer apparatus of claim **8** wherein the reciprocating drive means comprises a fluid-operated cylinder.

10. The sheet transfer apparatus of claim **8** including counterweight means coupled to the vacuum belt means at the end adjacent the first station and applied in a direction calculated to overbalance and elevate the vacuum belt means, returning it to its second position automatically in the event of failure of the vacuum belt oscillating means.

11. The sheet transfer apparatus of claim **5** wherein the sheet release means comprises a plurality of plates spaced from each other and arranged transversely of the sheet at longitudinal intervals predetermined to prevent breaking of the same, and lever means coupled to the plates for moving them in the direction of sheet release.

12. The sheet transfer apparatus of claim **11** wherein the lever means comprise bellcrank levers, coupling means coupling the levers to each other and a fluid-operated cylinder connected to the levers for actuating them all in unison.

13. The apparatus of claim **5** including floating weight means applied to the sheet during its travel at the second station from the vacuum belt means to the support.

14. The sheet transfer apparatus of claim **13** wherein the floating weight means comprises a vertical rod, guide means mounting the rod in freely floating condition, stop means on the upper end of the rod for retaining it in the guide means, contact shoe means of predetermined weight on the other end of the rod for contacting the sheet, and lever means connected to the guide means for moving it between operative and inoperative positions.

15. The sheet transfer apparatus of claim **5** wherein

the vacuum belt means includes a pair of spaced, parallel, perforated, vacuum-applying endless belts and wherein the vacuum belt drive means comprises motor means, a pair of clutches coupled independently to the motor means and each coupled to one of the belts, a pair of brakes each operatively associated with one of the clutches, abutment means at the second station positioned for engagement by the sheet when in proper position with reference to the support, and a pair of spaced, clutch-and-brake control means positioned adjacent the abutment means, one adjacent each of the belts for contact by the sheet when properly positioned, each control means being operable independently of the other to skew the sheet against the abutment means in the event of sheet mis-alignment.

16. The sheet transfer apparatus of claim **5** including upwardly indexing feed means arranged at the first station for continuously positioning the stack in operative position with reference to the vacuum belt means during the transfer operation.

17. The sheet transfer apparatus of claim **16** wherein the indexing feed means comprises scissor lift means and an indexing hydraulic cylinder drive therefor.

18. The sheet transfer apparatus of claim **16** including fork lift means positioned for lifting a partially depleted stack of sheets from the indexing feed means, and conveyer means positioned for introducing a new stack of sheets into a space provided by lowering the indexing feed means to a level below the level of the fork lift means and stack.

19. The sheet transfer apparatus of claim **16** including indexing feed means having mounted on its upper support surface a plurality of spaced rolls and including fork lift means having fork arms dimensioned for insertion in the spaces between the rolls, whereby to enable lifting a partly depleted stack of veneers by insertion of the fork lift means thereunder and lifting the same.

20. The sheet transfer apparatus of claim **19** wherein the fork lift means comprises track means mounted beneath the indexing feed means, a carriage mounted on the track means, reciprocating drive means for reciprocating the carriage between an advanced position underlying the indexing feed means and a retracted position withdrawn therefrom, vertical guide means on the carriage, fork arm support means mounted on the guide means, a pair of fork arms extending outwardly from the support means in spaced, parallel, horizontal relation, in the direction of the indexing means, and reciprocating drive means coupled to the fork arm support means for reciprocating the same between raised and lowered positions.

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U.S. Cl. X.R.

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